LEARNING FROM PROJECT-RELATED FAILURES IN UK CONSTRUCTION PROJECT BASED ORGANISATIONS: AN EXAMINATION OF ACTOR APPROACHES, INTENTIONS AND BEHAVIOURS.

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ABSTRACT

Society is experiencing what is being referred to as 'projectification' since projects have become a common way of organising across several sectors. This is based on the understanding that the use of projects improves service delivery. However, the use of 'projects' has not yielded the much-anticipated efficiency since projects continue to experience project-related failures (P*r*F). Thus, Project-Based Organisations (PBOs) within the construction sector are being encouraged to learn from failures. Therefore, the aim of this study was to analyse PBOs' practices and approaches towards learning from project-related failures (Lf-PRF) within the United Kingdom Construction Industry (UKCI). To achieve that, a qualitative and exploratory approach to the study was adopted. 32 semi-structured interviews were conducted with construction professionals within the UKCI. The data was analysed using thematic- and discourse analysis- data analysis methods. The findings reveal that the definition of failure remains subjective with a huge reliance on time, cost and quality parameters. In their attempt to Lf-PRF, PBOs mostly use project review meetings and lessons learnt sessions. Cross-organisational learning is rarely done, with external learning typically taking the form of continuous professional development (CPD) or statutory training. From a Neo-Institutional Theory perspective, this shows a large influence of the external environment via coercive and normative isomorphic forces on Lf-PRF. Notable barriers to Lf-PRF include negative perception of failure; project constraints; not owning failures, and; unstandardized definition of failure. Realising the complex nature of failure and learning and since PBOs interact with other organisations such as competitors, professional-and regulatory- bodies, a multilevel model involving the sectoral, organisational and project levels was developed. Additionally, instead of the typical approach of Lf-PRF via 'project reviews', PBOs are encouraged to create a conducive environment for Lf-PRF by embedding the following facets within their organisations; structural, cultural, psychological, policy, contextual, technological, governance and the N^{th} facet (representing continuous learning). This study contributes to the understanding of the under researched area of P*r*F, the social context of Lf-PRF and provides a toolkit for PBOs to consider when learning from failure. The implications for the sector and PBOs are that for meaningful Lf-PRF to be achieved, communication and collaboration should be improved across the sector and project parties (and teams). This also calls for a change in the perception of failure from it being a negative experience to being an opportunity for learning.

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List of Abbreviations and Acronyms

AEC	Architecture, Engineering and Construction
AI	Artificial Intelligence
APM	Association for Project Management
BIM	Building Information Modelling
CIOB	Chartered Institute of Builders
CITB	Construction Industry Training Board
C*m*P	Community of Practice
CoPs	Complex Products and Systems
CPD	Continuous Professional Development
CSCS	Construction Skills Certification Scheme
CSFF	Critical Success and Failure Factors
CSF	Critical Success Factors
DA	Discourse Analysis
HSE	Health and Safety Executive
IPA	Infrastructure and Projects Authority
ISO	International Organisation for Standardization
IT	Information Technology
IOP	Inter Organisational Projects
LfF	Learning from Failure(s)
Lf-PRFs	Learning from Project-related Failure(s)
KPIs	Key Performance Indicators
MPF	Multi-Project Firm
MPO	Multi-Project Organisation
NHS	National Health Services

NAO	National Audit Office
OL	Organisational Learning
PBC	Project-Based Companies
PBF	Project-Based Firms
PBO	Project-Based Organisation
PLOs	Project-Led Organisations
PNW	Project Networks
PM	Project Manager
PMO	Project Management Office
PPP	Public Private Partnership
PIF	Project-Intensive Firm
PIO	Project Intensive Organisation
PMO	Project-Matrix Organisation
POC	Project-Oriented Company
P*r*F	Project-related Failure(s)
PSO	Project Supported Organisation
QS	Quantity Surveyor
RIBA	Royal Institute of British Architects
RICS	Royal Institute of Chartered Surveyors
TPO	Temporary Project Organisation
TSC	Tunnel Safety Cards
UKCI	United Kingdom Construction Industry

Dedication

This work is dedicated to my loved ones; my late mum and dad, Billy Mumba Chiponde and Anne Bwalya Chiponde for their sacrifice, love and care; and my wife, Lucia and our dear children (Changwa, Anne and Bubotu) for their unwevering support and understanding during my PhD journey.

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Author's Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

Any ethical clearance for the research presented in this thesis has been approved. Final approval was granted by the Faculty Ethics Committee on 23rd October, 2019.

I declare that the Word Count of this Thesis is 77, 662.

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Glossary

Cultural-Cognitive Pillar – Institutional norms which highlight shared conceptions and values through which meanings are made (Scott 2008).

Coercive force – Isomorphic force which arises from both formal and informal forces mainly in form of regulations (government and political influence).

Cultural Facet - The core values of learning enshrined on transparency, integrity, issue orientation, inquiry, and accountability (Popper and Lipshitz, 2000).

Context Facet - Focuses on factors that are considered as not being under the control of management or exogenous factors.

Failure - Lack of success; An unsuccessful person or thing (e.g., project, company); neglect or omission of expected or required action; a subnormal quantity or quality; an insufficiency; a lack or deficiency of a desirable quality; the action or state of not functioning; a sudden cessation of power (e.g., the collapse of a business).

Governance Facet – Refers to the overall oversight and organisation of learning from failure within a PBO.

Isomorphism – Regarded as a form of uniformity within institutional environments and organisation; homogenous behaviour and requirements on passive organizations through the isomorphic forces (coercive, normative and cultural-cognitive (Meyer and Rowan, 1977; Scott, 2008).

Institutions – Rules of the game or norms (North, 1991). Institutions also refer to organizations, companies, establishments, foundations, societies, or the like, devoted to the promotion of particular cause(s) or programme(s).

Learning from Project-related Failure (Lf-PRF) – considered as "*…the capability of an organization or individuals to obtain information and knowledge from past events [failures] and transfer these into measures and safety actions that will help avoid reoccurrences and improve safety [and performance]* (Kilic and Soran, 2019 p. 2)*.*

Mimic Force – Isomorphic force which leads an organisation to imitate other organisations (perceived to be legitimate/successful) due to uncertainty and limited technological understanding (DiMaggio and Powell, 1983).

Normative Force – Isomorphic force which stems from Associated with professionalization by bodies such as unions and professional bodies. This also includes learning institutions such as universities (DiMaggio and Powell, 1983)

Normative Pillar – Contains elements of good practice, prescriptive, evaluative and obligatory dimensions of the social life (Scott 2008).

Neo-Institutional Theory – From a social perspective, advances that formal organisation structure 'alike' due to isomorphic forces, namely coercive, normative and mimic forces (Meyer and Rowan, 1977; Scott, 2008).

Project Based Organisations (PBOs) – PBOs in this study are considered as discrete and permanent organisations which exist to deliver projects.

Policy Facet - Denotes the formal measures put in place to support Lf-PRF associated with failure identification, collection storage and sharing of lessons by management. These could be observed from rules, policies, and budgets to support learning.

Project-related Failure(s)- An unexpected negative result either small or large which highlights limitations in meeting the set qualitative and quantitative benefits of a project(s) (Cannon and Edmondson, 2005; Boss and Sims, 2008).

Psychological Facet - focuses on the 'psychological safety' of learners by trying to reduce; (i) the reluctance of individuals to take the risk to learn and (ii) reluctance to share failure-related information with others.

Regulative pillar – Reflects elements of rule-setting, monitoring and sanctions (Scott 2008).

Situated Learning – Learning is understood as a non-linear social process involving a group participating in a social world (Lave and Wenger, 1991).

Structural Facet - addresses the issue of the structure, process, parties, members, responsibilities of those involved in Lf-PRF.

Technological Facet – Refers to technological tools deployed by PBOs in order to enhance learning from failure for purposes collecting, storing and sharing lessons from failure.

Utilities - The study identifies 'utilities as actors' 'positive behaviours' for effective Lf-PRF such as openness/transparency, valuing and trust.

Waste - Waste in this study is regarded as any negative behaviour arising from the interaction of project actors that may hinder the process of learning from failure such as focusing on competition, conflict and the blame game.

Chapter 1 Introduction

Projects are the most common form of delivery for a number of infrastructure and service-related organisations across the world (Hobday, 2000; Whitley, 2006; Jensen *et al.*, 2016; Gemünden *et al.,* 2018). For instance, Miterev *et al.* (2017) note that 40% of the world economy uses projects as their primary form of operating. This has steered some organisations towards operating as dedicated Project-Based Organisations (PBOs) in which organisational activities and employees' attentions are directed primarily toward project-based work (Prencipe and Tell, 2001; Koskinen, 2010; Hall *et al.,* 2012). Hobday (2000) further elaborates that PBOs are commonly used in traditional economic sectors such as construction, shipbuilding, and other capital projects. With the advancement in technology, Teng and Pedrycz (2022, p. 233) note that PBOs *"are becoming popular in many fields, as modern management technologies become more specialised and innovative".* Thus, other sectors such as information and communication technologies, research and development, film making, high technology sectors, and consulting services such as accounting and law also adopt PBOs (Sydow *et al.*, 2004).

Unfortunately, project-related failures (P*r*F) and unsatisfied clients are still common features among PBOs (Winter *et al.*, 2006; Mir and Pinnington, 2014; Badewi and Shehab, 2016; Chan and Ejohwomu, 2018). Thus, PBOs are being encouraged to improve their performance and capabilities through organisational learning (OL), particularly from past project experiences such as failures (Prencipe and Tell, 2001; Hall, Kutsch and Partington, 2012; Zhang *et al.*, 2022). However, as much as 'failure' is a common feature in project delivery, it is rarely considered as a source of valuable lessons due to the social and psychological negativity attached to it (Baker *et al.*, 2018; Velikova *et al.*, 2018; Lee *et al.*, 2021; Zhang *et al.*, 2022). Hence, this research focuses on *organisational learning from project-related failures* (henceforth referred to as Lf-PRF); how it can be adopted by PBOs in the United Kingdom Construction Industry (UKCI); and how doing so might improve their performance.

In agreement with scholars such as Hobday (2000) Barbosa *et al.* (2022); Wang *et al.*, (2022) PBOs in this study are regarded as permanent firms within the construction sector that

organise and offer their services through projects. As a guide, it is also worth defining project-related failure (P*r*F) since failure is subjective (Herz and Krezdorn, 2022). Thus, in agreeing with Cannon and Edmondson (2005) and Zhang *et al.* (2022), this study regards P*r*F as a deviation from the initial project objectives, which may be small or large. See Chapter 2 for a detailed discussion on P*r*F and the nature of PBOs.

Since it is acknowledged that the social-context influences the learning process and the behaviour of actors (including learners) through 'rules' and 'norms', Neo-Institutional Theory and Situated Learning Theory have been adopted as lenses for this research (Lave and Wenger, 1991; Cassidy, 2004; Wang, Lu and Wei, 2022; Zhang *et al.*, 2022). From a Neo-Institutional Theory perspective, the three isomorphic forces - 'coercive', 'mimic' and 'normative' powers- are considered as the main influencers of Lf-PRF within a PBO. Considering Situated Learning, it is argued that learning (from failure) involves social interaction and occurs within a 'community of practice'[1](Dille and Söderlund, 2011; Biesenthal *et al.*, 2018). These are further discussed in Chapter 3, the Conceptual Framework.

1.1 OVERVIEW AND IMPORTANCE OF THE UK CONSTRUCTION SECTOR

Worldwide, over $9 trillion is forecast to be spent on delivering capital projects and infrastructure between 2014 and 2025 (PwC, 2014). This is associated with the increase and changes in world population, urbanisation and response measures to climate change (World Economic Forum, 2017; PwC, 2018). Similarly, in the UKCI, circa £600bn is expected to be spent on infrastructure during a period of 10 years starting from 2018 (HM Government, 2017; IPA, 2018). This makes the UKCI a key part of the UK economy since it is involved in the provision of the much needed commercial and social infrastructure (HM Government, 2013; PwC, 2018). Notably, the sector annually contributes approximately £90bn as gross value added (GVA) accounting for 6% of the Gross Domestic Product (GDP), with over 280,000 businesses and 2.9 million jobs representing 10% of the national job opportunities (PwC, 2018; Rhodes, 2018; Dun and Bradstreet, 2019). The sector is also considered as an enabling sector, since it impacts on the wider UK economy and individual lives by providing

[1] This is based on Macpherson and Clark (2009) who consider a community of practice as common identification based on values, beliefs and goals and purposeful participation and membership in a particular group.

the much needed infrastructure by other sectors such as transport, energy and social facilities (HM Government, 2013, 2017).

1.1.1 The Project Environment and Influence of the Institutional Context

The influence of the wider environment upon the internal activities of organisations (including the behaviour of their members) has been acknowledged by scholars (e.g., Hofstede, 2001; Schein, 2004). Similarly, projects are influenced by their external environments. This is because project delivery teams constitute various disciplines and organisations who have varying goals, tasks, values and institutional structures which influence their perception and eventual outcome of a project (Emmitt, 2010; Bresnen, 2016) . These include the likes of subcontractors, banks, insurance firms, the client, and their representatives, suppliers, and manufacturers of materials. Other organisations include regulatory bodies such as the Health and Safety Executive (HSE), and professional bodies such as the Chartered Institute of Building (CIOB), the Royal Institute of Chartered Surveyors (RICS) and the Association for Project Management (APM). Accordingly, Wideman (1995) and Lundin and Söderholm (1995) had earlier advised against considering project practices as occurring in a complete vacuum, with Easterby-Smith *et al.* (2000) raising similar concerns with respect to learning.

Overall, projects being delivered within the UKCI involve multiple teams. Additionally, the factors that influence PBOs from the external environment may be associated with the political, economic, social, technological, legal, and environmental , or ‘PESTLE’, elements. For that reason, it is important that project actors pay particular attention to the institutional context when managing projects (Khang and Moe, 2008; Morris and Geraldi, 2011). Consequently, actors should consider a multilevel approach to learning which appreciates the influence of other institutions such as professional and regulatory bodies on the process of Lf-PRF within a PBO.

1.1.2 An Overview of Project-related Failures in the UKCI

Although the UKCI has examples of projects that may have met many of their success criteria such as the British Airport Authority’s (BAA) Heathrow Terminal 5 (Potts, 2007), the London

2012 Olympics Stadium (HM Government, 2013), London Bridge station redevelopment and the Rossall Coastal Defence project (IPA, 2018), there are still some projects that fail to meet clients' expectations fully. For instance, the APM (2014) observe that 80% of projects fail to entirely meet all the project objectives. In the UKCI in particular, P*r*F prominently highlighted by the national media include:

A) **Performance Failure: The Grenfell Tower Fire Disaster** – Unlike the typical structural-, time and cost-related- failures, the Grenfell Tower Fire disaster highlights how failure remains hidden or latent in nature. The fire which engulfed a 20 floors residential high-rise building led to the loss of more than 72 lives (Gerrard, 2018). The fire spread quickly due to the aluminium composite material (ACM) cladding which did not meet the minimum fire tests or requirements. Lessons from this disaster have led to an improved regime for fire testing and certifying building materials and revision of building regulations. Consequently, the ACM material is no longer allowed to be used on any new high-rise building (Moore-Bick, 2019). The Grenfell Tower fire disaster has also led to the introduction of the 'Code for Quality' by the CIOB (2018, 2021) in order to improve delivery of projects within the UKCI.

B) **Cost and Time-Related Failures: Crossrail Ltd** – A major and complex programme of new rail services (approximately 118 kilometres long) between Heathrow and surrounding parts of London. Crossrail needed additional funding of circa £2bn and was delay for over 3 years from its original planned completion date of December 2018 (NAO, 2019, 2021). Causes of the time and cost overruns on the Crossrail project include underestimation of the projects' complexity by the parties, challenges in recruiting critical staff, the COVID-19 pandemic (affecting the supply chain) and missed milestones in the programme. Lessons from the Crossrail have been drawn in managing mega projects such as avoiding optimism biasness, improved governance strategy, business case development and management of benefits (The Green Book, 2020; NAO, 2021).

C) **Business/Organisational Failure: The Collapse of Carillion Plc** – The collapse of Carillion also gives an insight of the varied nature of failure, in this case 'organisational failure'. The company was liquidated on 15th January 2018 with reports of £1.5bn debt and 2,782 job losses. 278 contracts were transferred to other providers to prevent a further 13,945 jobs losses[2]. This resulted in the UK taxpayer losses (circa £65m) with the National Audit Office (NAO) reporting a total cost of £148m (Gerrard, 2019). The collapse of Carillion highlights learning points for the sector such as strengthening government's monitoring of the financial health and performance of key suppliers through its strategic supplier risk management policy (NAO, 2018).

D) **Sunk Costs in Abandoned Projects: The Garden Bridge Project** – Besides project failure(s) being experienced during or after completion, failure may occur before commencement of any project activities on site. This is the case of the abandoned Garden Bridge at design stage. This was a pedestrian bridge and garden which was planned to be constructed across the river Thames in London. Reasons for its abandonment include the significant flaws in preparing the business case such as uncertain and overstated benefits from tourism. A total of £28.5 million (covering pre construction activities such as design fees) was spent on a project whose construction works never commenced (NAO, 2016).

Other notable examples of failed projects or those that may have experienced some form of failure during delivery within the UKCI are given in Table 1.1 below.

[2] Other projects such as the Midland Metropolitan Hospital and the Royal Liverpool University Hospital subsequently experienced delays and cost overruns (since they were retendered) which illustrates the domino effects of failures (NAO, 2020a).

Table 1.1 Notable Projects and their Project-related Failures within the UK

Project Title	Sector and Stage	Manifestation of Failure
London Underground Jubilee Extension.	Infrastructure; Delivery.	20 months delay, over budget (£2.1bn to £3.5bn (70%) (Potts, 2007).
The Scottish Parliament Building.	Infrastructure; Delivery.	Delayed and overbudget (Kenley, 2010).
The Millennium Dome.	Infrastructure; Operation.	Low profit returns (National Audit Office, 2000).
National Program for IT in NHS.	IT – Paperless NHS – Delivery/Terminated.	Cost and time overruns, unrealised benefits (Committee of Public Accounts, 2013).
Failure of the FiReControl Project.	Service; Delivery - terminated with £469 million spent.	Delay – Terminated (Committee of Public Accounts, 2011).
Edinburgh Schools Walls Collapse.	Infrastructure – Operation.	Defects; poor workmanship (Cole, 2017).

However, it remains unclear if Lf-PRF really occurs since similar project failures in form of delays and cost overruns are continuously experienced on similar-types of projects[3]. For instance, the same reasons of complexity and technical advancement cited as reasons for the Crossrail project's time and cost overruns were also cited as reasons for delaying the completion of the London Jubilee Line Extension built in the mid-1990s.

To show the lack of learning within the sector, comparisons have also been made between the Grenfell Tower fire disaster (of 4th June 2017) and the Summerland Leisure Resort fire disaster (2nd August 1973) with the fire in both cases being associated with untested cladding materials (Khoo and Skitt, 2019). The lack of learning within the construction sector was also echoed by Hackitt (2018) in the independent review of the Grenfell Tower fire disaster. Beside the lack of learning across organisations within the UKCI, recent findings by the NAO (2020) show a lack of learning on nuclear infrastructure projects within the Ministry of Defence. This is a case were two similar projects running parallel experienced similar challenges such as delays and cost overruns without any attempt to learn from similar past nuclear projects within the department or those that have been done before across the globe.

[3] The projects featured in Table 1.1 relate to a variety of project-based economic sectors. However, to limit scope, this research focused on the construction sector.

Hence, the need to undertake this study which focuses on enhancing Lf-PRF among PBOs cannot be overemphasized. Therefore, instead of taking a localised or internal approach to Lf-PRF, the study argues in favour of a population level approach which appreciates the valuable lessons from both internally and externally.

1.2 INTERVENTION MEASURES – THE NEED TO LEARN FROM PAST FAILURES

In order to improve project delivery within the sector, several reports have been produced as shown in Table 1.2.

Table 1.2 Construction Related Reports in the UKCI

Report, Author and Year	Focus	Recommended Measures
Constructing the Team (Latham, 1994)	Continued underperformance/low output and unsatisfied clients in the sector.	Training; partnering; co-ordinated project information, guiding clients on their brief preparation.
Rethinking Construction 1998 (Egan, 1998)	Improving quality and efficiency in the sector.	Committed leadership; focus on customer; integrated working; quality driven agenda and commitment to people.
Rethinking Construction – Accelerating Change (Egan, 2002)	Review Progress in the Industry; Reform processes.	Adopting new business models that promote change; integrate education and training, Develop a new generation of leaders.
Never Waste a Good Crisis (Wolstenholme *et al.*, 2009)	Review progress since the Rethinking Construction Report 1998.	Innovation, collaboration, and integrated working.
Government Construction Strategy (Cabinet Office, 2011)	Lack of full value from public sector construction. (Better government and private relationship).	Co-ordination and leadership, Forward Program, Governance and Client Skills, value for money, standards and cost benchmarking, efficiency and elimination of waste, Building Information Modelling.
Construction 2025 Industry Strategy Report (HM Government, 2013)	Transforming the Sector's performance.	People, Smart, Sustainable, Growth and Leadership.
The Farmer Review of the UK Construction Labour Model (Farmer, 2016)	Industry's skills shortage and challenges.	Strategic intervention by both clients, government, and the industry; incentives to change for actors.
Government Construction Strategy (IPA, 2016)	Develop the Government's capability as a construction client.	Increase use of digital technology; develop skills and capability, collaborative working.
Industrial Strategy – Construction Sector Deal (HM Government, 2017)	Transform Productivity in the sector.	Ideas (innovation), People (skills and training) benefits for all, Infrastructure, Business environment (for starting and growing businesses).
Transforming Infrastructure Performance (TIP) (IPA, 2017)	Productivity in infrastructure.	Benchmarking for better; Alignment and integration; Procurement for growth; Smarter infrastructure.

Notably, from Table 1.2 above, though most reports refer to low productivity or performance, 'failure' in the sector is not explicitly highlighted. Instead, terms such as 'under-performance' and 'unsatisfied clients' are used. However, Farmer (2016) explicitly states that the industry shows critical symptoms of failure and poor performance exhibited through low productivity. The majority of mitigation measures from the reports focus on technical and engineering related mechanisms forgetting the influence of social factors in addressing the problem of failure (Sage *et al.,* 2014). Consequently, Love *et al.* (2002), and more recently Unterhitzenberger (2021), argue in favour of paying attention to the 'human enterprise' instead of solely focusing on the technical side of projects because projects in nature are complex, dynamic and involve multiple interdependent parties. Thus, this research by focusing on people-related factors, responds to concerns of lack of learning from failures within the sector and how that can be enhanced in PBOs (Baker *et al.*, 2018; Hackitt, 2018).

1.3 PROBLEM BACKGROUND AND PROBLEM STATEMENT

With the increase in the size, technology and complexity of projects Agaiby *et al.* (2017) note that the chances of failures occurring are even higher. For instance, Flyvbjerg (2014) notes that mega projects are associated with excessive time and cost overruns. More recently, and in relation with the advancement in technology, Westenberger *et al.* (2022) observe an increased rate in the failure of implementing artificial intelligence projects within organisations. Hence, the need for understanding and managing failure on projects is far greater now than before even with the advancement in technology and project management skills. Additionally, Atkinson (1999) contends that unlike 'cathedral thinkers' who designed projects which they were never to see their completion, present project participants are required to deliver projects quickly (whilst meeting the provided specifications) with more immediate feedback.

In view of that, OL, including from failures, has been identified as a means of improving growth, performance, competitiveness and innovation in organisations (Barlow, 2002; Burnes *et al.*, 2003; Chan, Cooper *et al., 2005*; Swan *et al.*, 2010; Zhang *et al.*, 2022). However, though Lf-PRF is being encouraged, PBOs are faced with challenges in their attempt to learn from failure such as the the lack of ownership and sharing of failures. Accordingly, this study endeavoured to assess and provide insights on how PBOs may effectively Lf-PRF. The study covers both small and big failures since small failures if not

considered may lead to bigger failures occurring (Edmondson, 2004; Cannon and Edmondson, 2005). This broader approach is in agreement with Cannon and Edmondson (2001, pp. 162–163) who argue that failure *"conceptualization is deliberately broad, encompassing failures of diverse types and magnitude, because we propose that opportunities for learning exist in both minor misunderstandings and major mishaps".* However, worth noting is the realisation that Lf-PRF is not automatic but a complex process (Cannon and Edmondson, 2005; Bartsch *et al.*, 2013). This is because factors such as social barriers in form of norms, behaviours and attitudes of leaders and followers influence learning from failures (Stehlik, 2014; Duffield and Whitty, 2015).

Accordingly, models that overlook the social-context by focusing on technical approaches in reducing and understanding failure are regarded as being incomplete (Love *et al.*, 2013; Taroun, 2014). Hence, this research attempts to address the under-researched area of the social context and its influence on Lf-PRF through the lenses of Institutional Theory and Situated Learning. Accordingly, the study's research question is stated as follows:

"Is project-related failure accepted as a mechanism for learning in project-based organisations?"

1.4 RESEARCH AIM AND OBJECTIVES.

The aim of this research is **"*to review whether and how failure can inform organisational learning, within construction PBOs*".** To achieve that, the following objectives were developed:

i. Uncover how organisational learning occurs, within PBO's.
ii. Review the understanding of project failure within the construction sector.
iii. Review the common underlying root causes of project failure in the construction sector.
iv. Explore the nature of current practice, in the use of past project failures.
v. Assess whether failure may inform organizational learning in PBOs.
vi. Construct a model and evaluate whether it facilitates organisational learning from PrF(s) among PBOs.

1.5 RELEVANCE AND JUSTIFICATION OF THE RESEARCH

Though failures are perceived negatively, they offer opportunities and benefits. For instance, lessons from failures improve failure management, innovation and lead to avoiding repetition of loses or bigger failures from occurring (Barlow, 2002; Cannon and Edmondson, 2005; Caldwell *et al.*, 2009; Pankratz and Basten, 2013). As an illustration, the projected income of £600 million between 2019 - 2020 and 2023 - 2024 from the full operation of Crossrail will not be realised due to its delayed completion (NAO, 2019). Conversely, the IPA (2016b) observe that improved efficiency in productivity, essentially a situation of better failure management, may lead to a saving of an estimated £1.7 billion. Besides huge financial losses, other negative consequences of failure which may include damage to property and the environment, delayed projects and sometimes deaths may be mitigated by learning from failures (Love *et al.*, 2011; Agaiby *et al.,* 2017; Velikova *et al.*, 2018). Therefore, particular attention must be given to P*r*F and learning among PBOs realising that they deliver projects which are a vital vehicle for various economic and social endeavours (Jensen *et al.*, 2016).

Additionally, instead of solely focusing on project-to-project learning or within a PBO[4], the study argues in favour of integrating and leveraging the three main levels (project, organisational and inter-organisational learning) as sources of lessons (Madsen and Desai, 2018). This aligns with Levinthal and March (1993) who earlier argued against myopic approaches to learning which are focused on the internal environment of an organisation.

1.6 RESEARCH METHODOLOGY

The research involved two key stages discussed by Punch (2012). The first stage, the pre-empirical stage, involved research formulation (title, research objectives, research aim). The second stage was the empirical stage and involved the collection and analysis of primary data (interviews) and secondary data (document analysis). Qualitative data analysis methods (such as thematic and discourse analysis) were used. The data analysis process was supported by NVivo 12 software package.

[4] The PBO is seen as the heart or centre of Lf-PRF since according to Newell et al. (2006) learning focus on individuals alone leaves many organisations vulnerable since employees are temporal and leave at different times.

1.6.1 Research Approach

An exploratory research approach was adopted since according to Saunders *et al.* (2009), this allows researchers to understand rarely researched problems (topics) by initially starting broadly and then narrowing down on the specific problem. This corresponds with objectives (i), (ii), (iii) and (v) which focus on the understanding of 'project failure', 'organisational learning', 'causes of failure' and 'developing a model for learning from failure' in PBOs. See Chapter 4 for details on the adopted methodology.

1.7 RESEARCH GAP – CONTRIBUTION TO KNOWLEDGE AND RESEARCH DISTINCTIVENESS

Much attention in Lf-PRF is focused on identifying causes and preventive measures with minimal consideration of the social-context's influence on learning in PBOs (Bartsch *et al.*, 2013). Notably, technology and knowledge management tools are encouraged for improving the learning process (Koskinen, 2010; Bartsch *et al.*, 2013). In contrast, Cope (2011) argues against such normative approaches when researching on failure since they eclipse the complex and dynamic social aspects of 'learning' and 'failure'. This aligns with Pidgeon and O'Leary's (2000, p. 15) earlier observation that *"Theoretical models have also moved on now, from purely post-hoc descriptions of accidents and their causes, in the attempt to specify `safe' cultures and `high-reliability' organizations".*

Hartmann and Doree (2015) also contend that learning on a project is influenced by the social interaction of individuals through organisational rules, history, symbolic artefacts, norms, competence and experience. Similarly, Hobday (2000) and Duffield and Whitty (2015) contend that 'soft' human factors significantly influence inter-organisational and inter-project learning processes. Consequently, this research addresses how the social context influences the actors' behaviour and intentions when Lf-PRF within PBOs. This is in line with Li and Love (1998) who encourage understanding the human part of learning when establishing solutions to a problem.

In contrast to the micro or organisational level structures discussed by scholars such as Macpherson and Clark (2009) and Hartmann and Dorée (2015), this study takes a wider perspective to include PBO's external environment. This is based on the realisation that besides actors' interaction within a PBO or a project, there are other forces which

influence Lf-PRF, here-in conceptualised as isomorphic forces based on Neo-Institutional Theory. Thus, the adoption of Neo-Institutional Theory addresses the identified research gap of lack of research on the social context of Lf-PR. Overall, the study's contribution to knowledge is outlined as follows:

1.7.1 Theoretical Contribution

a) ***Understanding the Socio-cultural influence on learning Lf-PRF***. This is through a wider understanding of the influence of the socio-cultural context on the behaviour of the actors based through Institutional Theory's isomorphic forces. For example, the study discusses how institutions, including organisations such as professional bodies, influence the process of Lf-PRF. This aligns with Morris and Geraldi's (2011) recommendation of taking a contextual approach when managing a project(s).

b) ***A Model for Lf-PRF*** – Since 'learning' is typically a social process, the study argues for a multilevel approach to Lf-PRF which encourages interaction and learning to occur at the following levels; project level (individuals and project team members); PBO level (cross project and departmental learning); and sectoral level (cross-organisational learning with peer PBOs and suppliers). The sectoral level also highlights the influence of organisations from the external environment on the process of Lf-PRF such as professional bodies and regulatory bodies. Besides the multilevel actors, the model highlights the need to create a conducive environment within an organisation for Lf-PRF. This builds on the work of Lisphitz *et al.* (2002) and their five facets for OL (structural, policy, cultural, psychological and contextual). Three additional facets, namely *technological* (tools for capturing and sharing failure-related lessons), *governance* (overall oversight and control of the process of Lf-PRF within a PBO) and the N^{th} *facet* (symbolizes the need to continuously review the process of Lf-PRF and adopt any new mechanism as need arises). For purposes of collecting/capturing, storing and sharing failure-related lessons, a 'DATES' ('Documents, Actors, Technology, Events, and Space') framework is provided. Further discussion on the model is given in Chapter 7.

In addition, the study contributes to the literature and understanding of failure which scholars such as Söderlund (2008) and Liu *et al.* (2017) regard as a rarely researched

and subjective area. Consequently, a multi-sectoral approach when defining and measuring failure due to its subjective nature is encouraged (Atkinson, 1999; Boss and Sims, 2008; Hall *et al.,* 2012). The study also contributes to the growing need of understanding 'project behaviour' as echoed by Unterhitzenberger (2021). This is based on the findings that highlight the competing needs and demands from both the PBOs' external environment (such as competition) and its internal environment (such as profitability, and productivity).

1.7.2 Practical Contribution – PBOs' Toolkit for Lf-PRF

The study has developed a PBOs' Toolkit for Lf-PRF by identifying four Action Areas (AA); Action Area (AA1) - outlining the definition and measurement criteria of failure; AA2 - demonstrating the benefits and opportunities of Lf-PRF; AA3 – creating a conducive environment for Lf-PRF, and; AA4 – Identifying 'who', 'where' and 'when' to Lf-PRF summarized in the 'DATES' framework (Documents, Actors, Technology, Events and Space). See Appendix T1 for details.

1.8 CHAPTER SYNOPSIS

- **Chapter One** – Gives an introduction to the study, the background and problem statement. It further elaborates on the research aim, objectives and scope.

- **Chapter Two** – Literature review relating to PBOs, project failure and organisational learning.

- **Chapter Three** – The conceptual framework chapter highlights the various concepts and parties in the process of Lf-PRF and further discusses the adopted research lenses (Institutional Theory and Situated Learning).

- **Chapter Four** – The research methodology chapter discusses qualitative methods adopted for the study. This chapter further outlines the qualitative data analysis adopted and further elaborates the coding process.

- **Chapter Five** – This chapter covers Part 1 of the findings and data analysis (from the first round of interviews) and takes an exploratory approach.

- **Chapter Six –** Part 2 of the findings and data analysis is presented in this chapter (from the second round of interviews) and takes an explanatory approach.

- **Chapter Seven** – Discusses the development of the Multi-level Model for learning from Project-related failures by PBOs.

- **Chapter Eight** – This chapter provides the study's conclusions, recommendations, limitations and areas for future research.

In addition, as a way of providing more insights and understanding of the nature of failure, learning and the opportunities of Lf-PRF, Text Boxes are included in some sections of the dissertation. For instance, to highlight the paradox and challenges of learning, Manos Paradox faced by learners since ancient times is discussed in Text Box 1.1, which may equally impact on present attempts to Lf-PRF.

Text Box 1.1 Meno's Paradox and Learning from Project-related Failures – You Can only Find (Learn from) What you Know.

In the initial stages of discussing various aspects of Lf-PRF, worth considering is an old learning paradox, the 'Meno's Paradox'. In this paradox, Plato notes that if one does not know 'X', then it is not possible to find 'X'. Yet again if one knows 'X' then it is not necessary to look for 'X'. Similar assumptions can be made with learning from failure. Essentially, if the sector is to Lf-PRF, it is important that failures are identified quickly since it is only possible to 'find and learn from X if someone knows X'. This further highlights the need to establish a measuring criterion for failure so that learners can identify them and possibly learn from the very failures.

However, with a 'know it all' behaviour were some project team members believe they have all the experience and knowledge to manage projects, it becomes 'unnecessary' to learn from failure(s). This is exhibited by the tendency of multiskilling the project manager and other actors in good practice such as project planning, risk management etc instead of learning from failure(s). However, due to the negative impact of failures, addressing 'Meno's Paradox' effect on Lf-PRF is hindered by the fact that even if learners know the 'X' (failure), instead of learning from it, it is hidden in order to protect their reputation or image. Lf-PRF also becomes 'unnecessary' for project actors who would rather pursue income generating activities or move onto a new project(s). The question posed to the sector therefore is: how can we solve Meno's paradox in relation to Lf-PRF?

Chapter 2: Literature Review

2.1 INTRODUCTION

Literature review in any study is important since it helps in designing and refining the research problem, research questions, and methodology[1] (Kumar, 2011; Bryman, 2012). Literature review also aids in integrating research findings against existing knowledge and articulating a study's contribution to the existing body of knowledge (Kumar, 2011). Accordingly, this chapter serves as a means through which meaning and knowledge relating to key concepts in this study such as 'PBOs', 'failure' and 'Lf-PRF' will be uncovered. Bryman (2012) adds that certain inconsistences and controversies related to an area of study may be addressed through literature review. Consequently, a good first step taken in this chapter is providing (working/operational) definitions of key terms (Kumar, 2011; Zwikael and Meredith, 2018). According to Kumar (2011), operational definitions are concepts and terms that a researcher intends to use in the problem or identify in a study population. Of concern is the subjectivity of terms such as 'failure', 'OL' and 'project-related failure' amongst others which are also part of this study. Therefore, the following are definitions of the key concepts of the study:

- **Project Based Organisations (PBOs)** –PBOs in this study are considered as discrete and permanent organisations which exist to deliver projects.

- **Organisational Learning** – Involves learning from organisational experience, which includes failure related experiences, by the detection and correction of errors in an organization through the interaction of team members internally and externally (Lipshitz *et al.,* 2002*;* Burnes *et al.,* 2003 *and* Argyris, 1977).

- **Project-related Failure(s)**- An unexpected negative result/outcome at individual-, team-, project-, and/or organisational-level, either small or large which highlights limitations in meeting the set qualitative and quantitative

[1] This is because literature review assists in understanding and clarifying variables, uncovering existing knowledge in the area of study as well as exploring and selecting suitable theories to be adopted (Selvam, 2017).

benefits of a project(s) or a program to stakeholders (Cannon and Edmondson, 2001, 2005; Boss and Sims, 2008; Trangkanont and Charoenngam, 2014).

- **Learning from Project-related Failures** – Considering Kilic and Soran (2019, p. 2) this is regarded as "*…the capability of an organization or individuals to obtain information and knowledge from past events [failures] and transfer these into measures and safety actions that will help avoid reoccurrences and improve safety in the related industry.*

In reasoning with Lindahl and Rehn (2007), the given definitions are not final, exact or absolute[2]. Instead, they aid in reducing ambiguity within the research process. Overall, the literature review chapter is structured based on the following sections which are based on the research objectives listed in chapter one:

- Nature of Project-Based Organisations (PBOs).
- The Nature of project-related failures (P*r*F).
- Organisational Learning (OL) and relevant learning-related theories.
- Learning in PBOs.
- Learning from Project-related Failures (Lf-PRF) within PBOs.

2.2 AN OVERVIEW OF PROJECT-BASED ORGANISATIONS

Over the years, some organisations have shifted from 'functional' to more 'project-focused' type of organising work (Sage *et al.*, 2014; Chan and Ejohwomu, 2018; Sydow and Braun, 2018). Turner and Keegan (1999) note that much of the last half of the 20th Century experienced a shift from bureaucratic and functional paradigm of management which started between the late 19th Century and early 20th Century. Correspondingly, Seeck and Laakso (2010) contend that management research approaches are now focusing on innovation and organisational culture in contrast with earlier studies that focused more on scientific approach (Taylorism), human relationships and later on structural analysis. See Table 2.1 below which provides a timeline of trends and area(s) of focus in management research.

[2] Thus, social constructionism has been adopted as the ontological standpoint which considers social phenomenon, such as 'failure', being socially constructed.

Table 2.1 Changes in Research in Management - Adapted from Seeck and Laakso (2010).

Research Focus	Period	Features
Scientific Approach	Early 20th Century – End of WWI	Focused on work production.
Human Relationship	Post WWI	Focused on social and personal relationships.
Structural Analysis	During and after WWII	Focused on decision-making, and the arrangement of different functions, within an organisation.
Organisational Culture	Early 1980s	Focus on the symbolic and collective features of organisations.
Innovation Orientation	Late 1980s to date	Innovation and not simply relying on existing technology and science.

The change in the manner in which organisations deliver their services has also seen a number of firms adopting projects as a means of operating (Lundin and Söderholm, 1995, 2013; Turner and Keegan, 1999). For instance, it is estimated that 40% of the global economy uses projects as means of delivering their products and services (Miterev *et al.,* 2017). The KPMG (2017) project management survey report also indicates that 56% of PBOs use the Project Management Office (PMO) in coordinating their projects. Evidently, there has been an increase in firms structuring on the basis of Temporal Organising (TO) which involves ad-hoc and flexible systems (Bakker *et al.*, 2016) referred to by many as PBOs (Turner and Keegan, 1999; Hobday, 2000; Sydow *et al.*, 2004; Whitley, 2006). Though the concept of PBOs may sound new, Turner and Keegan (1999) observe that unconsciously, organisations have been operating as PBOs but only deploying the functional approach to managing projects[3]. Evidently, Miterev *et al.* (2017) trace their initial application to the 1930s, 1960s and in particular the 1990s a period in which their popularity rose as observed by Lundin and Söderholm (1995).

[3] Hobday (2000) adds that 'PBOs' use is not new but lacked theory or structure of managing them. This type of an organisation can also be related to Mintzberg's (1980) 'adhocracy structure' which is described as a group of experts drawn to together to function as a team, deployed as a functional team or relying on a matrix structure in order to carryout project works.

2.2.1 Drivers of Increased Use of Project-Based Organisations

Koskinen (2010) cites rapidly changing technology and bespoke products as some of the factors leading to increased adoption of PBOs. Following World War II governments were required to produce new/additional infrastructure, thus many adopting projects as means of organising their work (Koskinen, 2010). The rise of consumer choices, changing client needs, and market fragmentation have also been known to influence the shift towards PBOs (Hobday, 2000). Several scholars such as Teng and Pedrycz (2022), Awuzie and McDermott (2016), Martinsuo *et al.* (2006) and Hobday (2000) also observe that the increase in technology, size, number, time pressure and complexity of the projects being delivered has fuelled the demand to deliver projects via PBOs. Turner and Keegan (1999) cite weaknesses imbedded in the prior 'functional' approach; bureaucracy; delayed response to changing needs, and; the project demands as other factors encouraging the use of PBOs. Their greater autonomy also allows them to be flexible and respond faster to external demands, changes in the markets and technology (Swan *et al.*, 2010; Awuzie and McDermott, 2016). Improved project control, coordination and opportunities for knowledge sharing on multi-projects also influence organisations to adopt a project-based management, essentially operating as PBOs (Martinsuo *et al.,* 2006).

Overall, key drivers in the adoption of PBOs include the passage of time and changes in projects, technology, complexity (size of the project and its parent organisation) and clients' demands (Mintzberg, 1980; Hobday, 2000; Koskinen, 2010; Awuzie and McDermott, 2016).

2.2.2 What are Project-Based Organisations (PBOs)?

The term 'PBO' refers to permanent type of organisations that offer their services through projects (Sydow *et al.*, 2004; Sydow and Braun, 2018). Besides the term 'PBO' there are other terms that are used to refer to 'PBOs' and are interchanged. Those noted by Pemsel (2012) include; Project-Based Firms (PBFs), Project-Led Organisations (PLOs) and Project-Based Companies (PBCs). Miterev *et al.* (2017) also use terms such as Multi-Project Firm (MPF), Project-Intensive Firm (PIF), Multi-Project Organisation (MPO), Project-Matrix Organisation (PMO), Project-Oriented Company (POC). Hällgren and Wilson (2011) consider Project-Intensive Organisations (PIO) as permanent organisations utilizing temporal teams in executing their projects. Prencipe and Tell (2001) refer to PBFs

which operate in sectors such as; consultancy firms, marketing firms, film production, construction and Complex Product Systems (CoPs) industries[4]. In contrast to these permanent forms, Brewer and Gajendran (2012, p. 199) discuss Temporary Project Organisations (TPOs) as an organisation which *"consists of individuals and firms driven by their own commercial considerations, but are ideally joined together in pursuit of the project objectives*.

On a larger scale, Inter-organisational Projects (IOP) have been referenced and differentiated from PBOs in the sense that they create value through collaboration with other organisations (Sydow and Braun, 2018). In that regard, Bakker *et al.* (2016) consider Project Supported Organisations (PSO) as being permanent organisations supported by temporal systems and Project Networks (PNW) as an organisation created and sustained by several projects embedded in relationships[5].

2.2.3 Understanding of Temporariness and Permanence of PBOs

According to Bakker *et al.* (2016) the 'temporal' and 'permanent' relationship is always a challenge for researchers and should be contextualized. Hence, Bakker *et al.* (2016) identify the following three types of temporal organising and approaches to research in PBOs:

- ***Temporary Organising as a process*** – The focus is on temporariness of the structure (temporary task, resources) or agency (temporary contract, employment). This leads to temporal employment and having rules and routines as means of managing actors within and outside the organization.

- ***Temporary Organising as Form*** – Organisations are viewed as created to exist for a specific period such as those created during disasters to provide relief. Such organisations are hosted in a parent organisation or adopt an inter-organisation

[4] Further, Bakker *et al.,* (2016) also noted the growing use of temporary organising (TO) in project delivery and referred to it as short-term projects involving short-term networks with a temporary workforce.

[5] PNW identified by Bakker *et al.* (2016) can be related to IOP identified by Sydow and Braun (2018) highlighting the different terms used in describing PBOs. See also Wenell *et al.* (2017) who discuss PBOs, PSOs and PNW and argued that PNWs are popular for research and knowledge sharing.

form using contractors and transient relationships with suppliers (Müller-Seitz and Sydow, 2011; Bakker *et al.,* 2016).

- ***Temporary Organising as Perspective*** – Temporariness is considered as the logic of organising and understanding of organisations which supplements the other two forms of temporariness.

Further, Bakker *et al.* (2016) clarify that 'temporary' is not short duration but 'predetermined' duration and 'permanent' is viewed as 'indeterminate'. Reference is made to mega projects, which though temporal may take a long to be completed. Thus, context is crucial in understanding what a permanent and a temporal project or organisation really is (Sydow and Braun, 2018). Table 2.2 below summaries what a temporal and permanent organisation is.

Table 2.2 Temporal and Permanent Organisations Adapted from Bakker *et al.* (2016)

ACTOR **STRUCTURE**	**Temporary**	**Permanent**
Temporary	(Q1) Temporary, ephemeral or disposable organisation.	(Q2) Semi-Temporary organisations PNW.
Permanent	(Q3) Semi-Permanent organisation with temporary employment.	(Q4) Permanent Organisation - PBOs, PSO.

Consequently, this research considers quadrant (2) and (4) as where TPOs and PBOs lie respectively as shown in Table 2.2 above. This aligns with Wilson (2011) and Miterev *et al.* (2017) who view PBOs as permanent organisations which rely on temporary teams to deliver their projects which are themselves temporal. More recently, Barbosa *et al.* (2022) refers to PBOs as being 'perennial'. Thus, PBOs exist on a longer-term basis, 'undetermined' duration, making them permanent, while they manage projects organised via TPO with a *'determined'* duration[6]. Based on that understanding, the term 'PBOs' referring to 'permanent structures' has been adopted in this study. In addition, In trying to

[6] Such understanding and clarity is important since it influences the perception and behaviour of actors of OL (Bakker *et al.*, 2016). This is based on the understanding that when team members are employed on a temporal basis, in many cases, are not open to learning since they will be leaving an organisation (Cattani *et al.* (2011).

encourage a more open and inclusive discussion on failure and learning from such experiences, a more encompassing term has been used, that is, PBOs. Therefore, PBOs include not only construction companies but organisations that are involved in the delivery of projects such as consultants, designers and contractors. The term ‘PBOs’ is also known within the sector and is associated with organisations in both the private and public sectors (Miterev *et al.*, 2017).

2.2.4 Redefining PBOs as Knowledge Repositories

Several definitions and views of PBOs exist. For instance, Pemsel (2012) and Mainga (2017), using the term PBF define them as organisations that run their services and products mostly through projects for both internal and external customers. Appreciating the varying sizes of projects, Miterev *et al.* (2017) define a PBO as an organisation that adopts project, program, and portfolio management as a mode of delivering their works. Other definitions are summarised in Table 2.3 below with an emphasis on processes and products.

Table 2.3 Selected Definitions of PBOs

Author	Definition/Understanding	Focus	Expected output	Level
Hobday (2000)	The project is the primary unit of organisation, innovation, and competition.	Process and product	Innovation,	Competition – Organisational focus
Koskinen (2010)	Majority of bespoke products and designs may be stand-alone or subsidiaries of larger firms.	Product		Customer
Pemsel (2012)	Majority of products or services are produced through projects for either internal or external clients.	Product	Performance	Customer
Mainga (2017)	Outputs or products are carried out through project ventures.	Product	Performance	Organisational efficiency
Bakker *et al. (*2016)	Projects are the main forms of doing its business.	Process		Organisational Efficiency
Gemunden et al. (2018)	Uses temporal projects to define and implement its strategies.	Process	Performance	Organisational Efficiency
Whitely (2006)	Undertake several projects with more cumulative learning and greater continuity of employment		Learning	Organisational Efficiency
Sydow *et al. (*2004)	Creation of temporary systems to execute project tasks.	Project oriented.	Performance	Organisational efficiency

From Table 2.3 above, relevant to this research is Whitley (2006) who considers PBOs as being distinct from PBFs since they *"undertake a number of projects with more cumulative learning and greater continuity of employment* (2006, p. 78).Therefore, in this research, PBOs are viewed as the basic unit for knowledge production, integration and learning instead of them being only means of delivering or organising a company's activities efficiently (Grant, 1996; Hobday, 2000; Whitley, 2006; Gemünden, Lehner and Kock, 2018; Barbosa *et al.*, 2022)[7]. This is based on the understanding that PBOs have inter-disciplinary teams and specialists that act as sources of lessons to each other (Sydow *et al*, 2004; Söderlund, 2008). It is important also to view learning within PBOs as being a dynamic process because learning on a project could mean not only learning from the

[7] Morgan (1986) relying on organisational theory uses the 'brain' as a metaphor to describe organisations and Chinowsky *et al.* (2007) argues in favour of transforming construction-related PBOs, from being production-oriented into learning orientation.

organisation(s) but also the organisation(s) learning from existing and new employee(s). This also aligns with Barbosa *et al.* (2022) who encourage PBOs to develop their corporate memory through knowledge acquisition, retention and sharing in order to learn from mistakes and improve their performance

2.2.5 Challenges and Limitations of PBOs

As much as the adoption of PBOs is being encouraged, there are challenges associated with their use. These include lack of a strong theoretical basis on which PBOs can be structured for their operations (Miterev *et al.*, 2017). PBOs are also influenced by several factors such as technology, uncertainty, project requirements and clients' demands (Whitley, 2006). Awuzie and McDermott (2016) reason that failure is common in PBOs due to complex and difficulty communication processes since such organisations operate as inter-organisations and multi-disciplinary teams with diverse values and culture. See also Text Box 2.1 which provides the Summerland Fire Disasters as an example of clients' demand (time pressure on PBOs) leading to project failure. Thus, Easterby-Smith *et al.* (2000) and Hobday (2000) contend that despite PBOs' efficiency in integrating different experts, when compared to the matrix type of structuring, they fall short of achieving economies of scale, optimising repeatable tasks/routine, companywide coordination (and control) and learning. This is attributed to their temporal and transient nature of their projects and teams (Turner and Keegan, 1999; Awuzie and McDermott, 2016; Miterev *et al.*, 2017). This has led to calls for reviewing the management of PBOs with respect to; their structuring; and to project success and productivity (Mir and Pinnington, 2014; Awuzie and McDermott, 2016; Miterev *et al.*, 2017; Chan and Ejohwomu, 2018). Faced with such challenges, improving PBOs' performance, competitiveness and innovativeness hinges on OL (Burnes *et al.*, 2003; Whitley, 2006; Koskinen, 2010; Awuzie and McDermott, 2016). Accordingly, Sydow *et al*. (2004) and Turner and Keegan (1999) argue in favour of intra-organisational and inter-organisational learning in order to improve PBOs performance. Thus, considering Whitley (2006) and Scarbrough *et al.* (2004) it is suggested that the process of Lf-PRF by PBOs can be viewed via a multilevel approach through Institutional Isomorphism and communities of practice. Hence, to encourage Lf-PRF the section that follows gives a discussion on 'project-related failures' which are a common concern among PBOs.

Text Box 2.1 The 1973 Summerland Leisure Fire Disaster - The Human Factor, New Technology and Time Pressure within PBOs

The Summerland fire disaster of 1973 on 2nd August, resulting in 50 deaths and circa 80 people suffering serious injuries, presents an interesting case of events. Though the fire was started by 3 boys who were smoking in a disused kiosk near the Summerland building, other factors that led to the fire disaster include the use of novel cladding and roofing materials (galbestos and oraglas), informal communications between design teams and the pressure to complete the final phase of the building in good time for the tourism season. This resulted in cutting corners and disregarding regulations by the delivery team in order to meet the deadline. It is also believed that a small architectural firm was given to handle a big project which had higher fire risks since new materials were specified for the building. The initial use of the building and conditions for operation were also changed significantly.

Lessons and Influence - Among the lessons drawn from the disaster include reviewing the building and fire regulations and training staff in fire rescue and escape procedures. This disaster also gives an insight of the nature and circumstances within which PBOs operate such as time pressure, working with complex projects and their desire to maximize profits.

2.3 THE NATURE OF PROJECT-RELATED FAILURE

Agaiby *et al.* (2017) reasons that failure is still common on projects even with technological advancements, a situation which Simpson *et al.* (2018) and Liu *et al.* (2017) also consider to be a universal problem[8]. Boss and Sims (2008) simply put it that everyone fails. In agreement, Wilkinson and Mellahi (2005, p. 233) note that "*failure is a fact of life from which organisations cannot escape, and the importance of understanding and learning from failure need hardly be stated".* Evidently, McGrath and Martin (2017) indicate that 50% of projects fail in some regard and do not deliver on what was promised. Thus, the anticipated success by adopting project-based management has not been achieved since projects still fall short of meeting the clients' needs (Turner and Keegan, 1999; Prencipe and Tell, 2001). Yet, failure is rarely researched while success receives more attention (and research). Consequently, industry practitioners and researchers are being encouraged to pay to attention to failure (including learning from it). This has resulted in an increased number of studies on failure itself being undertaken as it affects several project-based sectors which include IT and construction sectors (Madsen and Desai, 2010; Holgeid and Thompson, 2013; Desai, 2016; Liu *et al.*, 2017).

In general terms, failure is regarded as a deviation from what was intended or planned (Cannon and Edmondson, 2005). However, amongst construction PBOs, the understanding of failure has been limited to the project delivery time, cost, and quality parameters (Jugdev and Muller, 2005; Turner and Zolin, 2012; Sage *et al.*, 2014). Yet, Boss and Sims (2008) contest that failure cannot be associated to a single category. This can be appreciated from extant literature which reveals the following types of failure:

- ***Organisational failure*** - When expected results or goals are not achieved by an organisation (Cannon and Edmondson, 2005; Wilkinson and Mellahi, 2005).

- ***Non-Fatal Individual Failures*** – These are known to contribute to the eventual failure of an organization or project, and relate to failures caused by individuals such as mistakes and failure to communicate (Wilkinson and Mellahi, 2005).

[8] See also Ormerod (2005) who contends that failure is pervasive, around us and everywhere. Sage *et al.* (2014) also contends that failure is always present in projects.

- ***Failed Decisions*** – Carmeli *et al.* (2012) associates this type of failure with top management teams and Chief Executive Officers (CEOs) such as failures in their decision making.

- ***Business Failure***[9] – The involuntary change in management and ownership of a company due to poor performance (Shepherd, 2003). Dun and Bradstreet (2019, p. 2) also define business failure as *"any business that seeks legal relief from its creditors or ceases operations without paying all its creditors in full".*

- ***Construction/Project/Building Failure*** – The incapability by the whole constructed building or its parts in meeting the set design standards, construction specifications (Wardhana and Hadipriono, 2003) and component and structural failures (Love *et al.*, 2011; Parfitt, 2012).

- ***Engineering Failure*** – This is considered as the ill performance of an engineered item unexpectedly (Agaiby *et al.*, 2017) or a system or component that does not meet its desired purpose (Parfitt, 2012).

Desai (2016) also considers 'poor performance' as a type of failure when an organisation fails to meet its expected level of performance. McConnell (2015) also discusses 'policy failure' when fundamental goals of the policy are not realised, or it is met with great opposition with little or no support. Public failure has also been cited by Winston (2006, as cited in Regan *et al.*, 2011) when considering situations where the social cost of interventions by a government exceeds their benefits. This demonstrates that failure can range from design-, or engineering-, type failures (Minato, 2003; Love *et al.*, 2008); from failures in primary or secondary structural components such as cladding (Shohet and Paciuk, 2006) to policy and public failures (McConnell, 2015). Failure may also take the form of entire business failure(s) where value is not realised from an investment (Holt, 2013; Alaka *et al.*, 2015, 2016).

[9] Considered as failure in meeting a company's economic threshold and goals leading to its closure (Cope, 2011; Walsh and Cunningham, 2017). Such business failure may be associated with the bankruptcy of Carillion Ltd Company.

2.3.1 Defining Project-Related Failure (P*r*F)- A Learning Perspective

Failure is subjective and complex to understand (Pinto and Mantel, 1990; Kreiner and Fredriksen, 2007; Lindahl and Rehn, 2007; Gupta *et al.*, 2019; Herz and Krezdorn, 2022). In order to reduce the ambiguity associated with failure and better scoping of the research, the definition of 'project-related failure' (P*r*F) necessitates understanding the separate definitions of the terms; 'project' and; *'failure'*. Though various definitions of a 'project' exist, relevant to this research is the definition by Turner and Müller (2003, p. 1): "*An endeavour in which human, material and financial resources are organized… to undertake a unique scope of work, of given specification, within constraints of cost and time, so as to achieve beneficial change defined by quantitative and qualitative objectives."* Notable features from this definition in relation to Lf-PRF are the *'humans'* who are the actors in learning from failure. Turner and Muller (2003) also consider *'beneficial change'* which may include learning from failure by team members and eventual change of the negative perception of failure. This is unlike other definitions that mainly focus on the iron triangle of time, cost and quality (Atkinson, 1999).

Various definitions of 'failure' also exist. For instance Cannon and Edmondson (2001, 2005) define 'failure' as a deviation from expected and desired results. However, in trying to review 'failure' for purposes of learning from them, worth highlighting is Boss and Sims (2008, p. 138) who define it as "*a short-term unexpected result that reflects a challenge in progress and that provides: a stepping-stone to success, an opportunity for learning and development; an opportunity for creative change and innovation".* Evidently, failure is not simply a 'bad' occurrence but 'an opportunity' for learning. Lindahl and Rehn (2007) equally reason that failure should not be viewed as being bad and judged morally. Instead, organisations should take an 'analysis' approach so that underlying lessons can be identified and used in improving the delivery of other projects. Thus, Lindahl and Rehn (2007) refer to projects that fail as 'martyrs' and a basis of success for future projects.

Furthermore, in their attempt to definine 'project failure', Damoah and Akwei (2017) consider two forms; 'project failure' as being: 'project management failure' on one hand, linked to the iron triangle, and; 'project failure' being failure in meeting end users' needs similar to earlier views held by Baccarini (1999) and Jugdev and Muller (2005). Hence, Damoah and Awkei (2017) define 'project failure' as not meeting the stakeholders' needs and further gave a more economic oriented definition as not getting enough returns on the

sum invested[10]. By focusing on project outputs and outcome, Ahmadzai and Paracha (2016, p. 315) contend that *"a project is considered a failure when it has not offered what was required, in line with expectations.… in order to succeed, a project must deliver to cost, to quality, and on time; and it must offer the benefits reflected in the business case or scope"*[11]*.* Trangkanont and Charoenngam (2014, p. 422) went a step further in defining 'program failure' as *"set of program objectives that were not hierarchically met"* and cite failure of meeting the objective of low-income earners' access to housing and ownership (which is an example of failure in project outcomes and impact).

However, instead of viewing failure as an unpleasant experience, this study considers the 'learning' or 'opportunity' aspects of failure. This aligns with the thoughts of other scholars such as Kilic and Soran (2019, p. 2) who consider learning from failures as "*…the capability of an organization or individuals to obtain information and knowledge from past events and transfer these into measures and safety actions that will help avoid reoccurrences and improve safety in the related industry.* Similarly, Dahlin *et al.* (2018, p. 6) define learning from failure or errors as "*the process by which individuals, groups, or organizations identify error or failure events, analyse such events to find their causes, and search for and implement solutions to prevent similar errors or failures in the future".* This equally calls for a change in perception of what a 'project' and 'project delivery' are. Consequently, *"project execution may be thought of as a process of constantly adjusting the project system to fit a confounding and emerging reality*" (Ivory and Alderman, 2005, p. 8) unlike the traditional perception of meeting a specific fixed target of cost, quality, and time[12]. Furthermore, for purposes of learning, instead of focusing on one type of failure (which limits the lessons to be learnt as each P*r*F offers unique lessons), a wider and pragmatic approach to defining P*r*F was considered as: 'the unexpected negative result(s) at individual, team, project and organisational levels, either small or large which highlights limitations in meeting the set qualitative and quantitative benefits of a project(s) to stakeholders which also creates an opportunity for learning and improvement in team members, the organisation and future projects or programs' (Cannon and Edmondson,

[10] . Shepherd *et al.* (2011, p. 1229) also refer to project failure as *"the termination of an initiative to create organizational value that has fallen short of its goals".*

[11] Syafiqah *et al.* (2016) also include 'external failure' as hidden costs after project handover in the form of insurance, maintainability, environment costs, energy use and latent defects.

[12] Therefore, Lf-PRF among PBOs calls for change by challenging the status quo and existing model within an organisation that are not adequate (Cyert and March, 1963, cited in Madsen and Desai, 2010).

2001, 2005; Lindahl and Rehn, 2007; Boss and Sims, 2008; Trangkanont and Charoenngam, 2014; Damoah and Akwei, 2017). The focus is on learning from the experience of failure instead of focusing on one type of failure. This is because, similar antecedents and responses to distinct types of failure have been observed such as blaming, scapegoating, rigid beliefs, cognitive biases and the 'we are too big to fail type' of behaviour (Turner, 1976; Pidgeon and O'Leary, 2000; Shore, 2008; Holgeid and Thompson, 2013). This pragmatic approach towards failure is discussed in the following section.

2.3.2 Research Focus – What type of Failure then?

Even if the study has adopted a broader definition of P*r*F, for purposes of scoping the study, it is important to specify the type of failure that will be considered as appropriate for OL. Worth noting is Liu *et al.* (2017) and Holgeid and Thompson (2013) who view failure on a project as being 'complete failure', that is projects that have been abandoned or cancelled. Equally, Pinto and Mantel's (1990, p. 269) define a failed project as "*a project that is terminated prior to completion".* Unfortunately, such a view does not pay particular attention to small failures (and their impact), which as discussed by Cannon and Edmondson (2005) and Baumard and Starbuck (2005) can lead on to bigger failures. Hence, the position on failure in this research assumes that P*r*F may encompass small or large failures, as these may produce lessons or lead to bigger failures. This aligns with Atkinson (1999), who contends that if learning from failure is to be encouraged, no failure needs any special attention. By doing otherwise, some failures may be neglected due to their sheer size (small) which may act as breeding ground for larger failures to occur. This may also create a culture within an organisation or practice that legitimises failure by overlooking it[13]. However, the study cannot be made open to learn from literally 'any failure' per se. Realising the huge sums of money the UK government commits to the construction sector by funding infrastructure projects and their significant impact on individuals and other sectors in any economy, this research focuses particularly on construction projects and their associated P*r*F. Precisely, human-related failures or arising from human errors will be considered since it has been suggested that most failures on

[13] Thus, for this study, as echoed earlier, failure is not limited to the iron triangle but takes a pragmatic definition or approach which also considers other aspects of a project such as functionality (Holgeid and Thompson, 2013).

projects are due to people-related factors (Atkinson, 1999; Holgeid and Thompson, 2013). The study also eliminates failures associated with fraud but instead focuses on failures related to the design, through to construction and post construction stages of a construction project.

2.3.3 Causes of Project-Related Failure(s)

According to Agaiby *et al.* (2017) and Love and Ahiaga-Dagbui (2018) some of the main causes of failure are associated with the increased number, nature and size of projects. Chen (2015) and Wilkinson and Mellahi (2005) also cite leadership, organisational context, team design and processes as factors that may lead to the failure of a project. Focusing narrowly on time and cost constraints is also another leading cause of failure (Love *et al.,* 2013). Notable causes of failure can be associated with the following themes:

- ***People or Leader-Related*** – This may include the leader's attitude and behaviour. Wilkinson and Mellahi (2005) cite managers' arrogance in believing that failure cannot happen to them. Sloth and pride have also been cited (Stehlik, 2014; Herz and Krezdorn, 2022).
- ***Project-Related*** – These include the size and nature of a project. The causes of failure (cost underestimation) are also considered as being project-based or institutional by Love and Ahiaga-Dagbui (2018).
- ***Change of regulations*** – Sage *et al.* (2014) note the changes made in the UK as late as 1970 which allowed construction organisations to downsize their workforce or restructure created a situation where site foremen had increasing workloads, which made them fail to deliver their core tasks accordingly[14].

Even with such categorisations, the causes of failure are not exhaustive[15]. For instance, Atkinson (1999) argues that errors in setting up the criteria for measuring project success or failure also leads to failure. Additionally, government-related factors have been

[14] Similarly, Holgeid and Thompson (2013) who observe that long term projects can be affected by any new legislation, public policies or technology changes introduced during their delivery phase

[15] The causes of project failure can also be associated with both the external and internal environments of a PBO (Wilkinson and Mellahi, 2005; Love and Ahiaga-Dagbui, 2018).

identified, especially on public projects. For example, Holgeid and Thompson (2013) associate failure on various government IT projects with a lack of skilled government employees, inadequate information and being too-ambitious in procuring large projects. Similarly, Regan *et al.* (2011) note that 'optimism bias'[16], failures in preparing the business case, and lack of capacity in government departments and their reliance on the traditional procurement route as some of the factors that lead to poor performance of government projects. Other causes are associated with the skillsets of the project manager, and the broader PM profession, the contractor, technological and context issues such as culture (Regan *et al.*, 2011; Holgeid and Thompson, 2013; Chipulu *et al.*, 2014; Sage *et al.*, 2014). Poor stakeholder relationships has also been cited by Herz and Krezdorn (2022).

Worth noting is the fact that the identified causes do not act singly, in certain instances, a combination of two or more factors may lead to failure which makes P*r*F complex (McGrath and Martin, 2017; Herz and Krezdorn, 2022). Accordingly, Ivory and Alderman (2005) contend that *"failures occur as a consequence of the multiple interactions (linear and non- linear), internal contradictions, and geographically dispersed and "multi-nodal" (i.e., multiple sites of control and influence) nature of projects"* (2005, p. 5). Realising the complex nature of failure, robust failure detection and analysis is important. This also calls for a broader perspective instead of focusing on the technical causes and the project managers' limited skills which Sage *et al.* (2014) describe as 'managerialisation' of failure. See also Dekker (2011) who recommends taking 'organisational wide' perspective of analysing causes of failure instead of taking a reductionist approach. See Text Box 2.2 which further illustrates the complexity of failure. In summing up the causes of failure, it is worth noting that extant literature on causes of failure and the success criteria (or factors) has been criticised for the lack of in-depth understanding of relationships between the very factors (Holgeid and Thompson, 2013)[17]. Thus, for this research, the focus is on 'why projects fail' and 'what' can be learnt from P*r*F instead of focusing on the causes alone.

[16] Optimism biasness is regarded as a situation where negative occurrences are downplayed. Love and Ahiaga-Degbui (2018) also regard optimism biasness as the apparent exaggeration of positive outcomes of a project whilst the negative outcomes are underestimated or understated.

[17] See Gupta *et al.* (2019) who highlights the focus on causes or project failure factors and mitigation measures.

Text Box 2.2 Acknowledging Complexity of Failure – The Influence of Relationships-

The typical response or perception of failure according to Dekker (2011) takes a simplistic approach by identifying a broken part which is then fixed. Often, a linear approach or a model of sequential events is considered when analysing failure. The response is equally localised to fix or 'blame' the broken part/individual. Dekker argues that this is mostly influenced by the scientific-engineering language based on Newton and Descartes model of simplifying systems and complexity (predicting and conditioning events and outcomes). Thus, basic assumptions about rationality and humans choice (or predictive knowledge) are made which are somehow impossible to validate in a complex system. And yet, according to Dekker, *"the growth of complexity in society has got ahead of our understanding of how complex systems work and fail. Our technologies have got ahead of our theories. Our theories are still fundamentally reductionist, componential and linear. They get released into environments that make them complex, emergent, and non-linear. Thus, taking a linear approach to failure denies us the opportunity to respond effectively in light of a failure".*

Therefore, Dekker reasons that failure is not caused by parts but relationships. Accordingly, it is important to appreciating the relationships that exist between parts in any system. Thus, in complex systems, it is advisable to appreciate the fact that no single action or part controls everything, but instead, a single part influences everything in a system. Consequently, to effectively mitigate or manage failures, this responsibility does not simply lie with a single manager or leader but every team member and organisation involved in the delivery process. Typically, for project team members and PBOs to manage and learn from failure, there is need to appreciate the complexity of failure and the relationships or networks that are created during the project delivery process. These in turn create a socio-political, dynamic and bureaucratic environment that needs to be considered and understood for effective management of the process of learning from failure. Thus, this echoes the need for a context-wide approach to Lf-PRF among PBOs.

2.3.4 The Effect of Project Failure

The consequences of failure are well known and mostly have negative connotations. Gupta *et al.*(2019) observe that P*r*F costs firms, across many sectors and industries, several million dollars. Accordingly, Agaiby *et al.* (2017) groups the main effects of failure into two types of costs:

- ***Costs from the occurrence of failure*** – Financial losses, delay related losses, damage to property, third party damages and fatalities.

- ***Costs related to the prevention of failure*** – Investigation costs and new materials.

Additionally, Love *et al.* (2011) note that environmental, social effects and sometimes fatalities are suffered besides economic losses. Shepherd *et al.* (2013) adds that voluntary withdrawal increases due to the occurrence of failure leading to unnecessary costs through hiring and training new employees. This also depletes the learning and knowledge achieved earlier (Shepherd *et al.*, 2013). Bell and Taylor (2011) also argue that failure leads to a type of grief which evokes sadness and anger in the light of the 'death' of an organisation among team members[18]. The reputation of both an individual and an organisational is also affected negatively (Herz and Krezdorn, 2022). Realising the wide ranging negative effects of failure, it is inevitable that industry practitioners and the academia spend more efforts in studying/understanding failure(s), with this present study focusing on Lf-PRF (Holgeid and Thompson, 2013; Gupta *et al.*, 2019).

2.3.5 Measuring Project Failure and Success on Projects

Over the years, researchers and practitioners in project management have developed several scales of measuring performance (and failure) without establishing a standard criteria or scale (Pinto and Mantel, 1990; Atkinson, 1999; Chen, 2015). Based on extant

[18] Essentially the occurrence of failure also has negative emotional, physical and psychological effects on team members (Walsh and Cunningham, 2017) and social losses (Gupta *et al.*, 2019). See also Shepherd and Cardon (2009) and Shepherd *et al.* (2011) for a detailed discussion on the emotional effect of failure on team members and how managing emotions is important in the recovery and Lf-PRF.

literature, the following are some of the hindrances in managing or understanding failure which could also be related to barriers of measuring failure on projects:

- ***No agreement on the definition of project failure*** – Pinto and Mantel (1990) refer to project failure as being *'nebulous'* which is noted from several literature that give a variety of definitions of project failure.

- ***Anecdotal Research*** – Limited empirical research have been done in the field of project failure, thus most findings cannot be related or generalized[19] to a larger population (Pinto and Mantel, 1990).

- ***Multiple causes of failure*** –These may include political, social, economic, legal, environmental or technical (PESTLE) related factors (Pinto and Mantel, 1990).

Additionally, failure is perceived negatively which makes it difficult to share its related information (Cannon and Edmondson, 2001; Edmondson, 2011). However, an earlier attempt by Pinto and Mantel (1990) identified the following aspects as a measure of project failure or success; the success of its implementation; perceived value of a project, and; client satisfaction with the perceived project. Other models for measuring project failure that have been developed over time, are shown in Table 2.4 below and are inconclusive.

Principally, what should be avoided when measuring failure is having a monolithic measurement system (based on time, cost and quality) [20] especially that there are many causes of failure (Atkinson, 1999). However, the starting point, according to scholars such as McGrath and Martin (2017) and Atkinson (1999), should be the iron triangle with other benefits or factors not exceeding 16 in number (e.g., functional or technical specification; the business case; stakeholder engagement etc).

[19] This can be noted from a recent debate, where findings by Flyvbjerg *et al.* (2002) have been disputed by Love and Ahiaga-Dagbui (2018) because the population was too small for generalization .

[20] This is crucial realising that the size of projects has expanded to portfolio and mega projects (Flyvbjerg, 2014) and measurement of success and failure cannot purely rely on the iron triangle, instead consideration should be given to the value and benefits that may arise from projects, which align with project outcomes and impact (Chan and Ejohwomu, 2018).

Table 2.4 Failure Measurement Models

Author	Measurement Aspects	Examples
Pinto and Mantel (1990)	Implementation Process Perceived Value Client Satisfaction.	Schedule, budget, technical goals, team member's relationship. Potential impact of project on users, teams. Measure of success or performance of the project by the client.
Atkinson (1999)	Delivery stage. Post Delivery Stage.	Mainly measures time, cost and quality. The systems: getting it right – identify key stakeholders (Users, customers) though focus on the top management, project manager client and the team.
Lindahl and Rehn (2007)	Participants' perception.	Participants' perception, delivery process' context.
Chen (2015)	Capital projects; time, cost and profitability.	Communication, team, scope, creativity, technology, risk, quality and materials.
Chipulu (*et al.*, 2014)	Project performance.	Society/economy, organisational goals, project level-brief, scope, time, cost, quality, risk, safety, communication, leadership/decision making processes, project team effectiveness.

2.3.6 The Paradox of Success and Failure

Even with the development of several measurement models, assessing whether a project is a success or failure remains a paradox. This is mainly associated with the varying stakeholders' perception and the passage of time (Jugdev and Muller, 2005; Müller and Jugdev, 2012; Turner and Zolin, 2012; Gupta *et al.*, 2019). For instance, McConnell (2015) in referring to policy failure, argues that 'variance over time' renders certain failed projects (during delivery) to being successful projects by citing the Sydney Opera House which was 14 times over budget and with over ten years of delay. Yet, it is one of the world's tourist attraction presently. McConnell (2015) also refers to the factor of 'failure for whom' as a challenge because one person's 'failure' could be another person's success. For example, a local authority's failure to build a waste facility in a community being a success by stakeholders who opposed it. Overall, instead of focusing on the iron triangle, measuring project success/failure should also include project members' satisfaction,

viability or profitability and stakeholders' satisfaction (Baccarini, 1999; Müller and Jugdev, 2012; Turner and Zolin, 2012; Gupta *et al.*, 2019). Worth highlighting is the fact that this research does not attempt to develop a measurement criterion of failure. Instead, since Lf-PRF is hinged on failure identification, an attempt to identify and classify factors to consider when measuring failure is being made (Cannon and Edmondson, 2001; 2005).

2.3.7 Practices and Behaviour Towards Failure

Ormerod (2005) contends that failure is one of the great unmentionables with governments denying any single failed aspects of their policies. Accordingly, scholars such as Sage *et al.* (2014) and Zhang *et al.* (2022) observe that ownership of failure remains a huge hindrance in Lf-PRF since there is always a situation of 'others' when it comes to failure and 'self' in situations of success. This ultimately hinders the possibility of understanding the underlying causes of failure as it is attributed to a project manager without considering other factors such as stress (Sage *et al.,* 2014). Thus, project parties tend to focus on 'whom' to blame instead of finding solutions (Sage *et al.,* 2014). For instance, Edmondson (2011) reasons that most executives consider 70% to 90% of failures being 'blame worthy' and blame their workers so that they work harder. Unfortunately, Shepherd (2003) and Stehlik (2014) conclude that blaming does not result in hard work. Instead, it affects the workers' emotions negatively which reduces their performance (Cannon and Edmondson, 2005). Consequently, organisations are encouraged to reduce such blame cultures, especially if lessons are to be drawn from failures (Edmondson, 2011). Nevertheless, Edmondson (2011) recommends that if failure is due to reckless behaviour or is repeated more than three times, that warrants the blame. Love *et al.* (2011) further advises that everyone must take full responsibility of their actions and be open by stating their limitations so that precautions can be put in place.

Worth considering is Zhang *et al.* (2022) who contend that besides the negative influence of failure, a positive approach through failure coping mechanism is initiated. Through coping mechanisms, employees or those involved in the failure, according to Zhang *et al.* (2022, p. 3) *"when they encounter a project failure, they will allocate more cognitive resources to cope with that failure as well as experiencing a set of negative emotions caused by the failure event, which in turn accentuates the positive relationship between loss-focused coping and learning from failure"*. The influence of leaders (and their behaviour) on the perception of failure cannot be over emphasized. Hence, considering

Stehlik's (2014) conclusion that failure involves the leader, the follower and the environment, each failure must be assessed, and the blame applied appropriately. This is in agreement with Lipshitz *et al.* (2002, p. 90) who observe that "*Tolerance for error is management's principal contribution to psychological safety… it requires striking a delicate balance between sanctioning errors for the purpose of learning and holding people accountable for mistakes that either do not serve this purpose or reflect a failure to learn.* Besides the blame game, Baumard and Starbuck (2005) contend that failure is perceived negatively. Such negative perception is associated with the 'public nature' of failure and the consequential fear of loss of stature or tarnishing an individual's or organisation's image (Cope, 2011). In summary, this study encourages a change of behaviour and shift from a 'moral-approach' or view of failure where individuals are blamed to an 'analytical-approach' which encourages perceiving failure as being not only negative but also positive (Lindahl and Rehn, 2007; Flyvbjerg, 2022). Essentially, there is need to move from the traditional approach, practices and behaviour towards failure to a more critical approach as shown in Table 2.5 below.

Table 2.5 From a Traditional to a Critical Approach to Failure

Failure Parameters	Traditional	Suggested Critical Approach
Measurement factors	Cost, Time, Quality.	Beyond the iron triangle (Atkinson, 1999)
Research	Positivist.	Multi-paradigmatic, a critical approach (Kreiner and Fredriksen, 2007).
Mitigation	Project management best practice.	Good practice plus social, political, ethical and others (Kreiner and Fredriksen, 2007).
Perception of failure	Pathological, unproductive, to be avoided.	Beneficial, productive, necessary (Lindahl and Rehn, 2007).
Criteria	Result, achievement (output).	Continuous process and perception oriented (Kreiner and Fredriksen, 2007; Lindahl and Rehn, 2007),.
General Theory	Moral – Blaming, who to blame	Analytical, problem focused (Lindahl and Rehn, 2007).
Effect on a Project and wider economy	Not productive.	Ultimately, productive, and beneficial.

2.4 ORGANISATIONAL LEARNING

2.4.1 Learning Theory

Schunk (2012, p. 3) defines learning as *"…an enduring change in behaviour, or in the capacity to behave in a given fashion which results from practice or other forms of experience".* From this definition, the following observation can be made on learning:

- ***Change in behaviour*** – This could be change in both project leaders' and team members' considering failure as a source of lessons (Edmondson, 2011) .

- ***Learning through practice and experience*** – Highlights the importance of learning from past experience including failure-related ones. Similarly, Kolb (1984) considers learning as *"the process whereby knowledge is created through the transformation of experience"* (1973, p. 38).

Further, Schunk (2012) and Cassidy (2004) observe that learning does not occur in a vacuum, it is influenced by a number of factors such as the social interactions or the environment in which learning occurs. This aligns with Kolb's (1984) earlier observation that a leaner interacts with both the physical and social environments. With regard to organisational theory, Koskinen (2012) regards learning as a response to a stimulus and an integrating factor of the individual, team, and company levels. Therefore, besides considering learning as a process, Lf-PRF can help unify these various levels.

Accordingly, this study takes a multilevel approach to Lf-PRF as echoed by other scholars (Beck and Plowman, 2009; Hovden *et al.*, 2011; Roussin *et al.*, 2016; Zappa and Robins, 2016; Wiewiora *et al.*, 2019). Ultimately, it can be appreciated that learning involves experience, a community and does not happen in vacuum. Therefore, in the process of Lf-PRF[21], particular attention should be given to the social and physical environments where the failure occurs or where the learning takes place.

[21] Worth noting is the realisation that not every learning results in positive change. Hence, Levitt and March (1988, p. 89) caution that *"learning does not always increase the learner's effectiveness, or even potential effectiveness. Learning does not always lead to veridical knowledge… Entities can incorrectly learn, and they can correctly learn that which is incorrect".*

2.4.2 Learning Theories and Approaches

Yeo (2002) reasons that behavioural and cognitive learning approaches dominate literature on learning. On a broader spectrum Hung (2001) identifies four major theories of learning these being;

- ***Behaviourism***[22] – Focuses on the learner's response to a stimulus and assumes that the inner part of the human process cannot be understood. Thus the attention is their response or behaviour measured in a concrete form (Hung, 2001; Yeo, 2002). Consequently, learning is achieved and observed by responding to the external environment and does not include internal events such as perception, motivation, thoughts, beliefs and feelings (Yeo, 2002; Schunk, 2012). The basic assumption is that learners are unreflective and are conditioned to achieve desirable behaviour (Boghossian, 2006) and disregard their thinking and perception (Yeo, 2002). This act has its limitations since behaviourism considers learners as having no influence on the learning process.

- ***Cognitivism*** – Cognitivism theory focuses on internal learners' processes such as 'thinking' and embraces the view of conditioning learners through instructions (Hung, 2001). Learning takes place through mental processing and emphasizes learner's thoughts, attitude and value (Schunk, 2012). It further assumes that learning is complex, requires new ways of looking at issues and involves problem solving (Yeo, 2002). Its limitation is that though it acknowledges the learner as part of the learning process, reliance on mental models of learning is quite difficulty in ensuring that employees have a shared vision on learning (Yeo, 2002).

The behavioural approach also includes organisational rules and routines of learning and tends to use quantitative research methodologies (Yeo, 2002). Conversely, cognitive approach focuses more on the emotional and thinking process and relies on qualitative research methods such as observations, interviews and focus groups (Yeo, 2002). Hence, in relation to Lf-PRF, it is important that PBOs create an environment (via behaviourism)

[22] Schunk (2012) contends that learning refers to the origin, nature, limits, and methods of knowledge. On that basis, two views of knowledge are held; 'rationalism' where knowledge is gained from reason and 'empiricism' knowledge is gained from experience (Schunk, 2012). The empiricist model acknowledges that the external world or environment influences learning (Cassidy, 2004). Hence, behavioural learning theories are associated with empiricism while cognitive theories are realism oriented (Schunk, 2012).

that encourages learning from failure and at the same time, the perception (via cognitivism) of failure as a negative experience is changed. Realising the limitation of the two learning theories, alternative theories, 'constructivism' and 'social constructivism', have been developed:

- ***Constructivism –*** Regards the learner as a participant in the learning process through the construction of knowledge (Boghossian, 2006). Though the learner participates through knowledge discovery, the influence of the environment and other people on the learner is not considered under 'constructivism' (Hung, 2001).

- ***Social Constructivism –*** Hinged on the understanding that learners are influenced by the environment around them such as history, culture, and belief (Hung, 2001; Jones and Brader-Araje, 2002). It also views knowledge and truth as being created and not being discovered (Karataş-Özkan and Murphy, 2010). Social constructivism emphasizes the role of others, culture, and society using symbols and signs of language (Jones and Brader-Araje, 2002) [23].

Evidently, the understanding of learning has shifted from the intelligence and academic achievements to incorporate many other learning concepts such as perception, motivation, learners' interaction with others and the environment (Hung, 2001). Thus, acknowledging the fact that both learning and project execution do not take place in a vacuum, social-constructivism approach is adopted (Hung, 2001; Cassidy, 2004; Cattani *et al.*, 2011). This is unlike behaviourism and cognitivism approaches were the environment is set for them to receive instructions. See Table 2.6 below which gives a summary of the learning theories.

[23] Similarly, Karataş-Özkan and Murphy (2010) conclude that from a social constructionist perspective, people construct their view of reality through their daily interactions whilst going about their social life, thus embracing a social ontology.

Table 2.6 Learning Theories Adapted from Hung (2001, p. 284)

	Behavioural	Cognitive	Constructivism	Social Constructivism
Learning	Stimulus and response	Transmitting and processing of knowledge and strategies	Personal discovery and experimentations	Mediation of different perspectives through language
Type of Learning	Memorizing and responding	Memorizing and application of rules	Problem solving in realistic and investigative situations	Collaborative learning and problem solving
Instructional Strategies	Present for practice and feedback	Plan for cognitive learning strategies Reinforcement	Provide for active and self-regulated learner	Provide for scaffolds in the learning process
Key Concepts	Reinforcement	Reproduction and elaboration	Personal discovery generally from first principles	Discovering different perspectives and shared meanings

Overall, learning is regarded as the occurrence of 'change' within an organisation (and individuals) and can be actualised by appreciating the influence of others and the environment (Argyris, 1976, 1977; Yeo, 2002). Worth considering is Yeo's (2002, p. 110) understanding of learning as *"the acquisition of existing and the development of new knowledge, attitudes and skills; the application of knowledge, attitudes and skills in existing or new contexts; all with the purpose of improving the performance of the organisation".* Thus, it is important that learning is supported by adequate 'change management' mechanisms in order to achieve meaningful results.

2.4.3 Kolb's Learning Theory and Learning in Projects

Appreciating that experiential learning is encouraged for effective learning since it offers deeper learning and understanding, it is worth considering Kolb's learning theory (Holman *et al.*, 1997; Chan, 2012). Notably, Dewey (1938, as cited in Chan, 2012) is credited with having introduced the concept of experiential learning, as early as the 1930s, and regarded learning as the process of experience, inquiry and reflection. The origin of Kolb's experiential learning theory (KELT) can also be traced in the works of Kurt Lewin and Piaget's model of learning involving 'experience', 'reflection', and 'action' (Piaget, 1970,

cited in Kolb, 1984). Based on the models of Dewey, Piaget and Lewin, Kolb (1973) developed a four-staged continuous learning cycle involving; concrete experience (CE), reflective observation (RO), active conceptualisation (AC) and active experimentation (AE) (Chan, 2012).

Unlike the cognitive and behavioural approaches, KELT takes a comprehensive approach by integrating the two approaches (cognitivism and behaviourism) in learning and appreciates the influence of both experience and perception on learning. The main argument in KELT is that 'concrete experience' is critical in influencing observation and reflection of learners who should be actively involved in new experiences[24]. Essentially making every learning to be *'relearning'* (Kolb, 1984) and unlearning (Stead and Smallman, 1999). Hence, Lf-PRF should involve re-learning or changing the approach, rules, and policies in order to prevent future failures (Stead and Smallman, 1999).

KELT has received criticisms around its poor definition and categorisation of its learning stages and flawed logic[25]. Scholars also argue that it suffers from limited definitions (Bergsteiner *et al.*, 2010; Bergsteiner and Avery, 2014). Though KELT has limitations, it offers building blocks that can be used in Lf-PRF. For instance, Kolb (1973) acknowledges that it is not easy to have a learner who has all the abilities such as 'concrete experimenter' and 'reflective observer' and challenges that one needs to alternate depending on the situation. Additionally, since KELT considers both cognitivism and behaviourism, it offers a better opportunity of engaging learners and creating an environment for learning. This also aligns with Argyris (1976, 1977) who considers learning as a change in behaviour in response to error and recommends a triple approach to learning: 'single loop' learning (reactive to errors); 'double loop' learning (changes in goals and variables), and; 'triple loop' learning (system wide changes such as new rules or policies)[26]. In construction, this can be appreciated from the works of McClory *et al.*

[24] KELT also views learning as a process and not a product or outcome (Kolb, 1973, 1984).

[25] Holman *et al.* (1997) equally observe that the manager is put at the centre of the learning process and is considered as a fixer and scientist who should always be observant.

[26] Cope (2011) also argues in favour of transformative and double loop learning approaches since they are supportive of social processes of learning and necessitate reviewing existing norms.

(2017) who encourage a triple approach to learning from failures through the following 6 steps; act; measure; evaluate; decide; react and learn.

2.4.4 Defining Organisational Learning.

The emergence of OL can be traced back to as early as the 1960s and 1970s when many managers were faced with the challenge of change (Yeo, 2005). Its popularity and attention with scholars and practitioners has been on a rise since the early 1980s (Karataş-Özkan and Murphy, 2010). In trying to encourage PBOs to Lf-PRF, it is worth considering Argyris' (1977, p. 116) understanding of OL as involving both *"detection and correction of errors".* Argote (2011, p. 440) also defines OL as "*a change in the organisational knowledge that occurs as a function of experience".* This aligns with earlier definition by Fiol and Lyles (1985) and more recent Madsen and Desai (2010, p. 454) who define OL as *"a modification in organizational performance as a result of experience".* Profoundly, Huber (1991, p. 89) reasons that *"An entity learns if, through its processing of information, the range of its potential behaviours is changed".*

From these definitions 'experience' and 'change' can be highlighted as some of the key factors needed for OL to occur. Therefore, OL focuses on changing the behaviour of employees in order to improve performance (Argyris, 1976, 1977; Fiol and Lyles, 1985; Schunk, 2012). Thus, 'failure' is one such common 'experience' on projects which may offer lessons. However, selected definitions of OL amongst PBOs given in Table 2.7 emphasize on changing behaviour without including Lf-PRF, except for Argyris (1977) who referred to OL as detection and correction of errors.

Table 2.7 Understanding and Perception of Organisational Learning

Author	Definition	Key Feature
Levitt and March (1988, p. 320)	*"encoding inferences from history into routines that guide behaviour".*	Process
Baurmard and Starbuck (2005, p. 281).	*"involves changing goals and forecasts to reflect experience and current perceptions, adapting decision rules to suit circumstances, modify goals to make them realistic and searching where previous searches have succeeded".*	Process/Change
Swan *et al.,* (2010)	Changing actions new knowledge through reflection and action through sub-groups.	Interaction/change
Argote (2011, pp 440*).*	*"a change in the organisational knowledge that occurs as a function of experience".*	Process/change
Argyris (1977)	The detection and correction of errors.	Failure related
Koskinen (2012)	adjustment to a stimulus from the external environment which is done in order to improve productivity, innovation and competitiveness.	Result oriented

From Table 2.7 above, it can be appreciated that OL is a process and interactive. Therefore, among PBOs OL should not only focus on 'successful experiences', instead, 'failure-related experiences' should also be considered. Furthermore, the production or efficiency view of OL should be avoided as it takes a one-dimensional approach to learning (Easterby-Smith, 1997). Therefore, for this research, through the appreciation of social constructivism, OL is considered as: 'A process of changing behaviour and perception by learning from failure-related experiences through the interaction of team members internally and externally'[27] (Argyris, 1977; Burnes, Cooper and West, 2003; Cassidy, 2004; Koskinen, 2012). Accordingly, OL entails modifying goals, norms and rules with full realisation that both the external and internal environments (social context and learners) influence learning[28] (Baumard and Starbuck, 2005).

[27] Further to that, the study's focus is on learning from 'failure experience' unlike past studies which according to Levinthal and March (1993, cited in Easterby-Smith, 1997) oversampled successes compared to failures mostly influenced by the understanding that organisations promote successful people.

[28] As stated earlier, the social constructionist approach to OL has been adopted where learning is seen as being dynamic, processual, ascribed to members interaction and contextual, as supported by other scholars (Brown and Duguid, 1991; Lave and Wenger, 1991; Karataş-Özkan and Murphy, 2010).

2.5 CONTROVERSIES IN ORGANISATIONAL LEARNING

Though OL has been in existence for some time, there are several debates associated with its understanding. According to Easterby-Smith *et al.* (2000) notable debates include questions such as: '*Is learning a cognitive or behavioural change?*'; '*Single versus double loop learning*?'; '*Is there a difference between organisational learning and a learning organisation*?'; '*Does learning occur in the minds or in the organisational systems?*'. Such debates are appreciated because they have helped shape OL by prompting the creation of new knowledge (Argote, 2011). For instance, the debate on whether learning occurs at individual or organisation levels led to the emergence of the group-level of learning (Easterby-Smith *et al.*, 2000). Though it is appreciated that such debates are beneficial, they still raise misunderstanding and ambiguities. Therefore, to avoid ambiguity, the section that follows addresses some of the debates surrounding OL.

2.5.1 Organisational Learning vs Learning Organisation

Burnes *et al.* (2003) contend that even though OL and 'learning organisation' are sometimes used interchangeably, there is a difference. Tsang (1997, cited in Burnes *et al.,* 2003) concludes that the difference is basically in the latter '*being'* and the former *'becoming'*. Similarly, Yeo (2005) considers 'OL' as a process and 'learning organisation' as a type of firm. Burnes *et al.* (2003) further notes that OL involves activities that happen in an organisation when learning while a 'learning organisation' is an organisation that is good at OL. Accordingly, Chinowsky *et al.* (2007) identifies supportive leadership, process and infrastructure, communication, and culture as key features already present in a 'learning organisation' yet perhaps absent in an 'OL' based firm[29]. Table 2.8 below gives a summary of the comparison. For this research, OL has been adopted. This is because over time, the use of the term 'learning organisation' has reduced. Additionally, there is no agreed measurement of exactly when an organisation attains the level of being a 'learning organisation' (Burnes *et al.,* 2003).

[29] Considering, McClory *et al.* (2017) the term 'learning organisation' refers to a firm which considers learning in all its activities such as culture, ethics, governance to support learning and knowledge creation, storage and access throughout the organisation.

Table 2.8 Organisational Learning or Learning Organisation? Adapted from Burnes *et al.* (2003)

	Organisational learning	**Learning Organisation**
State	Becoming.	Being.
Mode or learning	Reactive.	Systematic, conscious learning, deliberate, synergistic.
Involvement	Top management, a few individuals.	Everyone.
Practice Orientation	Nonpractice – Academic.	Practice oriented.

2.5.2 Organisational Learning versus Knowledge Management.

Paradoxically, Chinowsky *et al.* (2007) consider knowledge management as being distinct, yet similar to OL because knowledge management takes a reactive approach by capturing knowledge after the event has occurred. The difference between the two can therefore be appreciated in the manner they are applied. Even though the two are viewed differently, scholars contend that knowledge management provides a platform for improving OL through technology while OL clarifies the learning (and knowledge management) process. This is by identifying agents, content, levels of learning and the social aspect of learning (Storey and Barnett, 2000; Hall *et al.*, 2012).

Thus, there is a shift towards dissolving this dualism (Easterby-Smith *et al.*, 2000; McClory *et al.*, 2017). Yet, others still argue that OL is diminishing while knowledge management is on the rise due to the perception that in OL no knowledge is created as compared to knowledge management (Storey and Barnett, 2000; Easterby-Smith *et al.,* 2000). On the contrary, OL is not all about creating knowledge but also unlearning (Nystrom and Starbuck 1984 cited in Burnes *et al*., 2003). The major differences between OL and 'knowledge management' are summarised in Table 2.9 and are not exhaustive. For this study, OL will be adopted instead of knowledge management since it involves the creation, storage, and use of knowledge (Hall *et al.,* 2012). Beyond that, OL also captures the social relations of learners unlike knowledge management which focuses on tools and technology for capturing and sharing the knowledge in most instances (Storey and Barnett, 2000).

Table 2.9 Organisational Learning vs Knowledge Management - Adapted from Storey and Barnett (2000).

	Organisational Learning	**Knowledge Management**
Objective	Change of behaviour through experience.	Capture, manage knowledge.
Focus	People.	IT and Tools.
Knowledge	Application of knowledge through learning.	Capture, store, and use of knowledge.
Response	Proactive.	Reactive.

2.5.3 Culture and Organisational Learning from Failures

According to Hofstede (2001) and Schein (2004), culture influences an organisation's performance including the people that work in it. It is also acknowledged that culture is one phenomenon that influences many aspects of project management such as; project success (Ajmal *et al.*, 2010; Stare, 2012), knowledge management and sharing (Wiewiora and Murphy, 2015), failure (Stead and Smallman, 1999) and learning (Cassidy, 2004). Accordingly, Ajmal *et al.* (2010) contend that a culture that lacks incentives and appropriate information system leads to unsuccessful knowledge management on projects. This aligns with Smith and Elliott's (2007) reasoning that the learning process relies upon the culture, communication, structures, and reward systems of organisations[30].

Furthermore, Cassidy (2004) argues that learning does not occur in a vacuum and underscores the influence of the socio-cultural environment on the learning process. Thus, focusing on failure, Vuuren (2000) recommends that the evaluation of failure should take a comprehensive approach by paying particular attention to culture besides the technical mechanisms. Organisational culture is also encouraged by Stead and Smallman (1999, p. 12), especially in learning from disasters and failures, who observe that *"With regard to factors restricting organizational learning, culture must be given further weight in studies of crisis".* Hence, for PBOs to effectively Lf-PRF, attention should be given to the socio-

[30] Wiewiora *et al.* (2013) further observe that organisational subcultures induce reluctance in transfer of knowledge among project managers due to 'silos' and a culture of 'lonely cowboys' with no interdependence. See Turner (1976) and Shore (2008) who discusses culture and learning from failures and disaster.

cultural context of both the organisation and the project. Unfortunately, in some situations culture breads a state of normalcy. This is when certain norms and beliefs in institution practices are tolerated in that failure is not possible which may lead to catastrophic disasters (Turner, 1976). For instance Shore (2008) observes that organisational culture (overconfidence and unwillingness to raise the flag) led to the Columbia shuttle disaster.

On the contrary, culture must not only be perceived as a hindrance but as an enabler (Stead and Smallman, 1999). This is by developing an open and collaborative culture with respect to learning from failure with an organisation and across the sector. Therefore, building on Cameron and Quinn's work (2005, cited Wiewiora *et al.*, 2013) four types of behaviour towards knowledge sharing induced by organisational culture were developed by Wiewiora *et al.*, (2013) as follows:

- ***Clan culture*** – Emphasized on collaboration, non-competitive and friendly atmosphere.

- ***Market type Culture*** – Reluctant to share knowledge due to emphasis on competitiveness and achievement orientation.

- ***Adhocracy culture*** - Flexibility, creativeness, and adaptability.

- ***Hierarchy culture*** - Procedural, information management, documentation, routines, control, and centralization.

Realising that the challenge of failure(s) is experienced by majority in the sector, it is inevitable that a 'clan culture' is developed amongst PBOs to allow for Lf-PRF across organisations[31]. Contiu *et al.* (2012) describes culture as being the personality of an organisation which is unique from others with its distinct norms, behaviour and values. Thus, focusing on the norms which are also considered to be informal and formal laws (Sumner, 1907, cited in Kulatunga, 2010) the research discusses how these (norms) can

[31] Hence, at the core of Lf-PRF, Smith and Elliott (2007) emphasize the need for a change in behaviour of how the knowledge is used and inevitably a change in organisational culture for sustained leaning. This also includes considerations of cross OL and exchange of failures lessons.

influence a ‘culture of Lf-PRF’. This is both as inhibitors and enhancers by adopting Neo-Institutional Theory through the three institutional pillars (regulatory, normative, and culture-cognitive) and the isomorphic forces (coercive, normative, and mimic) shown in Figure 2.1 below. Considering Figure 2.1 below which echoes the need to change the culture and perception of failure, this has led to the adoption of Neo-Institutional Theory as the theoretical lenses for the study. See Chapter 3, Conceptual Framework, for a detailed discussion.

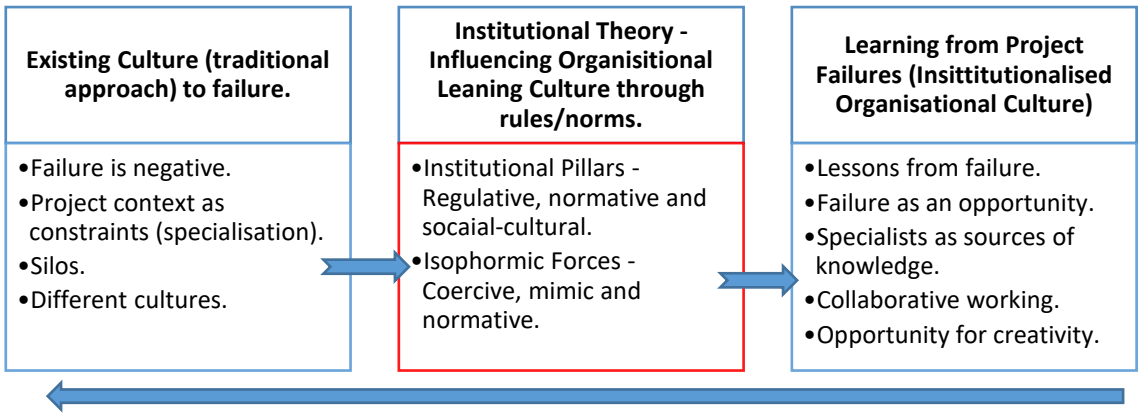


Figure 2.1 Institutionalization of Organisational Learning from Project Failures.

However, as a precaution, learning within a project environment or PBOs cannot be taken literally as in the case for learning from organisations operating in non-project-related environments. Hence, learning within PBOs is given particular attention in the following section.

2.6 LEARNING IN PROJECT-BASED ORGANISATIONS

Over time, PBOs including those operating in the construction sector have been experiencing a number of changes such as globalisation, changing clients’ needs, the aging workforce, uniqueness of projects with clients requiring different solutions and technological changes (Chinowsky *et al.*, 2007). In a bid to improve PBOs’ performance, many scholars acknowledge that OL remains key (Burnes *et al.,* 2003; Chinowsky *et al.*, 2007; Bakker *et al.*, 2011; Bartsch *et al*, 2013). Consequently, there has been increased research on how PBOs can conduct project-based learning (Scarbrough *et al.*, 2004; Swan *et al.*, 2010). According to Prencipe and Tell (2001), Scarbrough *et al.* (2004) and Bartsch *et al.* (2013) project-based learning refers to the creation and acquisition of knowledge on a project which is later transferred to other projects and parts of an organisation.

2.6.1 Importance of Organisational Learning and Its Drivers Within PBOs

According to Hall *et al.* (2012), both the private and public sector organisations are investing huge sums of money in learning since individual and departmental intangible benefits accrue from learning. For instance, Burnes *et al*. (2003) note that OL enables firms to manage and transition through change and enhances competitiveness. This resonates with Senge's (1990) earlier reasoning that OL is an important discipline for the survival of any organisation. Koskinen (2012) reasons that OL helps to integrate key elements of an organisation for better performance. Improved productivity, innovation, and market share performance have also been noted as some of the benefits of OL in PBOs (Bartsch *et al.*, 2013).

From extant literature, failure is rarely cited among drivers of OL in PBOs. What is considered mainly is improving performance, best practice, and competitiveness and innovation[32]. In contrast, Burnes *et al.* (2003) and Cannon and Edmondson (2005) reason that failures within an organisation ought to influence its learning in order to avoid repetition of mistakes and improve problem solving mechanisms. Thus, this research, argues in favour of viewing failure as a driver of learning since it offers lessons and opportunities of mitigating failures or disasters (Stead and Smallman, 1999; Voss and Wagner, 2010).

2.6.2 Nature and Key Parties Involved in Learning within PBOs.

Within PBOs, Wiewiora *et al.* (2013) observe that various experts from different fields, professions, background and cultures are involved in OL. Thus, the environment for learning within PBOs and outside is viewed as complex and multifaceted (Müller *et al.*, 2014). Similarly, Easterby-Smith *et al.* (2000), Hofstede (2001) and Schein (2004) conclude that there is more to learning than individuals since it is influenced by systems, structures, interaction of learners (and team members) and cultural. Correspondingly, Sydow *et al.* (2004) and Turner and Keegan (1999) encourage a multi-level approach to learning in PBOs, that is; within the projects, between project teams, firm level and between firms. This aligns with the ecology perspective based on Hannan and Freeman's

[32] Other key drivers include; performance, meeting clients' demands (Koskinen, 2012), aging workforce, the need for better solutions, evolution and growth of organisations and the distribution of workforce (Chinowsky *et al.*, 2007).

(1977, pp. 933–934) who earlier argued that: *The situation faced by the organizations analyst is more complex. Instead of three levels of analysis, he faces at least five: (1) members, (2) subunits, (3) individual organizations, (4) populations of organizations, and (5) communities of (populations of) organizations"*[33]. Thus, when researching on OL in PBOs, it is worth considering Hannan and Freeman's (1977) 'community of organisations' or the ecological perspective. Similarly, Chinowsky *et al.* (2007) identify the organisation (top management and all other management levels) and the community (group of individuals involved in similar technical activities) as parties involved in OL[34]. Accordingly, the core factors influencing OL according to Yeo (2005) are relationships, team building and cooperation among team members

Therefore, this study agrees with scholars such as Yeo (2002), Swan *et al.* (2010), Love *et al.* (2011) and Wiewiora *et al.* (2019) who recommend integration of the following levels or parts for effective learning among PBOs: individual, team/department, project and sector/industry level. Essentially, learning does not occur only at individual level (Yeo, 2002, 2005; Karataş-Özkan and Murphy, 2010) or one level of organisational members (lower or upper ranks/managerial). Instead, learning involves the interaction of all parties within and outside an organisation.

2.6.3 Tools, Approaches and Process of Learning within PBOs.

Hartmann and Doree (2015) contend that majority of PBOs rely mostly on post-project reviews, company intranet, and face-to-face meetings to share lessons from past projects. Unfortunately, because such mechanisms trivialise the process of learning on projects by taking a sender/receiver approach, they are considered to be ineffective (Hartmann and Dorée, 2015). Therefore, Love *et al.* (2011) and Duffield and Whitty (2015) argue in favour of having a balanced application of both 'people' and 'technology' mechanisms in learning. Hence, additional technological tools for data storing and processing are also being encouraged such as collaboration technologies since these are dynamic and are not based on sender-receiver approach (Duffield and Whitty, 2015). Further to that, Hobday

[33] Hannan and Freeman's (1977) observation highlights challenge recently observed by Miterev *et al.* (2017) that structuring for PBOs still remains a challenge since no standard structuring exists.

[34] For a detailed discussion of the construct and sub-processes in Figure 2.3 see Huber (1991) which saves as a summary.

(2000) contends that learning within PBOs involves both ‘formal’ and ‘informal’ learning. The common being formal learning which involves a structured approach to knowledge sharing, training, reviews, personnel development, and leadership. Accordingly, learning in PBOs is supported by creation of formal learning space, time, incentives and regular workshops (Hobday, 2000; Lukic *et al.*, 2012). On the other hand, informal approaches are supported by creation of coffee spaces and layout of office space and tables (Hobday, 2000).

Regarding learning approaches or mechanisms, Scarbrough *et al.* (2004) establish three forms of learning on projects namely: Practice Based; Project Autonomy[35], and; Knowledge Integration. Table 2.10 below provides a summary of models and practices of OL in PBOs.

[35] According to Scarbrough *et al.* (2004, p. 1582) Project Anatomy is *“allowing the development of practices which are distinctively different to mainstream organizational practices. In effect then, one of the implications of project autonomy is to highlight the importance of a further division of practice — that between project practices and organizational practices — in shaping project-based learning”.*

Table 2.10 Organisational Learning Process Models and Parties in PBOs

Author	Process/Model	Structure or people/culture	Problem/Interest and Solution	Parties Involved	Learning Approach
Huber (1991)	Knowledge Acquisition, Information Distribution, Information Interpretation and Organisation Memory.	People.	Lack of understanding of OL – Broader evaluation of past literature.	Within and outside the organisation.	Behavioural and cognitive.
Crossan et al (1999)	4I – Model - Intuiting; Interpreting; Integration; and Institutionalize.	People/Structure.	Strategic renewal – Viewed learning as dynamic and the open system approach.	Individual, group and organisational level.	Cognitive.
Prencipe and Tell (2001)	Experience Accumulation; Knowledge Articulation; Knowledge Codification – Suggested learning landscapes.	Structure.	Learning at all levels of an organisation and knowledge codification.	Inter-project learning (included all levels)	Cognitive.
Zollo and winter (2002)	Experience Accumulation, Knowledge Articulation, Knowledge Codification.	People/Structure.	Contingent factors relating to the task to be learned; frequency, homogeneity, causal ambiguity.	Organisational level	Behavioural and cognitive.
Lipshitz et al. (2002)	Multifaceted Model: Structural Facet; Cultural Facet; Policy Facet; Psychological Facet; Contextual Facet	Multiple facets.	Integrative approach to learning	All levels	Social constructivism.
Wiseman (2007)	Pre-institutionalization; Institutionalization and Post-institutionalization.	People/Structure.	Institutionalization leads to the embedding of knowledge in the organizational memory	Organisational level	Non empirical/ social constructivism.

Karataş-Özkan and Murphy (2010)	Paradigms in Organisational Learning	People/Structure	Lack of critical paradigmatic approach to learning- learning being complex and contextual embedded, suggests social constructionist.	Individuals/Organisational and Context	Social constructivism - Generation and sharing of knowledge from crises, economic and social uncertainties.
Wiewiora, Smidt and Chang (2019)	Learning Mechanism – Individual, Team/project and Organisation.	People, structure	Addresses the temporal nature of PBOs and suggested a multi-level approach to learning.	Multi-level	Social Constructivism
Wiewiora et al. (2013)	Competing Values Framework of Clan-type and Market-type Learning Cultures.	People and Structure	Influence of project sub-cultures on knowledge sharing in PBOs. Need for awareness on culture types.	Multi-level	Social constructivism.
Pemsel *et al. (2014)*	Setting Knowledge-based goals; Providing means of achieving goals; Controlling progress and Achieving knowledge-based goals.	Structure	The challenge of a temporal project imbedded in a permanent PBO; Goal setting through knowledge governance	Multi-level	Behavioural
Duffield and Whitty (2015)	Systemic Lessons Learned Knowledge model – SYLLK	People and Technology.	Inability to apply lessons learnt. Combined the social and technological	Project	Social constructivism.

Table 2.10 above shows a focus on either a project or organisation which does not address the context or ecological levels which influence learning. Table 2.10 above also reveals a focus on 'structural' and 'cultural' mechanisms as per findings of Popper and Lipshitz (2000) and Lipshitz *et al.* (2002). In contrast, Easterby-Smith (1997) also observe five 'disciplines' of OL themed as: Psychology (Human Development); Management Science (Information Processing); Sociology and Organisation Theory (Social Structures); Strategy (Competitiveness), and; Cultural (meaning systems), which can also be related to the facets observed by Lipshitz *et al.* (2002): 'structural facet'; 'cultural facet; 'psychological facet'; 'policy facet', and 'contextual facet' shown in Figure 2.2 below. This is unlike the common two dimensional approach of structure and culture observed by other scholars (Popper and Lipshitz, 2000; Yeo, 2002). Similarly, Probst and Buchel (as cited in Burnes *et al*., 2003) also identify four approaches of enhancing learning within an organisation by developing the following four areas: (i) 'strategy' 'structure' (ii) 'culture' (iv) 'developing human resources'. However, this study favours Lipshitz *et al.* (2002) model instead of Probst and Buchel (as cited in Burnes *et al*., 2003) since it is holistic by including psychological and contextual facets which are ideal in addressing the challenges of Lf-PRF such as fear to state situations as they are.

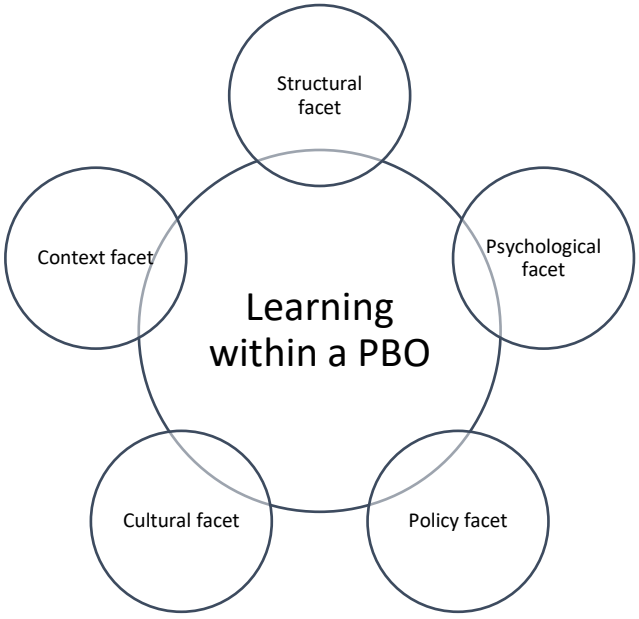


Figure 2.2 Facets for Learning from Project-Related Failures - Adapted from Lipshitz *et al*. (2002).

The learning process within PBOs can be associated with that of Huber (1991) elaborated in Figure 2.3 below with the main stages being: ‘Knowledge Acquisition’; ‘Information Distribution’; ‘Information Interpretation’, and; ‘Organisation Memory’. Huber's (1991) model aligns with Prencipe and Tell's (2001) model (Experience Accumulation; Knowledge Articulation; Knowledge Codification), and; Zollo and Winter's (2002) model (Experience Accumulation, Knowledge Articulation, Knowledge Codification)[36].

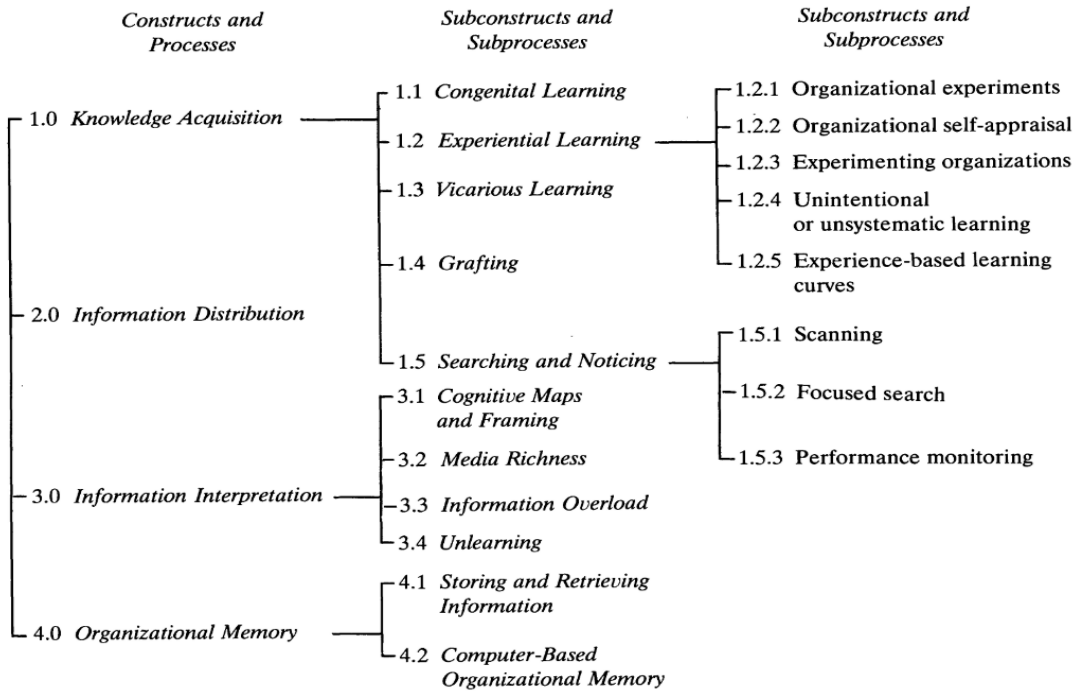


Figure 2.3 Constructs and Process(es) For Organisational Learning - Adapted from (Huber, 1991, p. 90).

2.6.4 Barriers to Organisational Learning in PBOs

Though OL is being encouraged, its implementation by PBOs still presents challenges (Hartmann and Dorée, 2015). Among these, Mainga (2017) cites the lack of motivation and incentives to employees for participating in post project reviews and fear of being dismissed when mistakes are reported. Hall *et al.* (2012) also observe the challenge of

[36] This is also similar to other scholars who consider OL or learning as the creation and transfer or diffusion of knowledge among members of a unit (Yeo, 2002; Karataş-Özkan and Murphy, 2010).

capturing tacit knowledge on projects. For instance, though projects with a long-life cycle may offer an opportunity of longer duration for learning, lessons are shared only a few cases (Prencipe and Tell, 2001). Other barriers include synaptic (language) barriers; semantic (meaning), and; practice boundaries (Scarbrough *et al.,* 2004).

The nature of PBOs also presents a challenge for successful learning since they involve different professionals and individuals with varying values and needs[37] (Turner and Keegan, 1999; Awuzie and McDermott, 2016). Prencipe and Tell (2001) and Swan *et al.* (2010) further note factors associated with the nature of a project and its context. These include the number of projects within a PBO, their scope and size, composition of team members and individual commitments to each project[38]. The focus on immediate deliverables, temporariness and diversity of team members (dispersing and assembling at different times) have been identified as barriers by Holzmann (2013) and Barbosa *et al.* (2022). According to Chinowsky *et al*. (2007) other barriers may include; a lack of resources (lack of time, money); lack of systems and infrastructure for learning; social/behavioural/human (lack of leadership) and; perceptual (value measurement). Dutton *et al.* (2014) summarises barriers to learning in PBOs under the following three types:

- **Actional-Personal Barriers** – Individuals behaviour, thinking, and attitude.
- **Structural Organisational Factors** – Existing structures, rules, and processes.
- **Societal Environmental Barriers** – Depending on the context of the groups.

In summarising the barriers, the study agrees with Yeo, 2002 (p. 117) that "*the decision-making process of top management, the macro structure, the mission and competitive*

[37] In line with that, the study aligns with Wiewiora *et al.* (2013) who reason that knowledge sharing in PBOs is complex due to the many parties involved with different types of knowledge (technical, procedural) required at different stages of a project.

[38] Besides that, the lack of a standard organisational structure (Miterev *et al.,* 2017), type of organisation and processes (Hobday, 2000) in PBOs also hinder learning. Sydow *et al.* (2004) argues that PBOs' focus on project completion, the risk of reinverting the wheel, strategies and technologies and the lack of clarity between organisational and inter-organisational learning process all hamper learning in PBOs.

strategy of the organisation, and the number of environments in which an organisation functions, all affect the level of learning to some extent".

2.6.5 The Influence of Nature of Projects and PBOs on Learning

To the above list of barriers to learning within PBOs, the nature of projects and PBOs[39] should be added. Evidently, Bakker *et al.* (2011) consider learning in PBOs as being paradoxical since the unique, inter-disciplinary and transient nature of projects which may inhibit the learning process may also make it convenient for knowledge creation and learning. For instance, Scarbrough *et al.* (2004) note that though specialization on projects creates learning boundaries, it also offers an opportunity for the collection and storage of lessons. Sydow *et al.* (2004) adds that multi-disciplinary organisations or teams that come together on a project must be viewed as repositories of knowledge. Similarly, physical separation of projects from the parent organisation also presents an opportunity for learning since PBOs can make their own rules and be open to each specialised team (Scarbrough *et al.*, 2004). Hence, instead of focusing on project-related barriers such as uniqueness of projects and different professionals, these should be viewed as enablers since having different communities, or heterogeneous teams, is ideal for quick development of networks or links for learning (Holzmann, 2013; Hartmann and Dorée, 2015).

2.6.6 Overcoming the Barriers and Enhancing Learning in PBOs

Even with the highlighted barriers to OL, the need for learning within PBOs cannot be overemphasized. To achieve that, Chinowsky *et al.* (2007) argue that top management (leadership) should involve everyone and take a leading role by allocating adequate resources to support learning. Instead of focusing on learning within an organisation, Sydow *et al.* (2004) also suggest the adoption of 'competence networks' as means of encouraging inter-organisational learning. This aligns with Levinthal and March (1993)

[39] To be more specific, PBOs' focus on immediate deliverables, temporariness and diversity of team members with varying background, skills and dispersing and assembling at different times have been identified as barriers to learning by Holzmann (2013). It is also worth considering Swan *et al.* (2010) who caution that learning within projects cannot be treated in the same manner as in an ordinary organisations. Particular attention should be given to the projects' unique features such as temporal teams.

who earlier recommended the use of exploitative (internal mechanisms and sources) and exploratory (external mechanism and sources) approaches to learning.

Furthermore, establishing the 'process', 'type of knowledge' and the 'form in which it is to be stored' remains crucial for effective learning observe Dutton *et al.* (2014)[40]. It is further argued that success in learning is mostly achieved by organisations that apply both the cultural and processes related measures (McClory *et al.*, 2017). Swan *et al.* (2010) and Crossan *et al.* (1999) also recommend formalisation or institutionalization of learning in an organisation by establishing standardized systems. To assist in that endeavour, Hobday (2000) recommends having learning coordinators in functional lines to oversee the learning while Chinowsky *et al*. (2007) emphasize the need for individuals to be informed of their individual or personal benefits of the learning process[41]. Hence, as a means of enhancing learning and overcoming its associated barriers in PBOs, Neo-Institutional Theory was adopted by this research. Since projects are unique and involve teams with varying specialisation, Situated Learning was also adopted as a learning mechanism via communities of learners. This aligns with Sydow *et al.* (2004) who argue in favour of competence networks for better inter-organisational learning among PBOs.

2.7 THE IMPORTANCE OF ORGANISATIONAL LEARNING FROM PROJECT-RELATED FAILURES (Lf-PRF).

The need to learn from failure is enshrined in OL. This is based on the understanding that any organisation's quest of learning involves reflecting on the past in order to correct errors (Argyris 1976, 1977). This is supported by Levitt and March (1988, p. 319) who note that *"Organizational learning is viewed as routine-based, history-dependent, and target-oriented. Organizations are seen as learning by encoding inferences from history into routines that guide behaviour".* Koskinen (2010) and more recent, Barbosa *et al.* (2022) further contend that the future cannot be improved without considering the past. Similarly, Edmondson (2011) argues that learning from failures helps improve performance of an organisation. Consequently, research on learning from the past over time has seen an increased focus on Lf-PRF in particular (Madsen and Desai, 2010). This

[40] Correspondingly, Koskinen (2010) notes that many projects record minutes of their meetings which are not taken to the next or new project.

[41] See Holzmann (2013) also who suggests the use of knowledge brokers.

is because ‘failure’ is considered to be inevitable and very much a part of human life (Ormerod, 2005; Edmondson, 2011). PBOs in particular devote more time and resources to Lf-PRF due to the increasing failure rates against advancements in technology (Shore, 2008). For that reason, Syed (2015) vies that it will be illogical for organisations not to learn from failure(s). Hence, the following section highlights some of the benefits and drivers of Lf-PRF.

2.7.1 Why Learning from Failure - The Benefits of Failure.

Though failure is associated with negative effects, many scholars argue that failure offers beneficial lessons and improves emotional resilience in team members (Shepherd, 2003; Carmeli and Schaubroeck, 2008; Edmondson, 2011; Wang *et al.*, 2019). Failure motivates managers and helps develop better models and innovation (Wilkinson and Mellahi, 2005; Raspin, 2011; Teng and Pedrycz, 2022). Similar reasoning can be appreciated, long before from Cyert and March (1963, as cited in Baumard and Starbuck, 2005) who observe that failure encourages a behavioural improvement and innovation and Hayek (1945, cited in Shepherd, 2003) who also reasons that failure generates improvement in technologies and increases economic resilience. Ormerod (2005) further argues that failure is key for a better understanding of success and considers it as a necessity for the healthy and survival of any system. Baumard and Starbuck (2005) equally agree that learning in an organisation occurs when problems (representing failure) are encountered[42]. In support of that, Lindahl and Rehn (2007) argue that future projects benefit from the ‘martyrdom’ of present projects that fail by offering lessons.

Conversely, other scholars such as Ellis *et al.* (2006), Ellis *et al.* (2014) and Kreiner and Fredriksen (2007) favour of learning from both success and failure since failure is given much attention. On the contrary, Hodgson and Cicmil (2008) and Raspin (2011) contend that most P*r*F are suppressed or go unnoticed. Therefore, the assumption by Kreiner and Fredriksen (2007) that failure receives more attention than success is debatable because mostly failure is not reported in many organisations due to its negative perception

[42]Thus, failure including other negative occurrences such as disasters, are considered as being beneficial to organisations since they provide lessons and create a cautious or careful approach within a team (Pidgeon, 1998; Voss and Wagner, 2010; Dekker, 2013; Crow *et al.*, 2018). This is because the negative consequences of failure such as financial loss, especially in enormously costly projects such as the orbital launch vehicles, forces organisations to pay particular attention to failures (Madsen and Desai, 2010).

(Cannon and Edmondson, 2005; Syed, 2015). Moreover, it has been acknowledged that organisations learn more from their failures than their success since failure highlights weaknesses in a system (Madsen and Desai, 2010; Raspin, 2011; Syed, 2015). Accordingly, the study agrees with Shepherd's (2003, p. 318) reasoning that *"by seeking success and avoiding failure, firms introduce errors that cannot only inhibit learning and interpretation processes but also make failure more likely or expensive than necessary".* Therefore, learning from success only makes failure more likely because team members become too confident. Team members also mostly focus on how to succeed and not how to prevent failure (Baumard and Starbuck, 2005; Syed, 2015). Thus, by Lf-PRF, organisations gain experience, identify and correct weaknesses within their system unlike a focus on success (Desai, 2016)[43].

Comparing 'success' and 'failure', more attention, thinking and retention is given to negative events (failures) compared to positive ones (Bledow *et al.*, 2017). Thus, the two are perceived differently with failure evoking a sense of checking for errors as observed by Ellis *et al.* (2006, p. 670) *"Failures differ from successes… because of the way failures are cognitively treated as opposed to successful events… errors motivate learners to figure out how to correct them in order to improve future performance. In contrast, successful experience does not clearly indicate that errors were made".* Beyond benefiting a single organisation the wider society benefits by applying the knowledge generated from the failures (Syed, 2015).

However, as a caution, the benefits of a 'loss' should not be overstated advises Shepherd *et al.* (2011). Hence, a critical approach to Lf-PRF should be taken. Brown and Jones (1998, cited in Sage *et al.* 2014) also add that failure often benefits a particular group of people and interests. Similarly, Baumard and Starbuck (2005) reason that failure is painted negatively because others want to draw advantages from it. Consequently, it is argued that 'benefits' of failure should benefit the client and other key stakeholders involved in that particular project. Subsequently, not all failures are inevitable (or beneficial) because some can be avoidable as observed from Edmondson's (2011) classification of failures as being: avoidable; blame worthy and praise worthy. Worth

[43] In agreement, Bledow *et al.* (2017, p. 40) reason that *"A one-sided focus on others' successes at the expense of their failures may hinder the development of managerial competence, because learners derive specific lessons from failures, and respond differently to success and failure".*

stating is that lessons should be drawn from all types of failures because each failure offers different valuable lessons[44].

2.7.2 Salient Features of Learning from Project-related Failure (Lf-PRF)

Learning from failure is difficult and is not an automatic process since it is complex and involves emotions (Shepherd *et al.,* 2013; Desai, 2016). Thus, Love *et al.* (2011) advise that Lf-PRF should be considered as a continuous process to influence the peoples' behaviour and the project systems. Accordingly, Cope (2011, p. 606) refers to Lf-PRF as the '*learning journey'* and a '*stepping stone'* since it presents learning opportunities*.* Consequently, studies and models have been developed in various sectors and industries such as aviation, transportation and healthcare in a bid to benefit from such occurrences (failures, accidents and disasters) (Carmeli, 2007; Shore, 2008; Kilic and Soran, 2019). Table 2.11 below details some selected models relating to learning in PBOs and Lf-PRF.

[44] It is worth noting that there is a difference between accepting (allowable failures) and legitimising failure. The first case is on the basis that failure is inevitable and must be identified and analysed for future lessons while the latter situation sees failure as a norm with no consideration of analysis.

Table 2.11 Summary of Selected Research Related to Learning from Failures

Author/Sector	Model/Features	Structural/Process or People/Cultural.	Problem and solution	Levels and learning approach	Research Gap
Cannon and Edmondson (2001) – Multi-sectoral	Failure Identification, Discussion and Analysis; Managing Conflict.	People.	Psychological and organisational barriers; – clear direction and supportive work context.	Individual and Organisational level - Social-constructivism.	The lack of systematic literature and learning process from failures.
Cannon and Edmondson (2005) – Multi-sectoral	Identify Failure, Analysing failure and Deliberate experiment.	Structural and People.	Technical and social barriers - Learn from small and big failures; mindset shift (negative to positive perception).	Managerial – Cognitive.	Building routines, structures, and incentives to encourage/enhance learning from failures.
Carmeli (2007) – Private and Public sector.	Psychological safety and Social Capitals' influence on LfF behaviour.	People.	Use of social capital in creating psychological safety to encourage LfF behaviour.	Considered top and middle management. Behavioural.	Personality, attributes and attitudes of manager towards Lf-PRF; Understand failure-based learning behaviours;
Madsen and Desai (2010) – Space Industry	Effects of success and failure on organisational learning.	People.	Lack of clarity on whether organisations improve more their performance by learning from failure or success alone or from both	Organisational level – Cognitive.	Learning and benefit from failure without being exposed to its costs; Investigation process of failure influence on learning from it.

Cope (2011) - Entrepreneurship	Failure recovery Continuum; Aftermath, Recovery from failure, Re-emergence (learning from failure).	People.	Recovery from failure and emergency from failure - Encourages grief recovery and avoid prolonged critical self-reflection.	Individual – people - Social-constructivism.	examining of the failure time frames through a learning lens. Defining the process of learning from failure.
Shepherd, Patzelt and Wolfe (2011) – Entrepreneurship	Coping Orientation during project failure.	People.	Varying healing process; coping of project team members with the occurrence of failures - managing negative emotions	Organisational level – Behavioural.	Review the varying perceptions of members project success and failure.
Shepherd et al. (2013) Entrepreneurial Project Related	Failure and emotions of team members.	People and Process.	Learning process and failures viewed as complex - Management of negative emotions from multiple project failures.	Individuals – Behavioural.	Insufficient attempts made on learning from other companies pursuing similar initiatives.
Desai (2016) – Railway	Organisation's knowledge codification and production arise from exposure to failure.	People.	Conflicting understanding of failure: source of opportunities and threats. – Encourages learning from failures as a buffer to threats.	Organisational level - Social-constructivism learning.	Collect data over a longer time and differentiate the severity of failure.
Walsh and Cunningham (2017) – ICT business failure	The attribution of failure.	People.	Influence of Attribution of failure on learning from failure.	Manager - Behavioural and cognitive.	Limited research on failure attribution and learning from failures.
McClory *et al*. (2017) – Project Management	Act; Measure; Evaluate; Decide: React; Learn	People and Process.	Triple Loop Project Learning Approach.	Project and Organisational Levels – Cognitive.	Lessons learnt throughout the project.

					life cycle and organisation wide.
Bledow *et al.*, (2017) – Management	Learning from other people's failures – Vicarious learning.	People.	Learning from failure stories; Institutionalisation of communication of failures.	Individual/managerial - Cognitive.	Lessons from other people's failures is under-utilized.
Velikova, Baker and Smith 2018) – Construction sector.	Taxonomy of failure (Causes, symptoms, and consequences).	Process.	Lack of understanding and definition of failure Suggested a failure taxonomy	Cognitive.	Introduction of 'failure' in the engineering curriculum.
Min (2018) – Aviation	Vicarious learning from crises – Learning spill overs.	People/Process.	Lack of research in failure/crises at an international level. Encourages vicarious learning.	Inter-organisational/international level – Cognitive.	Identify potential vicarious crises that can be used for learning.
Kilic and Soran (2019) – Aviation	Human Factors Classification and Analysis System (HFACS).	People – Pilot training.	Introduced non-technical skills in training pilots by learning from failures and accident.	Student training - Cognitive learning.	

Other models include that of Lukic *et al.* (2012) who identify the lack of a clear approach to learning from incidents by firms and provide five key factors: participants (learners); type of incident; learning process; type of knowledge, and; learning context. The other popular model is the Swiss Cheese model which has been applied in other sectors such as health, railway, nuclear power and aviation (Duffield and Whitty, 2015). However, many of these models or research have not been applied in PBOs operating in the construction industry with majority being applied in management and entrepreneurship related studies as shown in Table 2.11 above.

Scholten *et al.* (2019) also identify the following antecedents for learning from non-routine incidents: processual; anticipative; situational; collaborative; experiential, and; vicarious. Raspin (2011) also identifies 5 points for Lf-PRF: share information with qualified and involved parties; search for both minor and major failures; vicariously learning from other organisations' failures; executive power and feedback, and; establishing deliberate learning processes. Considering Table 2.11 above, research among PBOs in Lf-PRF and OL has focused on learning from within or across projects without explicitly reference to vicarious learning or cross organisational learning. Few cases were vicarious learning is discussed, the focus is on successful organisations and models (Bledow *et al.*, 2017)[45].

Considering Lampel *et al.* (2009) who observe tendencies of 'learning about rare events' the literature on Lf-PRF can be summed up into two categories; a) Learning about failure and b) learning from failures as shown in Figure 2.4 below. 'Learn about failure' approach merely questions the causes of failure and how it can be mitigated. However, 'learning from failure' starts by learning about failure, team members' skills and capabilities, pick lessons from the failures and apply them in day-to-day activities (Lampel *et al.*, 2009). Besides that, changes are instituted as necessitated or considering the lessons learnt. This is based on the two extremes of 'why or what is failure?' (understanding failure) and 'application of failure lessons' represented as 'Q6' in Figure 2.4 below. For firms to reach the highest level of learning, 'sharing failure lessons and learning from others' failures' (Q6), it is important that the perception of failure is changed from that of a 'negative' to a 'positive' outlook.

[45] Exploratory (learning from others' failures) learning from mistakes or failures has received little attention observed Weinzimmer and Esken (2017) even when it has been proven that people keep a better memory of other people's failure than their own success (Bratslavsky *et al.,* 2001 cited in Bledow *et al.*, 2017).

	Negative	Perception of failure	Positive
High	Q4 - Exploring the use of failures - Trying to answer the question of how failure lessons can be used.	Q5 - Explore and use of failures - Application of the lessons from failure.(Cannon and Edmondson, 2001; Carmeli, 2007).	Q6 - Share Failure Lessons - The firm share its lessons and learn from others (Diwas *et al.,* 2013; Scholten *et al.*, 2019).
Application/use of lessons from failure **Low**	Q1 - Unaware of failure - No attention is given to failure.	Q2 - Learning about Failure - Ask the what', why and how failure can be mitigated e.g. (Velikova, Baker and Smith, 2018).	Q3 - Continuous Inquiry and failure analysis -Realizes that failure is complex, thus continuous learning and inquiry.
	Low	Understanding of failure	High

Figure 2.4 Type of Research/Literature and Learning Levels for PBOs from Failure.

Literature has also revealed different references to learning from failure such as 'learning from accidents' (Hovden *et al.*, 2011; Jørgensen, 2011), 'non-routine events' (Scholten *et al.*, 2019), 'rare events' (Christianson *et al.*, 2009; Lampel *et al.,* 2009) or just 'events' (Ramanujam and Goodman, 2011; Schöbel and Manzey, 2011). Unlike such research references, this study considers Lf-PRF, because some of these, though not proved empirically, may be terms that hide 'failures'. The use of terms such as 'rare events' remains vague since 'rare events' could be costly or beneficial (Lampel *et al.*, 2009). Failure is also trivialised, including its devastating effect, by referring to it as a 'rare event', 'near miss' or 'small accidents'. Therefore, an assessment of how an organisation responds or treats small failures does highlight its capacity of Lf-PRF (Cannon and Edmondson, 2005). Accordingly, by considering Shaba (2015), an organisation that is considered to be Lf-PRF can be likened to high reliability organisations (HRO) whose characteristics are shown in Table 2.12 below.

Table 2.12 Characteristics of an Organisation that Learns from Failures - Adapted from Shaba (2015, p. 5).

Characteristics	Significance
High priority placed on safety by leaders.	Leadership (setting the agenda and emphasis).
Decentralized authority.	Make decisions related to ensuring safety are empowered to do without fear of reprisal. Includes decisions that may have significant economic impact.
Ability to learn from past mistakes.	Key to avoiding reoccurrences of unwanted events.
Transparency.	A key requirement for the ability to learn.
Collective mindfulness of danger.	"collective" indicates that it is system wide responsibility as opposed to focus on individuals.
Commitment to Resilience.	Increases system resilience and thus the ability to compensate for failures.
Just culture.	Encourage reporting without fear of reprisal.
Preoccupation with failure.	A robust understanding of the diverse failure modes, key to ensuring they can be prevented, detected or managed effectively.

2.7.3 The Life Cycle of Failure and Learning from Failure

Identifying failures as early as possible is crucial if meaningful learning is to be achieved from them. Referring to a failure journey, Wilkinson and Mellahi (2005) note that this starts when managers and leaders fail to anticipate failure due to their perceived strengths. Edmondson (2011) argues that failure can be hidden as long as there is not any noticeable harm. Similarly, Reason (1997) notes that there exists latent and active failures or errors with Dekker and Pruchnicki (2014) referring to accident incubation in their discussion of 'drifting into failure'. Turner (1976) also refers to pathogens as latent failures that are unnoticed and may cause a failure or disaster[46].

[46] To elaborate further, Love *et al.* (2013, p. 676) reasons that *"The defining aspect of these metaphorical pathogens is they predate the conditions that trigger the breakdown, and are generally more stable than the triggering events…… such latent conditions lay dormant within the project system until a problem comes to light".*

Therefore, it is important that the failure journey is detected as early as possible so that at each stage, measures can be put in place and lessons learnt (Edmondson, 2011). This calls for transparency, clear instructions, and a culture of trust among team members (McGrath and Martin, 2017)[47]. Cope (2011), accordingly identifies the following as the major steps in Lf-PRF which may also be associated with the failure journey: i) Descent into failure; ii) Experience of Managing failure; iii) Aftermath of failure; iv) Recovery from failure; v) Re-emergence from failure. Considering other scholars, Table 2.13 below provides a summary of the failure journey.

Table 2.13 The Failure Journey and Learning from Failures

Model	Stages
Sheppard and Chowdhury (2005)	Decline, response, initiation, transition, and outcome.
Mellahi (2005)	Conception, early warning, rebellion, and collapse.
Love et al. (2013)	Pathogens, errors, failure.
(Turner, 1976)	Preconditioning, trigger, crisis, recovery, and learning.
Suggested Journey	Unawareness at the beginning and end of each cycle due to latent failures based on Reason (1997) and Dekker and Pruchnicki (2013).

Considering Table 2.13 above, this study contends that the first stage in failure is the 'unawareness stage' and similarly 'collapse' in Wilkinson and Mellahi's (2005) model does not mark the end of the 'learning journey'. There could be other failures that project participants may not be aware of. Hence, every PBO should aim at shortening the 'unawareness' phase as early as possible. Unfortunately, the unawareness stage maybe prolonged due to the focus on analysing failure in economic sense via delays and other parameters of the iron triangle (Atkinson, 1999). Equally, Flyvbjerg *et al.* (2002) observe that besides optimism biasness, focusing on project benefits such as creating jobs for various professions and organisations, failure may not be considered or envisaged due to 'self-interest'. Earlier, Turner (1976) contends that a culture of not paying attention to small failures (state of normalcy) equally makes it difficult to notice even bigger disasters.

[47] Importantly, McGrath and Martin (2017) note that the early occurrence and identification of failure early in a project is a sign of good communication which leads to success and saving of huge sums of money.

Love *et al.* (2011) also notes that there are always failures that are not detected, even when some can be detected and reworked on. Reason (1997) refers to this as latent failures. Refer also to Stehlik's (2014) Johari window of failure for a detailed discussion[48].

Therefore, in this research and as illustrated in Figure 2.5 below, it can be said that with failure, PBOs may operate in the circle of 'unawareness to unawareness'. Consequently, the identified stages in the failure journey or life cycle, in consideration of Wilkinson and Mellahi (2005), for the study are; 'unawareness', 'conception', 'early warning', 'rebellion', 'collapse' and 'unawareness'. This also aligns with Dekker (2011) who takes an 'emergent' approach to failure[49]. Consequently, unlike the linear representation of the failure journey, this research adopted a cycle as shown in Figure 2.5 below. Accordingly, Goodman *et al.* (2011) argue in favour of a learning approach from failure that ensures that measures are in place 'before', 'during' and 'after' the occurrence of a 'failure'.

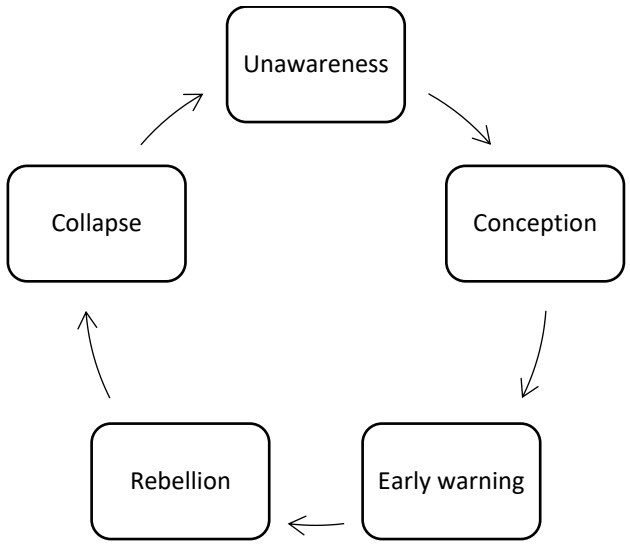


Figure 2.5 Failure Life Cycle Adapted from (Wilkinson and Mellahi, 2005)

[48] Relying on Johari's window, Stehlik (2014), it can be argued there are failures that 'others know', 'others do not know', 'I know' and are 'unknown' to all.

[49] Thus, it is important that organisations are aware of latent failures (Love et al., 2011) and avoid what Dekker (2011, 2013) and Dekker and Pruchnicki (2014) refer to as drifting into failure due to it (failure) being incubated.

The question that remains therefore is, how can the period of unawareness be reduced, since it hinders capturing the lessons? Achieving that remains crucial to learning because unnoticeable failures do not attract any attention and no lessons are drawn from them (Ellis *et al.*, 2006). Accordingly, the starting pointing for Lf-PRF is 'failure identification.' To achieve that, Stehlik (2014) encourages team members' participation, colour coding the failures, total quality management, soliciting feedback from customers and more importantly creating a blameless culture for the psychological safety of the workers and reducing the stigma attached to failure. Prior the failure, organisations may learn from others (vicarious learning) and their past failures instead of being reactive by focusing on the post failure/crisis stage.

Overall, this study encourages having in places measures to identify failures early and learn from each type regardless of its size since even if small failures do not invoke learning due to their size, if root causes are not addressed, they may lead to bigger failures occurring (Raspin, 2011). For example, the Challenger and Colombia disasters were associated with organisational antecedents of institutionalized trends of ignoring small failures (Madsen and Desai, 2010).

2.7.4 Barriers to Learning from Project-related Failures

Broadly speaking, barriers to learning can be associated with the learning process, failure's complex technical language, and the social and professional stigma attached to failure (Cannon and Edmondson, 2001, 2005; Wilkinson and Mellahi, 2005). Baumard and Starbuck (2005) also observe leadership and management issues such as managers' ineffective reporting and defensive self-justification of failure. Managers' comparison of their performance with competitors and their own past performance in the sense that they are not 'losing' more than they are 'winning' is another reported barrier (Baumard and Starbuck, 2005). Raspin (2011) also notes that failure-related information is not reported in situations of big failures for 'face-saving' purposes. Edmondson (2011) adds that many managers perceive Lf-PRF as being straightforward, achieved by assigning a team to analyse failure and establish learning points/lessons.

The nature of failure and projects such as large failures occurring on large projects also present challenges since large projects take time to be completed. The actual occurrence

of a failure creates an environment that is challenging for lessons to be picked (Carmeli and Schaubroeck, 2008). Tainter and Taylor (2014) refer to such a situation as a 'learning crisis'[50]. In such situations, related barriers that may impede Lf-PRF include; *"rigidity of core beliefs, values and assumptions; ineffective communication and information difficulties; failure to recognize similar or identical situations that happen elsewhere ("isomorphic properties"); maladaptation, threat minimisation and environmental shifts; cognitive narrowing and event fixation; centrality of expertise, denial and disregard of outsiders; lack of corporate responsibility; and focus upon "single-loop" or single-cause learning"* (Elliott *et al.*, 2000, p. 18). Cope (2011) also notes that social barriers impede Lf-PRF in trying to build new and maintain old personal relationships. Syed (2015) also argues that people fail to admit their failures by mentally reconstructing the situation in order to suit their earlier belief or values, referred to as the concept of cognitive dissonance[51].

Evidently, extant literature reveals several barriers to Lf-PRF. Considering Cannon and Edmondson (2005), these can be grouped under technical (project context, organisational policies and procedures, complex systems and technologies, task design), and social systems (human limitations in intuition and sense making, natural aversion of failure, desire to maintain self-esteem, leaders' behaviour). Dutton *et al.* (2014) also lists 'actional-personal barriers', 'structural organisational barriers' and 'societal environmental barriers', the third category that can be added to the list of factors by Cannon and Edmondson (2005) are the external environment-related barriers. In summary, the barriers to Lf-PRF can be associated with the following factors:

- ***The understanding of failure*** - This also leads to failure being persistent and difficulty to identify since there is no agreed definition of failure and the process or learning from failure remains unclear (Cope, 2011; Hall *et al.*, 2012).

[50] Accordingly, Desai (2016) reasons that certain failures or disasters by their nature make it difficult for learning to occur because they are rare with ambiguous causes and may also be impeded by the political interest which they generate. Thus, PBOs find it hard to learn due to the unpleasant and frustrating experience of failure (Liu *et al.*, 2017). See Elliott *et al.* (2000) and Smith and Elliott (2007) learning in a crisis situation.

[51] A psychological phenomenon where individuals reject any new information or evidence that contradicts their existing beliefs.

- ***Managerialisation of Failure*** - Sage *et al*. (2014) argues that there is a general understanding that project failure is as a result of 'failures' in management. Thus in an event of a failure, it is hidden in fear of being blamed. Thus, denying the opportunity of learning from such failures.

- ***Training of professionals*** – Most AEC curriculums do not discuss project failure (Velikova, Baker and Smith, 2018). The emphasis is always on succeeding which hinders them from learning from failure when they experience it during their execution of projects (Simpson, *et al.,* 2018).

- ***The nature of projects*** – Projects are temporal, and have uniqueness, which may make it difficult to replicate any lessons. Projects are also executed by parties from varying organisations with different values and goals (Scarbrough *et al.*, 2004; Newell *et al.*, 2006; Swan *et al*, 2010).

- ***Learning (from failure) process*** – There is no standard way of implementing OL (Argote, 2011) and there is no particular understanding of what failure is (Pinto and Mantel, 1990). The process of learning is also complex and not linear (Nevis *et al.,* 1995 cited in Burnes *et al.*, 2003).

- ***Nature of PBOs*** – PBOs are considered as being temporal with diverse teams which makes it difficult to share or for learning to occur within them (Swan, Scarbrough and Newell, 2010).

Interesting to note also is the non-occurrence of failure or problems on projects being cited as a factor that does not encourage Lf-PRF. For instance, Newell *et al.* (2006, p. 182) found that *"project team members… only sought knowledge beyond the confines of their project when they were experiencing a problem that they could not solve… As long as things 'went more or less to plan' there was no attempt to learn from others".*

In terms of the influence and impact of barriers, individual and leadership/management barriers are the major hindrances. This can be seen from Baumard and Starbuck's (2005, p. 295) observation that "*…learning is not likely to occur…. Because other people… resist analyses that might hold them responsible for errors or oversight or failed promises and they conceal causes of failure. Managers find it easy to explain both large and small*

failures as having idiosyncratic or exogenous causes that no one could have foreseen, and to rationalize their personal actions in terms of their firm's core belief"[52]*.* This highlights the fact that people (actor) related factors need to be addressed if PBOs are to effectively capture lessons from failures. Thus, the following section outlines suggested mechanisms for enhancing the process of Lf-PRF.

2.7.5 Sector Related Strategies

Since failure is influenced not only by the internal environment but also the external environment, extant literature reveals several sectoral level related strategies that go some way to addressing this issue:

- **'*Calling a spade a spade'/'Name the Elephant in the Room'*** – Wilkinson and Mellahi (2005) advise that learning from failure starts by admitting failure. This remains a challenge worldwide especially in western cultures where there is a high focus on success, wining, and endemic pursuit of future advancement. In such cases Wilkinson and Mellahi (2005) argue that managers behave like politicians and do not refer to failure for any lessons. Consequently, in instances of failure, different terms are used to disguise 'failure'[53].

- ***Redefining Organisational Learning*** – A number of definitions exist; however, many seem to suggest learning by acquisition of quality knowledge or successful experience related knowledge. What should be appreciated is the understanding suggested by Argyris (1977) that organizational learning is the detection and correction of errors.

- ***Education and Training of Professionals*** – Reviewing professional curricula to include failure, and not just emphasizing on project success, so that graduates are

[52] In that regard, Stead and Smallman (1999, p. 14) reason that *"Researchers and managers must build bridges and cut across organizational and professional orthodoxies that have difficulty in admitting to errors, talking to each other and `outsiders' about such failings, recognizing the significant role of the human factor, and accepting that cultures must change in order to protect the best interests of organizational stakeholders. To do so, the academic and managerial communities may have to undertake significant learning and un-learning about themselves, their organizations and their assumptions about each other and the world"*

[53] For example, with failures relating to cost estimation, Flyvbjerg *et al.* (2002) note that technical terms such as 'imperfect techniques', 'inadequate data', and 'honest mistakes'. Instead of agreeing that these are serious causes of failure, they are included as allowable sources of errors in estimating.

informed on the process of Lf-PRF. This includes reviewing teaching and assessment approaches (Simpson *et al.*, 2018). This aligns with (Baker *et al.*, 2018) who observe that failure is rarely discussed in the training of AEC professionals.

- ***Enforcement*** –In comparing various types of failures, Baker *et al.* (2018) observed that health and safety failures in the UKCI are reported more due to the enforcing agency, Health and Safety Executive (HSE).

- ***Cross-organisational Learning*** – Cope (2011) recommends that organisations can learn from each other. Others have called for networks (Sydow and Braun, 2018) or inter-organisational (Sydow *et al*, 2004) through which PBOs can learn from each other. According to Min (2018) this allows an organisation to gain without any pain.

- ***A Set of New Capabilities or skills/New Breed of Managers*** - Employees should be equipped with specific skills that relate to Lf-PRF (and managing failure) such as emotional intelligence (Shepherd, 2003; Shepherd *et al.*, 2011).

In essence, for effective Lf-PRF at the sectoral level, coordination within and across organisations and across projects is crucial as it has implications on how knowledge is gained or routinized practices can be used in other projects (Sydow, Lindkvist and DeFillippi, 2004).

2.7.6 Organisational Level Intervention/Strategies

Individual and collective (organisational) knowledge is important for a successful learning process within any organisation since knowledge resides simultaneously in both the organisation and the individual (Madsen and Desai, 2010). Therefore, at the organisational level, the following measures have been identified:

- ***Reviewing the Appraisal Systems and Purpose***[54] **-** Focus has always been linking good performance and producing successful outcomes, recorded in appraisals, to promotion or pay rises. Failure means forfeiture of such benefits, thus employees are not keen to report failure. Easing the focus on time pressures is also being encouraged since employees would rather finish the task with little attention to learning (Swan *et al.*, 2010).

- ***Grief management –*** Shepherd (2003) notes that when failure occurs, it generates emotions and one such can be a form of grief, which if not handled properly can propel an employee to learn quickly from failure.

- **Stop 'Killing the Messenger' –** Cannon and Edmondson (2005) emphasize that managers should motivate their employees and uplift them emotionally in order to avoid the psychological and organizational factors by avoiding what they call 'Shooting the messenger'. Equally, in a recent study, Taylor and Goodwin (2022) recommend protecting whistle blowers supported with leaders' commitment (timely response/action) in order to encourage Lf-PRF and avoid organisational failure.

- ***Avoiding Managerialisation of Failure*** – Blaming the manager hides other sources of failure (Sage *et al.,* 2014). Hence, capabilities in Lf-PRF should focus at improving the leaders, followers, and the whole organization instead of the project manager (Stehlik, 2014).

- ***Formal and Deliberate Learning Process*** – Raspin (2011) and Scholten *et al.* (2019) advise that it is important to establish deliberate processes for purposes of identifying minor and major failures to ensure that formal recordings, team responsibilities and implications are set.

- ***Conflict Resolution –*** Since failure may be accompanied by conflicts or disputes, these should also be managed properly and calls for proper stakeholder management, advises Stehlik (2014).

[54] In view of this, Stehlik (2014) advises that it is important to approach failure with Appreciative Inquiry (AI), a situation where one does not only focus on the 'bad' or 'failure' by also by seeing the good in people. Essentially employing positive language. Importantly, feedback on failure should be given to a team instead of to individuals (Raspin, 2011).

The above strategies (organisational and sectoral level) are not exhaustive, since failures are unique and will require diverse types of strategies being applied (Edmondson, 2011; Love *et al.*, 2011; Bakker *et al.* 2011). Equally, Bakker *et al.* (2011) contend that learning in PBOs is complex and requires a configuration of multiple factors with particular attention to relational and organisational processes. Furthermore, considering Cannon and Edmondson (2001; 2005) the strategies for enhancing Lf-PRF in PBOs can be divided into the following two categories:

- ***Technical or Structural Insights –*** Putting in place formal and deliberate system to support Lf-PRF such as reporting procedure. Essentially, this focuses on organisational measures which will help eliminate technical related barriers.

- ***Socio-Economic Based Insights -*** These relate to addressing people-related barriers and accordingly such strategies are aimed at influencing issues relating to behaviour. This may include avoiding the blame game, changing the negative perception of failure and non-acceptance of failure.

Essentially, for successful Lf-PRF, attention must be given to both the internal and external environments of an organisation as advised by Wilkinson and Mellahi (2005).

2.7.7 Common Mode of Learning from Failures and Organisational Learning

OL (and Lf-PRF) within PBOs can be achieved through two common modes. Firstly through internal critical analysis, experience and mechanisms and secondly knowledge transfer across boundaries or organisations (Scholten *et al.,* 2019). Similarly, March (1991) considers exploitative and exploratory approaches which can be associated with knowledge creation internally and knowledge leveraging across boundaries respectively. Correspondingly, vicarious learning is used by others to refer to exploratory learning (Madsen and Desai, 2010; Argote, 2011; Raspin, 2011; Desai, 2016; Scholten *et al.*, 2019). Vicarious Lf-PRF is encouraged since it is considered as a ‘cost free’ approach of

mitigating and learning from failures (Min, 2018). Hence, this research argues in favour of Lf-PRF directly and vicariously (Regan *et al.*, 2011; Holgeid and Thompson, 2013)[55].

However, worth considering are Prencipe and Tell (2001) who advise that PBOs should avoid routinizing their learning. Accordingly, Ivory and Alderman (2005) contends that norms, controls and regulations hinder the understanding of failure. On the contrary, Swan *et al.* (2010) and Scholten *et al.* (2019) argue that PBOs should not 'reinvert the wheel'. Bledow *et al.* (2017) also argue in favour of institutionalizing communication of failures by creating a platform for employees to share their failure via after-event reviews. Thus, this motivated viewing Lf-PRF through Institutional theory. In particular, the three pillars (regulatory, normative, and cultural cognitive) and theory isomorphism forces (normative, mimic, and coercive based on Neo- Institutional theory). This is in line with scholars such as Oti-Sarpong *et al.* (2022) who contend that isomorphic forces influence sharing of lessons on construction projects. The influence of institutions is elaborated further in Chapter 3, the Conceptual Framework.

2.8 Chapter Summary

Extant literature reveals that though learning in PBOs has been happening for a long time, there is no properly defined and standardised procedure (Burnes *et al.*, 2003; Koskinen, 2010). In comparison with higher levels of learning in an organisation such as knowledge articulation and knowledge codification, Swan *et al.* (2010) and Bartsch, *et al.* (2013) conclude that learning in PBOs is mainly successful through networks (social capital) based experience accumulation. In addition, Cannon and Edmondson (2005) also acknowledge that organisations are traditionally viewed as being technical systems and social systems. Thus, PBOs are encouraged to have a balanced approach when Lf-PRF by ensuring that the organisational (technical system) and the social (People or soft system) are addressed. Additionally, Bakker *et al.* (2011) observes that the absorptive capacity of organisations and motivation of the senders are key in the learning process.

[55] By and large, experience is considered as the main source of learning, including Lf-PRF, among PBOs (Madsen and Desai, 2010; Desai, 2016; Scholten et al., 2019). Therefore, vicarious learning is also encouraged as a solution to a dilemma faced by firms of diminishing failure experiences internally by using public repository of failure events by Maslach et al. (2018).

As a way of further encouraging learning from failure, see Text Box 2.3 which provides examples of instances were failure led to innovation.

Unfortunately, the process of Lf-PRF is sometimes oversimplified by taking only one approach or method to learning. In addition, several barriers (associated with the sectoral, organisation and project levels) hinder the process of learning of Lf-PRF. Therefore, attention is drawn to scholars who argue in favour of taking a multifaceted approach to learning (Popper and Lipshitz, 2000; Lipshitz *et al.*, 2002; Moynihan and Landuyt, 2009). Particular attention is thus given to Lipshitz *et al.* (2002) who recommends that for effective OL to occur it is important that the following facets are integrated: structural facet; psychological facet; policy; cultural facet, and; contextual facet. Additionally, it is evident that there is need to consider the external environment of PBOs and how it influences Lf-PRF. Hence, Neo-Institutional Theory, Situated Learning Theory and Lipshitz *et al.* (2002) five facets serve as the foundation of the conceptual framework. These are further discussed in Chapter 3, the Conceptual Framework.

Text Box 2.3 Failure, Mother of Success and Innovation

Matthew Syed advises that *"To spark the imagination and take our insights to their fullest expression, we should not insulate ourselves from failure; rather; we should engage with it…. It is when we fail that we learn new things, push boundaries and become more creative".* Syed, affirms a crucial point that needs to be appreciated by PBOs in order them to learn from failure, the understanding that one does not only learn by being correct or getting things right but also by being wrong. Similarly, John Dewey, a philosopher reasons that we only think when we are confronted with a problem. This is also supported by James Dyson, the UK's inventor of the first ever bagless vacuum cleaner achieved after 5127 failed attempts. Worth appreciating is Dyson's positive perception of failure: *"… in business or technology, we need to reach beyond our current expertise. We do not want to know how to apply the rules; we want to break the rules. We do that by failing and learning".*

Similarly, the long-sought excellence by the construction sector cannot be achieved solely by means of 'good practice', instead failures should be considered as offering opportunities for learning, possibly leading to innovation. Thus, instead of seeing failure as an enemy, the study agrees with Syed who notes that *"Failure has many dimensions, many subtle meanings, but unless we see it in a new light, as a friend rather than a foe, it will remain woefully underexploited"*

Chapter 3: Conceptual Framework

3.1 INTRODUCTION

The importance of theoretical framing in any study cannot be overemphasized. Adom *et al.* (2018) reason that this helps with the following: explain the research path and theoretical constructs identified; enhance empiricism and research rigour, and in obtaining meaningful findings. This is achieved by means of a 'theoretical framework' or a 'conceptual framework'. Before defining the theoretical framework, it is worth defining the term 'theory'. More elaborately, Strauss and Corbin (1998, cited in Love *et al.*, 2002, p. 296) define a theory as a *"set of well-developed concepts related through statements of relationship, which together constitute an integrated framework that can be used to explain or predict phenomena"*. A 'theory' therefore is an attempt in explaining an observable phenomenon and predict the connected behaviours supported by facts gathered over time (Li and Love, 1998; Imenda, 2014). This can be expressed mathematically, verbally, as a system with definitions of key concepts and their relationship expressed as a theoretical framework. Therefore, considering Imenda (2014, p. 189) a theoretical framework is defined as "*the application of a theory, or a set of concepts drawn from one and the same theory, to offer an explanation of an event, or shed some light on a particular phenomenon or research problem".*

Imenda (2014, p. 189) also defines a conceptual framework as *"an end result of bringing together a number of related concepts to explain or predict a given event or give a broader understanding of the phenomenon of interest or simply, of a research problem.*" The conceptual framework helps to synthesize existing views from literature and empirical sources that could be in a model (ibid). According to Adom *et al.* (2018) the conceptual framework also serves as a blueprint for the research, and presents remedies for the phenomenon under study arranged logically or visually. However, the conceptual framework and theoretical framework[1] are sometimes interchanged. The major difference

[1] Imenda (2014, p. 189) defines a theoretical framework as *"the application of a theory, or a set of concepts drawn from one and the same theory, to offer an explanation of an event, or shed some light on a particular phenomenon or research problem".*

between the conceptual and theoretical frameworks is that the former synthesises several semi-relevant and semi-related concepts with its application limited to a specific research problem whilst a theoretical framework applies a selected singular theory or closely related theories which are applicable to other research problems (Imenda, 2014). Therefore, since the study has adopted a combination of theories, the conceptual framework was deemed appropriate for this study.

3.2 THE CONCEPTUAL FRAMEWORK

Realising the multifaceted and complex nature of 'learning' and 'failure', the study adopted the 'conceptual framework' approach in order to review how PBOs may Lf-PRF. Accordingly, concepts from Institutional Theory (IT), organisational learning (OL) through situated learning and Lipshitz *et al.* (2002) five learning facets model have been adopted and are discussed in subsequent sections.

3.2.1 Key Theories Informing the Conceptual Framework

Notable theories that have previously been used in attempting to understand P*r*F include Actor Network Theory (ANT) which views failure as a subjective socio-material phenomenon due to the influence of social-cultural factors and attribution theory (Imamoglu and Gozlu, 2008; Sage *et al.*, 2013). Ivory and Alderman (2005) favour a systems approach because failure in its nature is complex with its causes being non-linear and linear forming multiple interactions. Though it is appreciated that these, and other theories help understand failure and the learning opportunities arising from it, they do not address the challenges around Lf-PRF. These challenges include the negative perception(s) of failure and the non-acceptance of failure behaviours; the 'blame game'; scapegoating, and; lack of trust (Turner, 1976; Elliott *et al.*, 2000; Smith and Elliott, 2007). In addition, the wider context is rarely addressed with a focus on internal learning. Thus, Neo-Institutional Theory was adopted since it offers; an opportunity to change behaviour; takes an inherently systemic approach by considering 'norms' through isomorphism (Levitt and Scott, 2016; Oti-Sarpong *et al.*, 2022). Though early (traditional) Institutional Theory focused only on static 'control' or 'regulation' through conformity and non-conformity, Neo-Institutional Theory takes a more critical view, by calling for change through control and intervention mechanisms influenced by institutions and social interactions (Biesenthal *et*

al., 2018; Loosemore *et al.,* 2021)[2]. Against such a background, instead of merely reviewing the causes and factors surrounding failure, Neo-Institutional theory has been adopted. This is based on the understanding that Neo-institutional Theory influences actors' behaviour and strategy within organisations by either constraining or empowering them through institutional pressures referred to as isomorphism (Mirimoghadam and Ghazinoory, 2017; Oti-Sarpong *et al.,* 2022). Thus, the study's conceptual framework has been informed by three theories namely, Neo-Institutional Theory, Situated Learning Theory and a multifaceted model by Lipshitz *et al.* (2002) based on OL summarised in Figure 3.1 below.

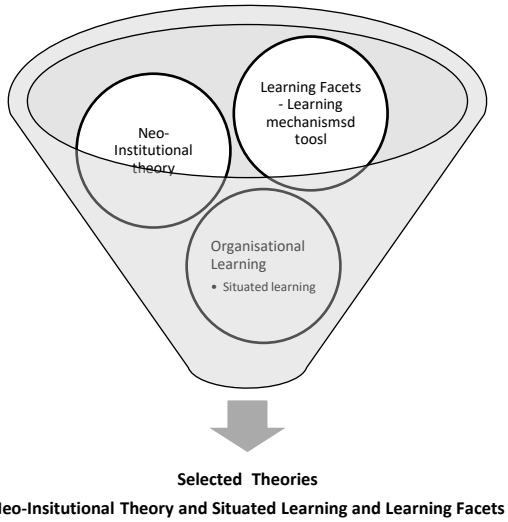


Figure 3.1 Key Theories Informing the Study

The multi-facet model (based on OL) produced by Lipshitz *et al.* (2002) has also been included in the conceptual framework in order to identify specific measures needed for Lf-PRF. This is based on the realisation that though Neo-Institutional Theory and Situated Learning highlight the influence of norms on PBOs and actors in the learning process, specific mechanisms on Lf-PRF are not addressed by the two theories. The selected theories are further highlighted in the following sections of this chapter.

[2] This also resonates with Ivory and Alderman (2005) who advise embracing project management approaches that sit between these two positions of 'command and control' and 'intervention'.

3.3 WHAT IS INSTITUTIONAL THEORY?

Institutional Theory covers a wide range of fields such as economics, ecology, and sociology (Scott, 2008; Mohamed, 2017; Sydow and Söderlund, 2022). Bresnen (2016) contends that it is largely influenced by structuration theory, as it attempts to overcome the dualism of structure and agency. Bresnen (2016), further notes that *"rather than considering behaviour as the consequence either of structure (thus determined) or agency (freewill), structuration theory treats them as a duality — in which actors' behaviour is simultaneously and continuously shaped by, and in turn re-produces (or modifies), the structural conditions in which they are embedded"* (p. 333). Thus, Institutional Theory views an organisation through a social-constructivism approach with institutions governing the social interactions (or behaviour) of individuals and organisations (Bresnen, 2016; Sarhan *et al.*, 2016, 2018; Biesenthal *et al.*, 2018)[3]. Similarly, Meyer and Rowan (1977, p. 307) earlier observed that *"organizations are driven to incorporate the practices and procedures defined by prevailing rationalized concepts of organizational work and institutionalized in society".* Essentially, institutions shape the goals and means of organisations in an environment as echoed by Scott (1987). This is supported by Scott (2008, p. 429) who adds that "*Organizations are comprised of many institutional elements, some rules, norms, or beliefs being forged in on-going interaction and others being borrowed from their environments*".

Biesenthal *et al.* (2018), succinctly define 'institutions' as the 'rules of the game' while North (1991, p. 97) gives a more elaborative definition of institutions as *"humanly devised constraints that structure political, economic and social interaction….. consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct), and formal rules (constitutions, laws, property rights)".* In contrast to North's (1991) view of 'institutions-as-constraint' Mohamed (2017) views Institutional Theory as providing a 'solution'. Therefore, the influence of 'institutions' in this study is appreciated in two ways: one as aiding problem solving, and; secondly as constraining undesired behaviours through the creation of structural components and rules (Dille and Söderlund, 2011). A more elaborate influence of institutions can be appreciated through isomorphism which is based on the foundational work of Meyer and Rowan (1977) and DiMaggio and Powell

[3] Accordingly, under Institutional theory an organisation is viewed as being open to the influence of the external environment (Biesenthal *et al.*, 2018) and is shaped and sustained by the context in which they operate through socio-cultural legitimacy (Bresnen, 2016).

(1983) who contend that organisations are influenced by institutions which leads to organisations in the same environment to have similar structures or act homogenously. Therefore, this research views 'institutions' as a means of facilitating and encouraging Lf-PRF among PBOs[4]. Examples of such include "*organizational structures, explicit incentives, and contractual arrangements; in most cases, [these] are readily observable and also are typically stable over time*" (Wang *et al.*, 2018, p. 20). This aligns with Neo-Institutional theory which favours institutional development and change (Bresnen, 2016) and recent calls to reframe perception of failure, from being entirely negative to having positive elements in order to encourage Lf-PRF (Cannon and Edmondson, 2005; Edmondson, 2011).

3.3.1 A Focus on Neo-Institutional Theory

According to scholars such as Scott (2008) and Sahin and Mert (2022) the common strands of Institutional Theory are old Institutional Theory, Neo-institutional Theory and New Institutional Economics. This study adopted Neo-institutional Theory since unlike New-Institutional Economics which focuses on power and constraints, Neo-institutional Theory takes a sociological approach by placing emphasis on, legitimacy and networks (relationships) of multiple organisations which also serve as sources of norms (Meyer, 2018). In addition, Sahin and Mert (2022) contend that whilst New Institutional Economics is focused on economic performance, Neo-institutional Theory addresses both the economic and social behaviour of actors. This is by reviewing how institutions influence the behaviour of actors and organisations through isomorphism forces, (coercion, normative and mimic) (DiMaggio and Powell, 1983). Further, unlike Old Institutional Theory which is regarded as being rigid and resistant to change, Neo-Institutionalism, contends that organisations constantly adjust their structure and behaviour in response to external pressures or institutions (Meyer and Rowan, 1977; Oti-Sarpong *et al.*, 2022). Overall, Neo-Institutional Theory was adopted since it *"analyses how shared norms and values cause institutional pressures to motivate a firm's… strategy… not only economic efficiency but also social legitimacy is important to survive in a challenging environment"* (Sahin and Mert, 2022, p. 2). The main argument presented by sociological Neo-

[4] See also, Meyer and Rowan (1977, p. 480) who reason that *"Institutional rules function as myths which organizations incorporate, gaining legitimacy, resources, stability, and enhanced survival prospects".*

Institutional Theory is that besides organisational tools such as technology and other resources within PBOs, there exists 'institutional forces' influencing their behaviour (Meyer and Rowan, 1977; Scott, 2008). Thus, besides the technological tools and documents used in Lf-PRF, worth considering are 'norms' within PBOs and their influence on 'unlearning' and 'learning'. This is because negative institutional beliefs and norms (from coercive, normative and mimic forces) exist that will need to be unlearned or deinstitutionalised (Stead and Smallman, 1999). This also resonates with Scholten *et al.* (2019) who contend that routines are not supposed to be static but flexible to accommodate change[5].

3.4 KEY FEATURES OF NEO-INSTITUTIONAL THEORY RELEVANT TO THIS STUDY

Over the years, several aspects of Institutional Theory have been developed (Scott, 1987, 2008). Worth defining is institutionalization which according to Meyer and Rowan (1977, p. 341) *"involves the processes by which social processes, obligations, or actualities come to take on a rule like status in social thought and action".* In addition, Scott (1987) identifies four forms of institutionalisation: institutionalization as a process of instilling value; institutionalization as a process of creating reality; institutional system as a class of elements and institutions as distinct societal spheres (focused social beliefs and values). See also Scott (1987) for details who further adds mechanisms of achieving institutionalization as being; imposition of organisational structure, authorization of organisational structure, inducement of organisational structure and acquisition of organisational structure. As earlier observed by Scott (1987) there exists several forms of Institutional Theory. Of these the study focuses on the view of 'institutions as a class of elements and distinct societal spheres' since they take multiplicity and diversity of institutional sources and belief systems based on Neo-institutional Theory (DiMaggio and Powell, 1983; Scott, 1987). Therefore, in the case of Lf-PRF, PBOs and other organisations interact with each other such as professional bodies, learning institutions, regulatory bodies and competitors. Thus, for purposes of scoping, and focusing on Neo-Institutional Theory, the study identifies the following as being relevant to the research problem:

[5] See also Sarhan *et al.* (2016, 2018) who suggest changes in the procurement processes, and how PBOs conduct their business activities in order to reduce institutional waste.

3.4.1 Institutional Pillars

According to Biesenthal *et al.* (2018) there are three main types of 'rules' or 'norms' referred to as 'institutional pillars' through which institutions exert their influence on an organisation. These include: the Regulative pillar (legally sanctioned based on explicit rules, policies, regulations); the Normative pillar (authorized morally and relates to professional conduct and guidelines), and; the Cultural-cognitive pillar (supported culturally such as shared beliefs and values and dependant on individuals' cognition)[6] (Scott, 2008; Levitt and Scott, 2016). Accordingly Scott (2008, p. 429) advises that *"An important task of the institutional scholar is to ascertain what elements are at play in a given context and the extent to which they work to reinforce or undercut one another".* Thus, for this study, the argument presented is that the three pillars influence Lf-PRF. For instance, considering Scott's (2008) and Cicmil *et al.* (2006) argument, the regulatory pillar outlines the rules and sanctions in case of failure while the normative pillar offers prescriptive and obligatory practices for project actors to avoid failure such as planning, risk management etc. The cultural cognitive on the other hand offers shared values and conceptions such as negative perception of failure. Worth highlighting is the fact that institutions are created formally and informally with some studies focusing on both such as (Wang *et al.*, 2018). However, this study focuses institutions since unlike formal institutions which are explicit, informal institutions are subtle, implicit and difficult to notice and document (Wang *et al.*, 2018).

3.4.2 The Institutional Field and Actors

The institutional field or organisational field is defined by DiMaggio and Powell (1983, p. 143) as *"those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product customers, regulatory agencies, and other organizations that produce similar services or products".* Dille and Söderlund (2011, p. 483) further add that *"the concept of organizational field incorporates and bridges organizations to wider societal structures – including individual organizations, regulating*

[6] Each of these is important because personal ties (cultural-cognitive) or the regulatory (impersonal) institutions will not be effective in all circumstances when applied singly (North 1991).

agencies, networks and sectors"[7]*.* Hence, the institutional field present an opportunity for PBOs to create networks for purposes of Lf-PRF. However, instead of assuming that actors within an institutional field may be homogenous, the study agrees with Scott (2008) who contends that organisations within the institutional field are fragmented with competing values. Evidently, PBOs compete for projects within the sector and may not openly share their failures in order to remain competitive.

Therefore, in a bid to enhance the process of Lf-PRF, it is important to understand actors and institutions within the institutional field since these influence practices and organisation around project management. This is echoed by Bresnen (2016) who notes that *"What we know about project management and organisation is shaped by a huge variety of actors and institutions and informed by the diverse orientations and interests that they represent"*. For scoping, institutions in this study refer to organisations such as PBOs, professional bodies, government agency and suppliers whilst the term 'actors' refers to individuals such as project managers, team members and end-users.

3.4.3 Decoupling Tendencies

Meyer (2018, p. 802) observes that Neo-institutional Theory (also referred to as Sociological Institutionalism*) "in part, arose from the observation that organizational policies and structures are often loosely coupled with practical activity"* a term referred to as 'decoupling'. According to Boxenbaum and Jonsson (2008), 'decoupling' is when organisations are pressured to conform to certain social requirements (or what a company should do or look like), competition and internal rational myths may hinder that from happening. The result is that organisations will superficially adopt such requirements without putting them into practice (Davis and Marquis, 2005; Boxenbaum and Jonsson, 2008; Meyer, 2018). Mostly, decoupling is done in order to ward off evaluators and seemingly appear compliant (Davis and Marquis, 2005). In such instances, Meyer and Rowan (1977, p. 341) earlier observed that *"To maintain ceremonial conformity,*

[7] Worth noting is that the boundaries and structure of the institutional field cannot be determined priori, but only after empirical investigation (DiMaggio and Powell, 1983; Greenwood, Suddaby and Hinings, 2002). Meyer and Höllerer (2014) also suggest that for a better understanding and presenting findings, a distinction must be drawn between intra-institutions and inter-institutions since competing and complementary principles do not only exist outside one institutional order but also within.

organizations that reflect institutional rules tend to buffer their formal structures from the uncertainties of technical activities by becoming loosely coupled, building gaps between their formal structures and actual work activities". Hence, faced with increased call for Lf-PRF, the study attempted to evaluate whether the identified practices are put into practice or PBOs merely display 'decoupling tendencies'.

3.4.4 Institutional Isomorphism

DiMaggio and Powell (1983) define isomorphism as a situation where organisations resemble each other due to facing similar constraining forces and environmental conditions. The three isomorphic forces, considered by DiMaggio and Powell (1983) are:

a) **Coercive Force** - Arises from both formal and informal forces mainly in form of regulations (government and political influence), usually from external organisations on which PBOs are dependent. In response, PBOs conform by adopting laid down regulations or requirements, such as contract conditions, in order for them to be eligible. This leads to homogeneity amongst PBOs by conforming to institutions or laid down procedures.

b) **Normative Force -** Associated with professionalization by bodies such as unions and professional bodies. Thus, professionals in one organisation exhibit similar professional behavior and conduct to that of those in other organisations[8]. Other sources of normative forces are universities and other organisations involved in training professionals. Hence, such institutions remain key in the process of Lf-PRF which also aligns with DiMaggio and Powell's (1983, p. 154) reasoning that *"The exchange of information among professionals helps contribute to a commonly recognized hierarchy of status, of center and periphery, that becomes a matrix for information flows and personnel movement across organizations".*

[8] In some instances, professional power may draw on the authority of the national power or government such as a professional body established under an Act of Parliament etc. In addition, the network of organisations via professional bodies define and promulgate normative rules and practices for each profession. Therefore, career progressions are controlled to ensure that professionals become indistinguishable or create a pool of interchangeable employees across the organisations in a particular sector (DiMaggio and Powell, 1983).

c) **Mimic Force –** Leads an organisation to imitate other organisations (perceived to be legitimate or successful) due to uncertainty in the environment or tasks and limited technological understanding (DiMaggio and Powell, 1983). Therefore, a company may copy a model from other organization(s) indirectly (via employee turnover) or explicitly (consulting firms) and consequently develop the required attributes, innovation or differentiation (DiMaggio and Powell, 1983). Human resource practices, such as working conditions, are also copied to get legitimacy.

Worth highlighting is the fact that the three isomorphic forces are not empirically distinct since an institution from the regulatory pillar may request for a task to be done based on set professional standards (DiMaggio and Powell, 1983). Correspondingly, projects and PBOs are influenced by these forces through professional bodies and regulations or standards (Biesenthal *et al.*, 2018). Bresnen (2016) cites the development and use of Project Management Body of Knowledge (PMBOK) by the Project Management Institute (PMI) as an example of institutionalisation through normative and mimic forces[9]. Thus, through institutional isomorphism, the study argues in favour of PBOs learning from each other's' failures[10]. This aligns with Bledow's *et al.* (2017) observation that just like individuals, organisations acquire knowledge vicariously by replicating routines, designs and strategies from successful organisations. However, though mimicry (vicarious learning) produces positive results, competition hinders its application since PBOs may not be willing to share lessons with competitors (Huber, 1991; Min, 2018). Thus, organisations under the influence of isomorphism (coercive, normative and mimic forces based on Neo-Institutional Theory), are perceived as open systems influenced by the society (environment) (DiMaggio and Powell, 1983) unlike Old Institutional Theory's closed systems which solely impose rules. Accordingly, norms (which may also influence Lf-PRF) are created by multiple institutions collectively such professional bodies, state agencies and non-governmental organisations argues Meyer (2018).

[9] Additionally, *"this similarity can make it easier for organizations to transact with other organizations, to attract career-minded staff, to be acknowledged as legitimate and reputable, and to fit well into administrative categories that define eligibility for public and private grants and contracts"* (DiMaggio and Powell, 1983, p. 154). However, proof of conformity does not always guarantee efficiency in their activities.

[10] Duffield and Whitty (2015) also support the notion of projects learning from each other's mistakes or experience.

3.4.5 Institutional Factors Influencing Organisational Strategy

Focusing on Neo-Institutional Theory's terms such as decoupling and isomorphism, it is worth understanding factors that influence such behaviour among organisations. Accordingly, the study identifies institutional factors, which may also influence the discourse of Lf-PRF, based on Oliver's (1991) findings as shown in Table 3.1 below.

Table 3.1 Institutional Factors Influencing PBOs - Adapted from Oliver (1991, p. 147)

Explanatory Factor	Convergent Assumptions	Institutional Perspective	Implication on Lf-PRF.
Context of Organisational Behavior	Organizational choice is constrained by multiple external pressures. Organizational environments are collective and interconnected. Organizational survival depends on responsiveness to external demands and expectations. Organizations seek stability and predictability	Institutional environment Nonchoice behavior Conforming to collective norms and beliefs. Invisible pressures. Isomorphism, Adherence to rules and norms. Organizational persistence. Habit and convention	To show conformity, learning focuses on good practice without consideration of learning from failures.
Motives of Organizational Behavior	Organizations seek legitimacy. Organisations are interest driven.	Social worthiness. Conformity to external criteria Interests institutionally defined Compliance self-serving	Hide failures, Lacks failure tolerance. Non acceptance of failure; face serving measures.

More specifically, Oliver (1991) identifies 5 institutional factors as antecedents (influencing strategic responses) within organisations shown Table 3.2 below which are further related to Lf-PRF. This also aligns with a recent study by Wang *et al.*, (2022) who contend that institutions within an organization influence strategy and production efficiency.

Table 3.2 Institutional Factors as Antecedents to PBOs' Strategic Responses – Adapted from Oliver (1991, p. 160)

Institutional Factor	Research Question	Predictive Dimensions	Impact on Lf-PRF
Cause	Why is the organization being pressured to conform to institutional rules or expectations?	Legitimacy or social fitness. Efficiency or economic fitness.	Leads to hiding failures to attain 'social fitness'; focus is continuous work, productivity and not learning stopping to learn from failure.
Constituents	Who is exerting institutional pressures on the organization?	Multiplicity of constituent demands Dependence on institutional constituents.	Many actors are involved in the learning process due to many organisations involved in project delivery.
Content	To what norms or requirements is the organization being pressured to conform?	Consistency with organizational goals Discretionary constraints imposed on the organization	Focus on good practice as provided by professional bodies and regulations.
Control	How or by what means are the institutional pressures being exerted?	Legal coercion or enforcement; Voluntary diffusion of norms.	With no coercive force to learn from failures, PBOs rarely engage in such.
Context	What is the environmental context within which institutional pressures are being exerted?	Environmental uncertainty Environmental interconnectedness.	Failure despised; eliminate failures to achieve certainty via risk management etc.

3.4.6 Limitation of Institutional Theory

Though there has been a growing interest in the application of Institutional Theory, it has limitations. Mohamed (2017) notes theoretical and methodological limitations by being static in nature and the challenges of calculating and measuring institutional variables. Since Institutional Theory argues for standardisation, Baumard and Starbuck (2005) contend that usually firms become standardized and may lack relevance to the current situation or problem. The sector's fragmentation, levels of differentiation associated with the project management process and its contextual institutions also hinder the introduction of different discourses or institutions in project management (Bresnen, 2016).

In contrast, past research has demonstrated that Neo-Institutional Theory is a basis of stability, uniformity and change unlike the traditional institutionalization that heavily focused on stability, routines and persistence (Wiseman, 2007; Currie, 2012). Bresnen (2016) also notes that '*institutional logics*[11]*'* are used to challenge and displace what has been '*legitimised'* as cultural norms and values.

Institutional Theory also erodes the obvious heterogeneity of organisations by relying on isomorphism[12] (Greenwood *et al.,* 2014 cited in Meyer and Höllerer, 2014). Yet, Meyer and Höllerer (2014) and Stead and Smallman (1999) note that certain level of similarity or resemblance is inherent in some institutions such as projects being time bound and temporal, organisations operating in the same sector, having similar processes, tools and practices. Based on the above, even if Neo-Institutional Theory has limitations it is recommended for the study. importantly, realising that PBOs do not operate in a vacuum, Neo-institutional Theory offers an opportunity of understanding how organisations are influenced by the environment through mechanisms such as isomorphism (Engwall, 2003; Scott, 2008; Morris and Geraldi, 2011; Meyer, 2018). See Text Box 3.1 below for insights on how institutions such as professional bodies may influence Lf-PRF.

Overall, realising the social imbedded nature of projects, including failure (Sydow, Lindkvist and DeFillippi, 2004; Sage *et al.,* 2013; Sage *et al.*, 2014), Neo-Institutional Theory was adopted. This is because, unlike the Old Institutional Theory which according to Meyer (2018), focuses more on economics and politics, Neo-institutional Theory takes a sociological approach by emphasizing on networks, norms and multiple actors or organisations. Additionally, in Neo-institutional Theory, instead of constraining behaviour, *"relations are thought to constrain actors, as well as provide opportunities for their activities"* (Meyer, 2018, p. 791).

[11] Institutional logics are considered as symbolic features which include beliefs, practices, tools and values within an organisation used to order their reality or activities (Greenwood *et al.*, 2010).

[12] Koskinen (2012) also argues that as much as projects are unique there is no need to reconstruct our theories or approaches over and over again since they (projects) are hinged on traditional processes which offers a way of understanding PBOs on a 'similarity' basis.

Text Box 3.1 Professional Institutions Learning from Failures – The Tacoma Narrows Bridge Collapse.

The Tacoma Narrows bridge collapse highlights the historical existence of failure, not only in the UK but across the globe. It also highlights the influence of isomorphism on professionals learning from failure via the normative force. The Tacoma Narrows bridge was the first bridge that connected the Olympic Peninsula to the mainland of Washington in the United States of America. The bridge was built within 19 months at a cost of $6.4 million. Commissioned in 1940, the bridge collapsed on 7th November 1940 due to strong winds. The investigation revealed that flawed design and the non-factoring of aerodynamics in the design led to its collapse.

At the time of its construction, the bridge was regarded as a radical departure from past and existing practice. Its span to width ratio of a bridge was estimated to be 54% greater than any existing bridge. It was further established that neither the scale model tests nor existing designs or already built bridges provided confirming data on the proposed design (Holloway, 1999). Thus, the Tacoma Narrows Bridge collapse offered lessons in the development of bridge engineering professionals. Lessons from the collapsed bridge highlighted the need for analysing aerodynamics in bridge designs. This also led to the introduction of wind tunnels for testing bridges which became standard procedure and requirements for any suspension bridge thereafter. Essentially, isomorphism in form of regulatory and normative norms (pillars) was at the centre of influencing and sharing the lessons from the Tacoma Narrows bridge. Importantly, designers were discouraged from relying heavily on theory without having adequate confirming data. Therefore, it can be argued that failed projects offer an opportunity for relevant institutions within the construction industry (and bridge design) to pick lessons in order to improve their performance or designs.

3.5 SITUATED LEARNING THEORY

Developments in OL have seen the introduction of Situated Learning which is regarded as the brain child of Lave and Wenger (1991) and Brown and Duguid (1991). Compared with other learning theories, Situated Learning serves as a bridge between the cognitive process since it takes a practical and social context focus towards learning (Lave and Wenger, 1991; Sense, 2007b). Accordingly, Fox (2006, p. 427) notes that *"The basic idea is that people learn through participation in pre-existing communities of practice which socially reproduce both: (a) the practices their participants share and (b) the communities defined by their membership".* Therefore, instead of viewing learning as being individual based, it is understood as a non-linear social process involving a group participating in a social world (Lave and Wenger, 1991; Sense, 2007b, 2007a; Sense and Badham, 2008; Curnow, 2013). Fundamentally, Situated Learning Theory acknowledges the interdependence between the agency (actor) and the world (socio-context or environment) and subsequently making the person, world, activity and participation crucial to the learning process (Lave and Wenger, 1991).

3.6 KEY FEATURES OF SITUATED LEARNING

According to Curnow (2013) the key features of Situated learning are that members learn through Legitimate Peripheral Participation (LPP) in a community of practice (C*m*P) which are discussed as follows:

3.6.1 Legitimate Peripheral Participation

According to Lave and Wenger (1991, p. 29) LPP is "*…..the process by which newcomers become part of a community of practice".* This facilitates how newcomers (new learners) and old-timers participate in learning through identities, artefacts and activities within a communities of practice (Lave and Wenger, 1991). Consequently, in situated learning, learning is made legitimate[13] through 'acceptance' and 'interaction' with experienced practitioners in the C*m*P . Thus, Situated learning through LPP is not seen as the definition of boundaries but a demonstration of its multifaceted nature of interconnections

[13] According to Lave and Wenger (1991) 'legitimate' relates to the importance of membership or ways of belonging, legitimizing contents and what is to be learnt while 'Periphery participation' symbolises that learning is through participation with no specific position for learners in a community of practice.

amongst people, activities, the knowledge, and the world in which the learning occurs, hence, the situatedness of learning (Lave and Wenger, 1991).

3.6.2 Community of Practice

Lave and Wenger (1991, p. 98) consider a C*m*P as *'a set of relations among persons, activity, and world over time and in relation with other tangential and overlapping communities of practice'.* The commonality of identification and understanding include values, beliefs, goals and purposeful participation and membership in a group which are regarded as important for learning to occur (Brown and Duguid, 1991; Macpherson and Clark, 2009). Lave and Wenger (1991) also add participation, transparency, access to resources, information, old members, and other members as vital for successful learning in a C*m*P.

3.6.3 Limitations and Challenges in Implementing Situated learning

One of the limitations of Situated Learning is its lack of an established theory, and at times, contradicting on the knowledge that is created in dominant C*m*P since it suggests that newcomers cannot learn central activities (Curnow, 2013). Roberts (2006) and Macpherson and Clark (2009) further add that there is no clear definition of the C*m*P since members leave with others joining while belonging to several other projects. Consequently, from a project perspective, Lave and Wenger's (1991) view of C*m*P were participation is long term is not achievable. Tensions between the communities, willingness and ability to negotiate also affects the learning process (Macpherson and Clark, 2009).

The term 'community' in the 'community of practice' also gives an image of understanding, yet varying predispositions exist among members, and they take time to develop in the project environment (Roberts, 2006; Kakavelakis and Edwards, 2011). Hence, Lindkvist (2005) recommends a 'collectivities' of practice' as a complementary to C*m*P, which could be set up quickly with collective understanding suited for complex, temporal and fast paced organisations or C*m*P having members with varying skills. Hence, the study proposes an 'institutional field of PBOs' for Lf-PRF because project participants come

from different organisations with opposite or vying goals, institutions, values and culture[14]. However, even with such limitations, Situated Learning has been adopted since it takes cognisance of the context and multiple actors in learning which can be likened to projects since they are also delivered by multiple parties.

3.7 SITUATED LEARNING AND INSTITUTIONAL THEORY – INSTITUTIONAL FIELD OF LEARNING

Since theories fall short in one way or another, theory triangulation is encouraged by adopting two or more theories in order to compensate for weaknesses and strengths in each particular theory (Love *et al.*, 2002; Jack and Raturi, 2006; Denscombe, 2010). This rationale also justifies the selection of a conceptual framework, by adopting and integrating, the complementary Situated learning theory and Neo-Institutional Theory as opposed to a theoretical framework. Some commonalities between these two theories can be drawn via; firstly, the emphasis of artefacts, practices and; secondly the 'C*m*P' in Situated learning and the 'institutional field' in Neo-Institutional Theory. Evidently, both theories focus on several actors in a particular activity and the context (Macpherson and Clark, 2009; Dille and Söderlund, 2011; Levitt and Scott, 2016). Thus, the study aligns with Curnow (2013, p. 837) who notes that *"Rather than simply acquisition or mimicry, learning is understood as a process of active social engagement in which people move into different forms of participation, learning the activity, the logic, and the performance..".* Furthermore, Curnow (2013), Lam (2000) and Macpherson and Clark (2009) all contend that the influence of power on the C*m*P remains a limiting factor and is under researched especially that Situated learning theory does not account for how norms and practices influence learning in PBOs. Bresnen *et al.* (2005) equally acknowledge the influence of organisational routines on learning in PBOs and how they disrupt the power and knowledge bases within an organisation[15]. Thus, Neo-Institutional Theory, which focuses

[14]See also Roberts (2006) who further identify the following limitations: power; trust; new members' predisposition; competition; culture, and; size and spatial reach. C*m*P also differ with others being faster than others in processing; short-term and long term, and; pace of changes.

[15] Though Lave and Wenger (1991) regard the social structure and its power relations as a basis for legitimacy and possibility of learning, Robert (2006) observes that there is a lack of clarity and understanding on the influence of power on the C*m*P. Hence, through Neo-Institutional theory, these powers are considered through Isomorphic forces of coercive, mimic and normative which will may influence Lf-PRF.

on norms and practices (North, 1991), is applied together with Situated Learning theory the purpose of Lf-PRF[16].

3.7.1 The Conceptual Framework – A Multifaceted and Institutional Approach.

Though scholars call for institutionalisation of learning, the focus has been on the processes and institutional forces (Crossan *et al.*, 1999; Wiseman, 2007). Yet, key elements or features for achieving institutionalisation of Lf-PRF remain unclear and under researched. Therefore, the multifaced model by Lipshitz *et al.* (2002) is added as a middle-range theory through which mechanisms of learning from failure influenced by Neo-Institutional theory and Situated Learning theory within PBOs can be actualised. Accordingly, for PBOs to be successful in Lf-PRF, the study builds on the model by Lipshitz *et al.* (2002) who contend that OL should integrate the following facets:

- **Structural Facet** – This facet addresses the structure, process, parties, members, responsibilities of those involved in Lf-PRF. By and large this takes the form of post-project or after-action reviews. The structural facet of OL answers the 'who' 'when' and 'where' questions.

- **Cultural Facet** – This facet highlights the core values of OL based which include transparency, integrity, issue orientation, inquiry, and accountability (Popper and Lipshitz, 2000). The main purpose of the cultural facet is ensuring that valid information is shared and commitment from participants is achieved.

- **Psychological Safety Facet** – This facet focuses on the 'psychological safety' of learners by trying to reduce; (i) the reluctance of individuals to take the risk to learn and (ii) reluctance to share failure-related information with others. This also includes encouraging individuals to discuss their mistakes or errors freely

[16] This is in line with Crossan *et al.* (1999) who argue in favour of institutionalised learning by providing routines and procedures for learning. This includes providing shared values, understanding, tools, procedures, symbols and routines in the C*m*P (Wenger, 1998 cited in Macpherson and Clark, 2009).

(Carmeli, 2007). A good sense of psychological safety also supports the cultural facet values of inquiry, transparency, and accountability (Lipshitz *et al.*, 2002).

- **Policy Facet** – This facet denotes the formal steps that have been put in place to support Lf-PRF by management observed via rules, policies, and budgets. This is achieved via an organisation's commitment and tolerance to errors and support for the workforce (Lipshitz *et al.*, 2002).

- **Contextual Facet** - This focuses on factors that are considered as not being under the control of management or exogenous factors. These include error criticality, environmental uncertainty, task structure (influences), proximity or relevance of learning to an organisation's business or mission. The impact of the failure on an organisation is also considered under this facet.

Based in extant literature (Duffield and Whitty, 2016; Pemsel *et al.*, 2016; Pemsel *et al.*, 2018), the study has added three more facets: technological facet (tools for collecting and sharing lessons); governance and the Nth facet (continuous learning). Additionally, realising that PBOs do not exist or operate as islands and that learning occurs via interaction with others as a C*m*P (Macpherson and Clark, 2009)[17], the study's conceptual framework adopted a multi-level approach as shown in Figure 3.2 below. However, instead of a C*m*P, an institution field of Lf-PRF is recommended.

[17] In support of that, Moynihan and Landyut (2009) contend that learning is oversimplified in most instances by only taking the structural approach which addresses the process and parties in the learning process or the cultural approach by arguing that learning is achieved through shared norms of the parties involved in the learning. Thus, Moynihan and Landyut (2009) advise combining the two (Structural and cultural facet).

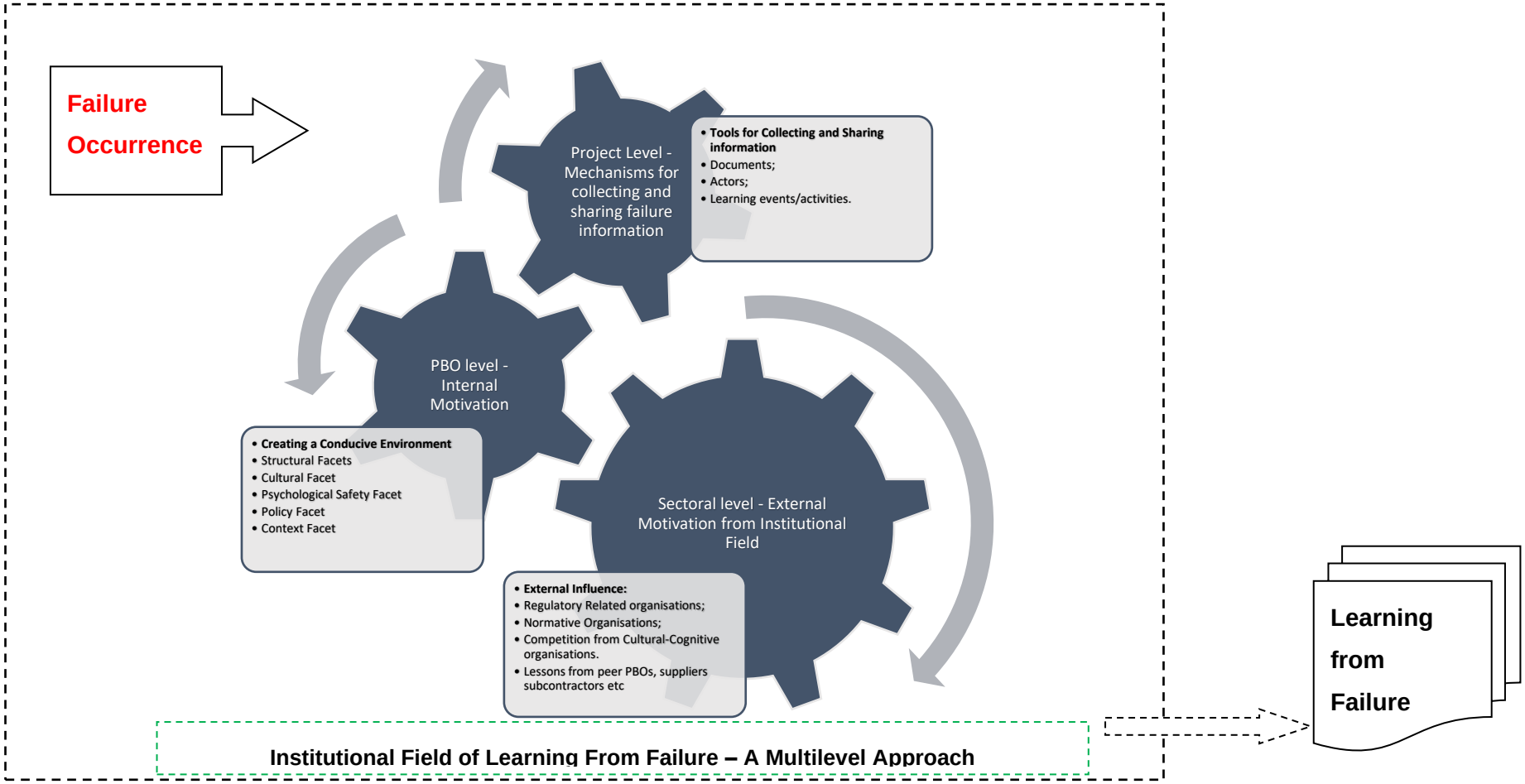


Figure 3.2 An Institutional Field Conceptual Framework – Multilevel Approach to Learning from Project-Related Failures.

The conceptual framework in Figure 3.2 above for Lf-PRF emphasizes the interaction between PBOs and organisations from the external environment categorised under the institutional pillars: Regulatory pillar-related organisations (client organisations, regulatory bodies, government bodes); Normative pillar-related organisations (professional bodies such as APM, CIOB), and; Cultural-cognitive related pillar organisations (peer PBOs, subcontractors, suppliers and end users). These are collectively referred to as the institutional field of Lf-PRF. Hence a multilevel approach is adopted which involves the following. The first level of the model acknowledges the influence of other institutions (the external environment) on Lf-PRF at the sectoral level. The second level is based on a PBO creating a conducive environment for Lf-PRF represented by the 5 five facets identified by Lipshitz *et al.* (2002)[18]. At the micro level, that is the project level, the focus is on PBOs providing appropriate tools and mechanisms for capturing lessons. This is by identifying learning artefacts such as documents and organising events for learning such as lessons learnt meetings and project review meetings.

Considering extant literature, the conceptual framework for Lf-PRF is hinged on the realisation that learning is a social process with the learner and the external world having influence on that process. This is in line with the social constructivism learning style which appreciates the influence of learners and the external environment on the learning process. This is unlike the behavioural and cognitive learning styles which regard the learner as not having influence on the learning process and can be motivated (behavioural) or given clear instructions or structured information to learn from (cognitive). Accordingly, the conceptual framework in Figure 3.2 above elaborates the influence of the external world. This can be appreciated through institutional pillars that influence, or 'push', the behaviour of PBOs by responding to normative, coercive, and mimic forces. The PBOs' influence (or pull/incentives) can be appreciated by embedding the 5 facets internally to support Lf-PRF and ensuring that the mechanisms for collecting and sharing failure-related information are provided at the project level. The PBO and project levels

[18] Among the various frameworks and models on learning from project-related failures in other sectors include Edwards (2017) whose model is focused on identifying defects, measurement and mindfulness, while Madsen and Desai (2018) discuss population level of learning and influence of its actors. Considering, these there is a lack of a holistic approach in the sense that former discusses failure analysis and identification whilst the later (Madsen and Desai, 2018) focuses on the sectoral level. Thus, the suggested model takes both sectoral and organisational levels.

also highlights the existence of sub-institutional fields within the institutional field. For instance, PBOs are structured based on departments and deliver several projects with respective project managers or leaders (with respective teams) who focus more on meeting their respective projects' needs.

Worth noting is that instead of presenting these parts in a block form or layers, the conceptual framework in Figure 3.2 above, tries to emphasize the interaction of the three levels (project, PBO and sector levels) for PBOs to effectively Lf-PRF. The sectoral level also serves as the source of lessons from failures experienced by other PBOs or organisations/institutions in the wider supply chain. Thus, in line with March's (1991) reasoning, the conceptual framework encourages PBOs to consider both, exploratory learning (external or vicarious learning from other PBOs' failures) and exploitative learning (internal learning from firm's own failures). As a preliminary review of the conceptual framework, document analysis, which is outlined in the next section, was done.

3.8 THE CONCEPTUAL FRAMEWORK IN VIEW OF DOCUMENT ANALYSIS

One of the main barriers of qualitative data analysis is its reliance on small sample sizes. To counter that concern, and as a way of conducting a preliminary review of the developed conceptual framework, document analysis was conducted. Sources such as industry documents, and reports relevant to Lf-PRF were included in order to augment the interview findings (Harper, 2003; Stephanie, 2014). Additionally, realising the sensitive nature of the topic of failure, document analysis was considered since it is regarded as being unobtrusive, provides permanent, comparative, and contextual data (Bryman, 2012). Since there are several sources and types of archival data or documents (Bryman, 2012; Ventresca and Mohr, 2017), to avoid biasness, the following factors were considered when 'including' or 'excluding' the reports; Firstly, since failure is a sensitive subject area, only reports on failure in the public domain were considered. Secondly, in order to use credible reports, only reports from government-related bodies such as the NAO and professional bodies (such as APM, CIOB) were considered. To avoid biasness leads from interview participants were also considered (e.g., Crossrail and Arcadis related reports were recommended). Key words and relevance to the study of project failure (conducted within the UKCI) and learning were also factors considered when selecting the documents. Overall, the documents were selected based on their relationship with answering the research questions or meeting the research objectives and being in the

public domain. Specifically, the reports aided in addressing objectives I; IV, V and VI. In total, 36 reports as shown in Table 3-3 below were used. See Appendix 7 for a detailed elaboration of the title and abstract of each report.

Table 3-3 Summary of Documents for Archival Analysis

Type of Reports	Number of Reports
Government Related Reports	
Department for Business Innovation and Skills (BIS)	1
National Audit Office (NAO)	7
HM Treasury	1
Infrastructure Projects Authority (IPA)	3
Department for Transport	1
National Infrastructure Commission	1
Edinburgh Schools Report	1
Hackitt Report	1
Home Office Report	1
Moore-Bick 2019	1
Professional Body Related Reports	
APM	3
CIOB	2
RICS	1
RIBA	1
Construction Sector PBOs' Related Report	
Crossrail Learning Legacy	6
Arcadis – 2021 Report	1
Participants' Documents	
Project Documents (Client feedback form, project management tools and lessons tracker)	3
Lessons Learnt Report	1
TOTAL DOCUMENTS	36

To guide the document analysis process, the study relied upon Ventresca and Mohr's (2017) four[19] types of archival data analysis of which two were adopted. The first type is 'few vs. many' and considered the 'few' approach which involves collecting archival data from a few organisations since it allows for intensive analysis. The second approach was the 'object vs. relations' with the study adopting the 'object' approach in order to understand 'practices', 'documents' and 'events' used in Lf-PRF.[20]

3.8.1 Overview of Organisational Learning from Failure Within the Sector.

The need for people intervention in delivering quality and successful projects has been acknowledged in the reports (Crossrail Ltd, 2007; RICS, 2016; CIOB, 2019, 2021). However, from the reviewed documents (in response to objective I and IV), only a few reports specifically cover OL such as the NAO (2009a) report on 'Helping Government Learn' and Crossrail Ltd (2007) through its learning development policy. Focusing on the Crossrail (2007) learning policy, learning within the sector can be divided into the following types: external learning (CPD, professional development and study programmes at universities), and; internal (coaching, mentoring, team training, workshops and seminars). Specific examples of external training include Construction Skills Certification Scheme (CSCS), Tunnel Safety Card (TSC) provided by the Construction Industry Training Board (CITB). Within PBOs, both approaches are bureaucratic and may involve application and approvals starting with the line manager. In most instances, these are scheduled annually or quarterly (Dumbleton and Pascutto, 2016). Worth noting from the reports is the definition of 'OL' provided by the NAO (2009a, p. 12) that *"learning is a collective, rather than simply an individual, process…. the significance of knowledge being used for a*

[19] The four types identified by Ventresca and Mohr (2011) are: 'Few vs Many' (few involving collecting data from a few companies and analysed intensively while many involves collecting small amounts of document from a large number of organisations); 'Read vs Measure' – reading involves intensive note taking through strategic reading whilst measuring relies upon patterns and configuration from formally measured data; 'Descending vs. Ascending' – In descending, the researcher macro patterns are used to explain micros processes while in ascending, micro or local practices are presumed to develop into the higher or macro level of society, and; 'Objects vs. Relations' – Objects approach focuses understanding traits, features and characteristics of individual social objects whilst the 'relational' approach focuses on relations connecting the objects instead of their characteristics.

20 According to Saunders et al. (2009, p. 150) when conducting document or archival analysis, *"Even where these records exist, they may not contain the precise information needed to answer your research question(s) or meet your objectives... data may be missing or you may be refused access or your data censored for confidentiality reasons".* For this reason and realising the sensitive nature of failure related information, the study only used documents that are available in the public domain. The referenced documents are not conclusive and not representative of the sectors' reports. However, these were selected based on their relevance to the study, specifically Lf-PRF

purpose, rather than simply collected or stored, and.. that learning is linked to change in departmental activities". This aligns with the study's view of learning as a social process which involves both organisational (including the project level) and sectoral parties. The 'change in departmental activities' also resounds with the earlier view of OL by Argyris (1976, 1977) as a change in behaviour and organisational system or policies. To achieve that, the NAO (2009a) provides four themes for consideration: leadership; infrastructure; people, and; process. These can be associated with the identified learning facets in the conceptual framework, instead of relying solely on one specific tool/facet, such as technological-, cultural-, and-governance facets. In contrast, the reports highlight a focus on 'individual training' through external events/measures such as CPDs and workshops. This was echoed in the RICS (2016, p. 18) report: *"There is no shortage of training in this area and thus no excuse for not taking courses, attending CPD events and using online resources"*[21]*.* Overall, key themes with respect to OL and Lf-PRF, arising from the reports are as follows:

- **Theme 1 - Internal Learning Practiced more Compared to Cross-Organisational Learning** - Reports evidence more of internal learning compared to cross-organisational learning. For instance, the NAO (2009a, p. 5) concluded that *"Departments find cross-departmental networks and communities of practice most valuable to supporting learning".*

- **Theme 2 - Guidance Overload** - According to the NAO (2009a) report *"There has been a proliferation of toolkits, guidance, and other products to help government learn. These have been useful but there is a danger of guidance overload".* This aligns with findings by Hackitt (2018) in reviewing fire safety that there are several regulations and guidelines, which are prone to being misinterpreted, and accordingly recommends for their simplification.

- **Theme 3 - Learning responds to big events and projects** - This is evidenced by reports that have been produced in response to the recent Grenfell Tower fire disaster and the Crossrail project. Such an approach highlights a

[21] The RICS (2016, p. 18) also recommends that *"For recently qualified surveyors organisations should consider mentoring and shadowing opportunities to watch and learn from others and also explore the potential for secondments with other organisations".*

'reactive approach' to learning. In contrast, the NAO (2009a) encourages organisations to include learning in their daily activities by changing departmental and staff members' behavior instead of being reactive.

- **Theme 4 – Training and Learning as an Event** - Learning mostly takes an 'event' approach through workshops, seminars and CPD (RICS, 2016; Arcadis, 2021; CIOB, 2021)[22]. The RICS (2016) argues against such learning within the sector since it suffers from the 'file and forget syndrome' and equating 'talking about something' to 'having been done'. Similarly, having a mission statement is also wrongly perceived as having established values for learning from failure (RICS, 2016). This aligns with decoupling tendencies observed by earlier scholars (Meyer and Rowan, 1977).

- **Theme 5 - Actors involved in Learning -** Reports emphasize on the project manager and project owners as those who should be held accountable (BIS, 2010; APM, 2012; RICS, 2016). Consequently, handling of P*r*F remains a preserve of senior staff instead of engaging everyone[23]. Similar with the study's conceptual framework emphasis on the need of an institutional field for learning, the IPA (2020, p. 9) report equally encourages engaging everyone through a 'tell it like it is' approach[24]. The APM (2012) however, recommends having a person responsible for the process of Lf-PRF.

- **Theme 6 – Documents and Accessibility** - Though construction projects involve several documents, the focus has been on documenting risks without a

[22] These events may take the form of; informal events such as lunch, tea break and other events open exchange of ideas and dialogue (RICS, 2016), and; formal events similar with the interview responses, such as lessons learnt meetings and workshops (APM, 2012; NAO, 2014; RICS, 2016).

[23] The BIS (2010) report provides such evidence by small 'issues' being left to the lower team members to deal with them while larger deviations such as poor estimations, delays should be handled by the project manager and senior responsible owners. However, there is no evidence on whether the small deviation are communicated or shared with the superiors and vise versa.

[24] The CIOB's (2021, p. 33) perception of quality improvements supports this: "There is no common definition of construction quality; it embodies many of the above *aspects. It is viewed from different perspectives: the investors and financiers, the client, the design team, the principal contractor, specialty contractors, end user, companies in the supply chain and the workforce".*

provision for documenting and record failures explicitly[25]. Documents that are used to record failures, though not explicitly mentioned, are 'checkpoint reports' produced by team managers to highlight *"what is not going to plan, what is likely not to go plan"* (BIS 2010, p. 38). The CIOB (2019) encourages easy access to documents and transparency since certain documents, especially those related to failure, are not easily accessible. For instance, investigations in the Edinburgh school's wall collapse were hampered by inability to access as-built or as-designed drawings and other structural information due to joint venture non-disclosure clause and litigation proceedings (Cole, 2017).

- **Theme 7 – Technological Tools -** For faster and easier access to failure-related information, Hackitt (2018) advises the use of BIM supported databases. The Crossrail learning legacy (Anthony, 2017) also recommends using a learning management system to track and keep an audit of individual learners activity. However, the CIOB's (2019, p.) report favors face-to-face interactions and cautions that *"Such systems [technological tools] may cope with large amounts of data, but the input matters... Information storage must be secure and accessible, especially lessons learned about quality failures or non-conformance"*. Hence, a balance of the two should be maintained for effective Lf-PRF[26] which aligns with the conceptual framework's argument for a multifaceted approach to learning.

3.8.2 Use of Lessons from Failure and their Influence on PBOs' Learning.

According to the RICS (2016) and NAO (2009) reports, the sector appears to be good at collecting and storing lessons learnt without sharing or using them. In instances were lessons are shared, reports do not elaborate or give guidance on how the lessons from failure can be learnt. For instance, the Department for Transport (2019) identifies 5 themes with 24 lessons, yet does not adequately highlight how lessons can be learnt.

[25] The BIS (2010) report lists the following documents without including a document for recording failure(s): Benefits Realisation Plan; Business Case; Checkpoint Report; Highlight Report; Issues Log; Project Brief; Project Initiation Document; Stakeholder Power/Impact Matrix; Stakeholder Map, and; Risk Log.

26 Opportunities for using technology in Lf-PRF are several ranging from failure detection storage and sharing of failure lessons. For instance the CIOB (2021. 96) indicated that "Laser scanning in construction can also help document where errors were made and identify a solution faster, this is particularly important for quality *assurance. Scans can be performed and accessed immediately, thereby improving operations, streamlining productivity and reducing rework".*

Therefore, in order to assess if PBOs have mechanisms in place to support Lf-PRF (and use of such lessons), and also review the conceptual framework's elements in view of the documents, the study sought for 'learning facets' within the reports. These are summarised in Table 3-4 below.

Table 3-4 Discussion and Reference to Facets within the Reports

Facets	Description	References
Structural Facet	Outline who is involved and learning mechanisms/tools.	"…*the project has realistic time schedules, active risk management and a post-project review"* (APM, 2014, p. 15).
Cultural Facet	Conducive environment for open sharing failure related information.	Open dialogue: senior managers being held accountable; making any challenges or problems visible; providing skills in handling sensitive or political related discussions; discourage hoarding of information by teams (RICS, 2016).
Psychological Facet	Team feels safe to state or call out situations as they are; free to try out new ideas intelligently.	*"Foster an open project culture, where people feel safe to challenge and raise risks and issues… If something isn't right, isn't ready or isn't working, say so, and take action accordingly"* (IPA, 2020, p. 9).
Contextual Facet	Not all lessons from failure are 'good'; valuing or making sense of the lessons.	*"The rote application of procedures or lessons or approaches from one major project to another can be equally dangerous… the lessons from other projects need to be applied with [caution]".* Department for Transport (2019, p. 38).
Policy Facet	Allocating time and resources for learning.	*"Give staff sufficient time to learn and reflect on the way they carry out their work and how it could be done better"* (NAO, 2009, p. 8).
Technological Facet	Tools for identification, collection, storage and sharing lessons on failure.	*"putting all this data in the cloud so that it is accessible online will unlock the full usefulness of the system, allowing easy sharing, fluid updating"* (RIBA, 2019, p. 4).
Governance Facet	Overall oversight and Criteria for Lf-PRF - identify responsible people; processes and guidelines.	*"The project needs to have clear reporting lines and regular communications between all parties."* (APM, 2014, p. 15).
Nth Facet	PBOs' continuously reviewing and improving the learning process; Unlimited tools and mechanisms for Lf-PRF.	

Though the facets were identified as shown in Table 3-4 above, decoupling tendencies can be observed from the reports. This is based on Anthony's (2017, p. 9) conclusion that

"Respondents recognised the value of learning lessons and continuous improvement but… in practice, the capturing, recording, and reviewing of them was inadequately achieved". In addition, using NVivo 12, the hierarchy chart of the facets shown in Figure 3:3 below shows less emphasis on cultural and psychological safety, which are encouraged by scholars for effective Lf-PRF (Edmondson, 1999; Cannon and Edmondson, 2005). Instead emphasis is more on policy (associated with the many guidelines) and technological related issues[27].

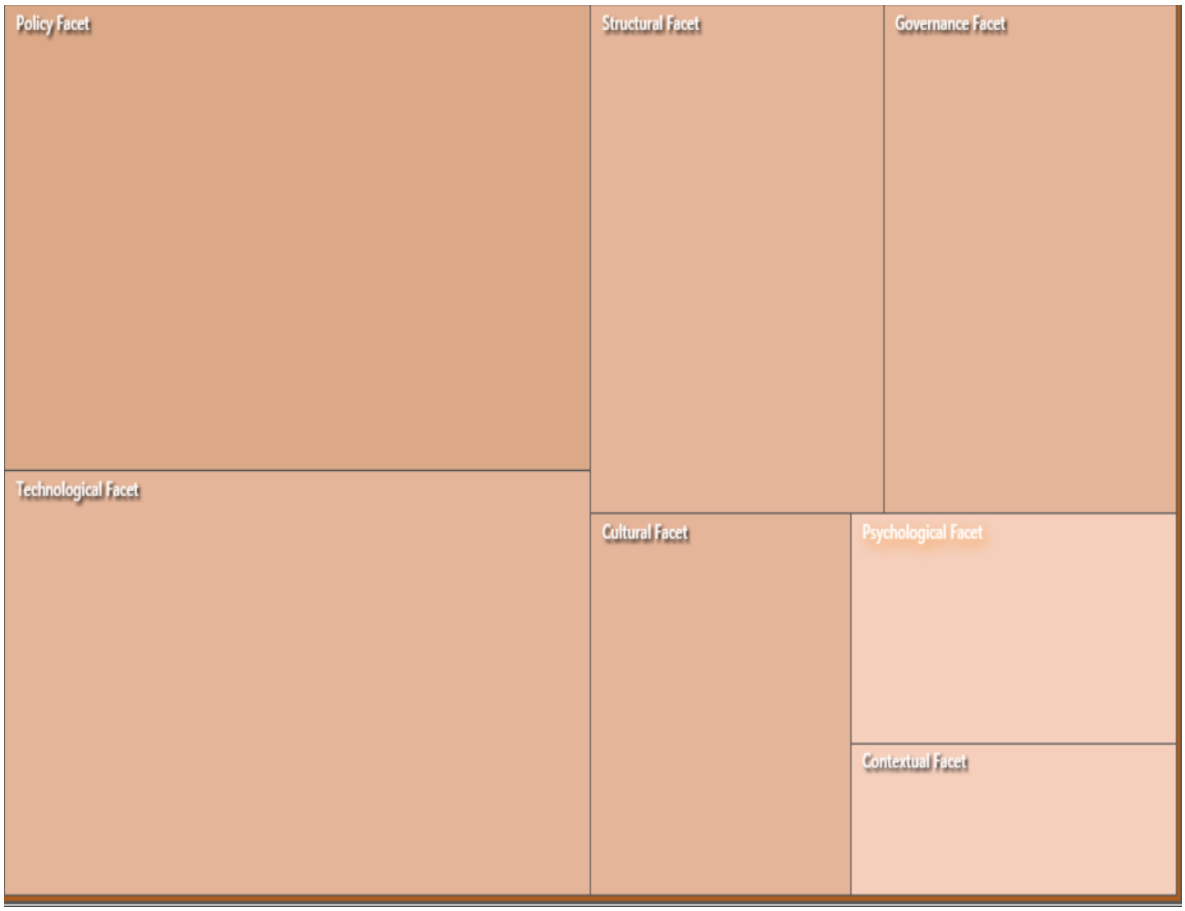


Figure 3:3 Hierarchy Chart - Emphasis on Facets Based on Document Analysis.

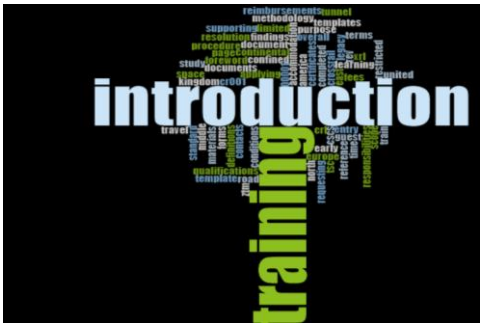
[27] Evidently, considering the NAO (2009a) having technology in place is not sufficient since any collaborative system is only as good as the culture and governance within the organisation.

3.8.3 Summary of Document Analysis and Implications

The various reports highlight how learning takes an 'event' approach which with a reliance on learning internal learning without engaging in cross-organisational learning. The reports also highlight how the industry's actors influence a standard way of working with an emphasis on project quality. This is supported by word clouds based on the reports' table of contents shown in Figure 3:4 below.

(a) Government Reports

(b) Professional Bodies Reports



(c) Construction Sectoral Documents

(d) All Reports

Figure 3:4 Word Cloud for Reports' Table of Content

From Figure 3:4 above, government reports show a focus on a 'project' mainly in form of project initiation and appraisal whilst the professional reports are inclined towards 'quality'. Correspondingly, PBOs respond with 'training' as shown Figure 3:4 above. From the conceptual frameworks point of view, this highlights the influence of the coercive isomorphic force on PBOs who focus on 'conforming' or 'structuring' their activities in order to meet the set quality standards or regulations. Evidently, Anthony (2017, p. 3) notes that *"Much work has been done to try to establish good, transferable and consistent practices to ensure the project is managed in a way that increases the likelihood of*

positive outcomes". Other forms of isomorphism (the normative and cultural-cognitive forces) can be appreciated from the CIOB's (2019) agenda on improving quality in the sector through:

- ***Regulatory/compliance*** – Associated with the Regulatory pillar through contractual compliance, standards, regulations, specifications and policy;

- ***Industry-led registration schemes*** – Associated with the Normative pillar such as registration with professional bodies; compensatory/insurance led, and;

- ***Market led*** – Companies within the sector decide and establish their quality standard scheme associated with the mimic force or Cultural-Cognitive pillar.

Since the study, through the conceptual framework, contends that the external environment, via norms, influences POBs' internal activities, Table 3-5 below gives a summary of the isomorphic forces and implications on Lf-PRF.

Table 3-5 Isomorphic Forces and Learning from Failure - Document Analysis

Isomorphic force	Examples	References	Implication on Lf-PRF
Coercive[28]	Regulations, standards, contractual conditions.	*"Conforming to a rule, such as a specification, policy, regulation, standard, or law"* (CIOB, 2019, p. 17).	Failure is despised and associated with incompetence, non-conformance, under trained; faced by punishment.
Normative	Using tested methods, tools.	*"Good practice project management tools, methods and techniques are applied"* (APM, 2014, p. 5).	Creates an environment which does not allow for testing new ideas.
Mimic	Lack of sharing failure lessons; adopting good practice only.	Quality and continuous improvement activities within communities of practice (CIOB 2019)	Failures are hidden; Lack of sharing lessons; Focus on interacting with seemingly successful PBOs.

[28] According to the CIOB (2019, p. 17) *"Health and safety in UK construction has benefited greatly from the regulatory/compliance nature of the Construction Design and Management (CDM) Regulations, with a legal requirement subject to punishment by fine/penalty*".

Worth noting is that isomorphism is driven by the increasing complexity, uncertainty, nature and size of construction projects which lead to the introduction of several standards, guidelines, regulations and policies (DiMaggio and Powell, 1983; CIOB, 2019). Consequently, PBOs focus on accreditation, using tested methods and certification to manage complexity (and uncertainty) and also show conformity or fitting in the social setting instead of Lf-PRF. This aligns with Basuki (2011) and Miterev *et al*. (2017) contend that isomorphic forces lead to homogenous strategies and practices amongst PBOs. In the case of Lf-PRF, the isomorphic strategies of LfPRF by PBOs are a lack of sharing failures and the blame game. However, instead of isomorphic forces identified in Table 3-5 above being viewed as barriers, these present opportunities through which Lf-PRF may be enhanced. For instance, the Regulatory pillar[29] (coercive isomorphic force) contracts may have provisions to encourage parties to document and share failures openly. Equally, the professional bodies could legitimize the process and contents via the Normative force, supported with guidelines on 'how to learn from failure' (DiMaggio and Powell, 1983).

Therefore, considering the CIOB's (2019, 2021) model of 'push and pull' in improving quality, it can further be argued that Lf-PRF requires two mechanisms (internal and external means - as argued via the conceptual framework): the push mechanisms from the sectoral institutions through regulations and guidelines (client, regulatory bodies and professional bodies) and the pull mechanism or internal incentives by PBOs (learning facets, collaboration and transparency). This is shown in Figure 3:5 below. Accordingly the developed conceptual framework argues in favour of a multilevel approach to learning (involving the sectoral, organisational and project levels) as opposed to the typical internal learning via lessons learnt meetings.

[29] The influence of the institutional pillars on Lf-PRF may be appreciated from Hackitt's (2018, p. 117) who notes that *"the regulator and government can have significant impact in developing lasting culture change by working together with industry to drive changes in behaviour through training and by providing leadership… adequate communication and clarity of messages are crucial".*

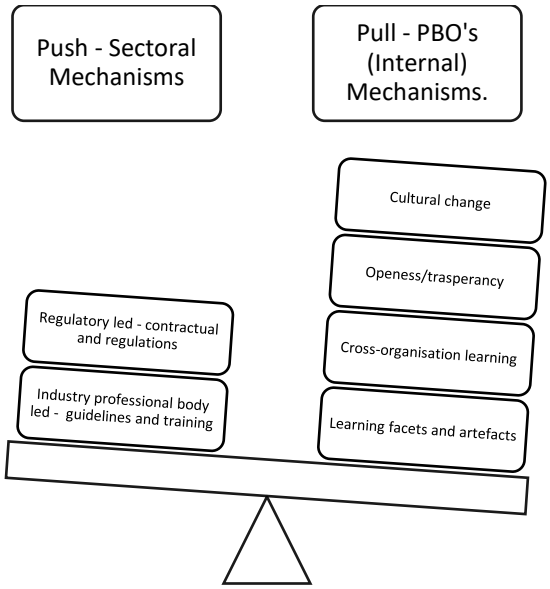


Figure 3:5 Pull and Push Approach to Learning from Project-related Failures

Overall, the perception of 'failure' and learning from it ought to change as encouraged by the RICS (2016, p. 11) *"that the purpose of a lessons learned process is to elicit information and build knowledge on both what went well and what could have been done better. It should be seen as a wholly 'positive' process, not 'negative' in the sense of labouring what went wrong and who is to blame"*. Thus, building a blameless culture remains among the key factors to be considered for effective . To achieve that, the conceptual framework argues in favour of multifacets (structural, cultural, psychological safety, policy, technological and governance) for effective Lf-PRF.

3.9 CHAPTER SUMMARY

Realising that there are several causes of failures, it would not be effective to have a single approach for PBOs to Lf-PRF (Pinto and Mantel, 1990; Cannon and Edmondson, 2005; Holgeid and Thompson, 2013; Gupta *et al.*, 2019). Thus, the adopted conceptual framework is based on multilevel and multi-facets, with a focus on how PBOs interact with the external environment in order to Lf-PRF. To achieve that, the study draws upon the principles of Neo-Institutional theory and Situated learning theory. These theories facilitate a better way of interpreting and understanding the dynamic relationship that exists between the agency and structure in the learning process since they both emphasize the importance of social relations, practices and artefacts (Kakavelakis and Edwards, 2011).

Therefore, Neo-Institutional Theory offers an opportunity to address the structure side by establishing norms for Lf-PRF while Situated Learning Theory will support learning among actors within a 'community'.

The overall understanding is that the influence of institutions[30] will be through the facets identified by Lipshitz (2002). Elaborately, Neo-Institutional theory has three institutional mechanisms of power (isomorphic forces; coercive, normative, and mimic) which are at play in any organisation and at the same time, these may address the eight facets suggested for Lf-PRF. For instance Friel (2017) observes that institutions create a stable structure which promotes efficiency and channel human behaviour in a particular way. Equally, Meyer (2018) contends that Neo-Institutional Theory assists with diffusing norms across society (both at national and organisational levels). Therefore, the influence of Neo-Institutional Theory may be actualised by establishing norms that address the facets identified by Lipshitz *et al.* (2002). This aligns with Desai's (2016, p. 201) reasoning that: *"Knowledge…, is embedded in organizational routines and processes that serve to guide and constrain the actions of organizational members"*[31]*.* See also Text Box 3.2 which further highlights the influence of practices such as communication and they may lead to failure on a project.

Overall, based on the conceptual framework, the study contends that the most common methods of capturing lessons evidenced in the reports (from document analysis) via lessons learnt reports, charts and other symbolic artefacts is limited. This is due to the complex nature of Lf-PRF which needs to be supported by relationships and interactions (Brown and Duguid, 1991; Macpherson and Clark, 2009). Projects are also increasing in complexity. Thus, for PBOs to effectively Lf-PRF, the conceptual framework echoes the need for PBOs to pay attention to both internal and external environments.

[30] This is based on Handy's (1999) argument that of the seven organisational theory schools of thought (scientific, human relations, bureaucratic, power, technology, systems and institutional) the institutional school of thought is applicable to any organisation to a certain extent and supports the other schools of thought through the formulation of rules.

[31] Dahlin *et al.* (2018) also discuss the integration of 'Opportunity', 'Motivation' and 'Ability' (OMA) mechanisms for Lf-PRF by taking a moderation-mediation process approach where the 'opportunity' to learn interacts/mediates between the 'motivation' and 'ability' instead of a three-way interaction.

Text Box 3.2 West Gate Bridge Collapse in Melbourne 1970 – Communication is Key, and No Error is Small.

What should a Lf-PRF model focus on? What concepts should underpin a conceptual framework for learning from failure? Insights on these two questions can be drawn from the Waste Gate Bridge Collapse. 35 deaths and several injuries were recorded due to the collapse of the Waste Gate Bridge in Melbourne during its construction on 15th October 1970. Investigations revealed that structural design deficiencies and unconventional construction methods led to the collapse of the bridge. The disaster was also caused by a culmination of minor errors during the design and construction phases which were not communicated. This shows a close relation between failure and communication since projects are delivered by different teams and organisations. Emphasis is made that no failure or error is too small to report, since the minor errors led to the loss of 35 lives. Small failures or minor errors should therefore encourage a culture of analysis and evaluation within a system to avoid major failures or disasters occurring.

Lessons and Influence – Inquiry in the collapsed bridge resulted in changes in the health and safety practices/regulations. The failure is also credited with workplace health related improvements which also demonstrates the influence of institutions within the construction sector. Has communication improved since the Melbourne bridge collapse? With so many projects associated with poor communication, the sector still experiences failures due to ineffective communication. How best then should the actors and parties within the sector communicate?

Chapter 4: Research Methodology

4.1 INTRODUCTION – RESEARCH METHODOLOGY

Research is considered as the studious and diligent inquiry, experimentation and investigation done for the purpose of discovery of knowledge, facts or revision of existing theories based on evidence (Edum-Fotwe *et al.*, 1996; Adams *et al.*, 2007). As such, Blumberg *et al.* (2008) and Runeson and Skitmore (2008) recommend that good research depends on collecting reliable data through a scientific method. Hence, this section outlines the formulated research methodology in order to establish knowledge around Lf-PRF by PBOs in the UKCI. Firstly, it is worth highlighting that the Research Methodology Chapter has been divided into two subsections. The first section of Chapter 4 outlines the research methodology detailed as follows: research philosophical positioning; research approach; research choices (qualitative and quantitative); time horizons; sampling methods; qualitative research methods; qualitative data analysis; Research ethics and qualitative research credibility. Realising the need to demonstrate research rigour, transparency and credibility in qualitative studies, the last sections of Chapter 4 takes an in depth discussion of the data analysis strategy detailed as follows: qualitative data analysis and the selected methods; the transcription process, and; the coding process (for thematic analysis).

Focusing on the first main subsection of Chapter 4, the following sections highlight the selected philosophical stance, approach, time horizons, techniques and procedures, methods, choices and strategies by using Saunders' *et al.* (2009) research onion shown in Figure 4.1 below as a guide.

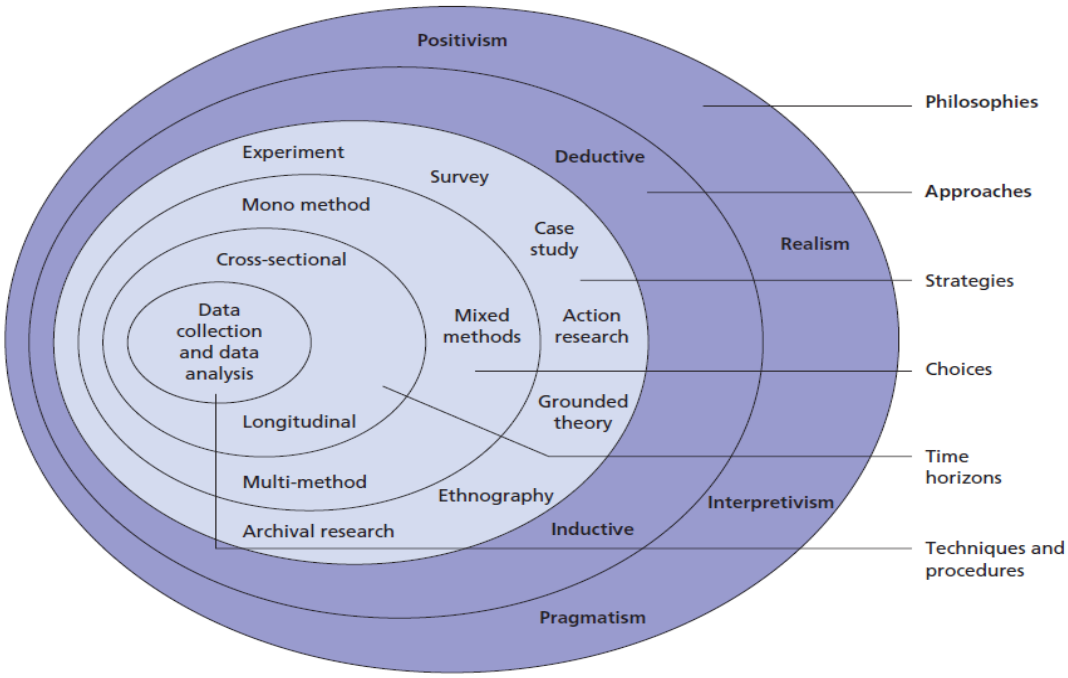


Figure 4.1 The Research Onion. Source: Saunders *et al.* (2009)

From Saunders' (*et al.* 2009) research onion shown in Figure 4.1 above, the following are applicable to this study: Philosophies – Interpretivism; Approaches – Deductive and Inductive; Strategies – Survey and archival research; Choices – mono method, and; Techniques – Interviews analysed using thematic, content and discourse analysis. Each of the layers are discussed in the following sections.

4.2 RESEARCH PHILOSOPHIES IN CONSTRUCTION PROJECT MANAGEMENT RESEARCH.

According to Knight and Turnbull (2008) and Voordijk (2009), research in the built environment uses methods from other disciplines such as social sciences, mathematics, economics and natural sciences. Subsequently, these form approaches to research in the construction sector as observed earlier by Edum-Fotwe *et al.* (1996) and Li and Love (1998). With many ideas and themes being borrowed from other sectors, there has been no standard method or approach of conducting research in the built environment. This has resulted in several arguments and disagreements around the appropriate research methodologies for the sector (Raftery *et al.*, 1997; Runeson, 1997; Wing *et al.*, 1998).

Nonetheless, Love *et al.* (2002) note that the most common methodologies in construction management research involve either positivism or interpretivism[1]. Positivism asserts that facts and knowledge are discovered through observing an object without individual's influence on the phenomenon being observed. Interpretivism instead rejects the causal explanations in positivism by arguing that every phenomenon is affected by the context and individuals involved in the research (Edum-Fotwe *et al.*, 1996). Though there is an increase in the use of interpretivism evidenced by scholars such as Sage *et al.* (2013, 2014), in the past, majority of construction-related research took a 'positivist approach'. This was by providing results that are scientifically valid, specific and highlighting how the variables being researched impact upon human and organisational success or failure (Seymour and Rooke, 1995; Seymour *et al.*, 1997). Additionally, Edum-Fotwe *et al.* (1996) observe that since funders need to have demonstrable outcomes, research in construction is mostly result oriented (positivism).

Accordingly, positivism through quantitative methodology instead of a balanced epistemological perspective, is what was reflected in the nascent construction management research (Seymour *et al.*, 1997)[2]. Seymour *et al.* (1997) contend that such an approach ignores social processes and relationships of people. This has resulted in attitudes which hinder productivity in the sector such as the 'managerial frame', a situation where all matters are seen through the 'manager' which blinds other possibilities (Hamel and Prahalad 1994, cited in Seymour and Rooke, 1995). Sage *et al.* (2014) refer to this situation as 'managerialsiation' of failure were by failure on a project is associated with the inadequacies in the project management functions and principles. This echoes the need to adopt interpretivism in construction related studies, which unlike positivism generates several possible answers to the 'why' question (Sage *et al.*, 2014). Table 4.1 below gives a summary of the key features of positivism and interpretivism philosophical approaches.

[1] Worth considering are modernism and postmodernism philosophical standpoints. According to Karataş-Özkan and Murphy (2010) postmodernism rejects the categorization of social practices by advocating for situational and contextual nature of knowledge. On the other hand, modernism argues in favour of objective and fixed realities. See Karataş-Özkan and Murphy (2010) and Knight and Turnbull (2008) for a detailed discussion on modernism and postmodernism.

[2] Other scholars (Winter and Smith, 2006; Winter et al., 2006; Runeson and Skitmore, 2008) also consider research in project management as being rational, deterministic, and positivist by emphasising on hard systems of planning and control with no regard to soft approaches or social processes (Sage *et al.,* 2014).

Table 4.1 Positivism and Interpretivism Research Philosophies

Features	Positivism	Interpretivism
Findings' Focus.	Generality.	Complexity (Romme, 2003).
Nature of objects	Empirical objects; descriptive; well-defined properties; observed from an outsider position.	Actors and researchers engage with complexity being considered in relation to objects (Romme, 2003).
Focus of the theory	Focused on testing phenomenon; Establishing causality (Runeson, 1997).	Understand human experience; measured in the sense of as "good", "fair" (Romme, 2003); study of meaning and appropriateness (Raftery *et a.*, 1997).
Purpose	Establishing the causal relationship of variables.	Attempts to portray and understand experience of human actors (Romme, 2003).

4.2.1 Organisational and Management Research – Focusing on PBOs

With relevance to PBOs, it is worth considering Romme's (2003) observation that research in organisations is primarily pluralistic in nature by involving both natural and social sciences. Evidently, in discussing organisational theory, Koskela (2017) reasons that both technical and social aspects are to be considered if production in both project and construction management processes is to improve. Importantly, knowledge arises from the actors' thinking which assumes the social-constructivist nature of knowledge. Therefore, Koskinen (2012) favours a dynamic approach to events within a learning system instead of merely analysing cumulative experiences. Essentially, being pragmatic by including both scientific and social approaches in organisation design and research is recommended (Romme, 2003; Voordijk, 2009, 2011). This is by adopting heterodox and pragmatic methodologies in order to achieve robust research outcomes (Kelemen and Rumens, 2012; Koskela, 2017).

Focusing on learning, Yeo (2002, 2005) argues against the objectivists (positivists) approach in OL research and recommends subjectivist approach (interpretivists) since learning involves both cognitive and behavioural facets. Yeo (2002) further recommends methods in OL that embrace both qualitative and quantitative methods such as case studies. Overall, unlike in the past when management related research either focused on using quantitative (dominantly) or qualitative research, presently mixed-methods research

is being encouraged since it is comprehensive and strengthens research outcomes and analysis (Jogulu and Pansiri, 2011; Kelemen and Rumens, 2012).

4.2.2 The Need for Multi-methods Research Approach

The need for rigorous research in construction has been made known long before in order to address construction problems (Edum-Fotwe *et al.*, 1996; Li and Love, 1998). Runeson (1997), Raftery *et al.* (1997) and Runeson and Skitmore (2008) argue that it is not sufficient considering only a single method since projects involve different parties and functions. Additionally, each research approach serves a different purpose in discovering knowledge (Raftery *et al.,*1997; Wing *et al.*, 1998). For instance, interpretivism is deemed valuable for problem identification, conceptualisation, articulation and establishing 'meaning' or understanding a phenomenon while positivism is more appropriate on 'causality' related problems (Raftery *et al.*, 1997; Runeson, 1997; Wing *et al.*, 1998; Aken, 2004). Jogulu and Pansiri (2011) further contend that quantitative methods offer validity and reliability while qualitative methods (by adopting multi-methods such as interviews and observations) give in-depth and meaningful interpretation of the phenomenon and variables being studied. This does not place any of the two approaches superior to the other, instead a balance should be sought based on the type of the research question or problem (Raftery *et al.,* 1997)[3].

4.2.3 Multi-method Triangulation

Appreciating limitations that may exist in each research methodology, triangulation and multi-methodology/pluralism is encouraged which allows the methods to complement each other (Love *et al.*, 2002; Jack and Raturi, 2006; Holt and Goulding, 2014). Triangulation also enhances the accuracy and credibility of research findings since they are created and verified by the use of divergent data collection and analysis methods (Jogulu and Pansiri, 2011). Additionally, triangulation highlights aspects that are blinded in the other research instrument or methodology (Dainty, 2008).

[3] Aken (2004) recommends firstly using non-positivist approaches in understanding a phenomenon which should then be later understood by testing the solutions through positivism approaches. Hence, this study by taking an exploratory approach in trying to understand the phenomena of failure has adopted an interpretivism.

Love *et al.* (2002) and Denscombe (2010) consider triangulation as the application of multiple research methods in order to overcome biasness and increase validity. Table 4.2 below illustrates the various forms of triangulation. Worth highlighting is that there is a difference between research triangulation and multi-methods research. Research triangulation as shown in Table 4.2 below may include a mix of methods, theories and participants and respondents used in collecting data while mixed method is basically the combination of two research approaches or methods, mainly quantitative and qualitative (Love *et al.*, 2002; Jack and Raturi, 2006; Denscombe, 2010).

Table 4.2 Types of Research Triangulation Source (Love et al., 2002; Jack and Raturi, 2006; Denscombe, 2010).

	Time	**Data Source**	**Investigators**	**Methodology**	**Theory**	**Validation**	**Discipline**
Love *et al.,* (2002).	Longitudinal or horizontal.	By many sources of data.	Two or more investigators.	By methodology.		By achieving validation through several input.	By interdisciplinary.
Jack and Raturi (2006).		Data Triangulation.	Investigator Triangulation.	Multiple observers, theoretical perspectives, and methodologies.	Theory triangulation.	More than one of quantitative or qualitative methods.	
Denscombe (2010).		Contrasting sources of information.	Different researchers.	Methodological triangulation within methods.	Theory triangulation.		

Thus, considering Table 4.2 above, instead of a mixed methods approach, the study adopted a multi-methods qualitative approach which also acted as a means of triangulation. This was in form of; analysing data sources from multi-disciplinary participants such as PM, CM; multiple sources of data such as interviews and documents; and multiple theories (i.e., Situated Learning and Institutional theory) (Jack and Raturi, 2006; Denscombe, 2010). Though triangulation is encouraged, it has limitations. These include the varying sensitivity of research instruments, difficulties with replication and the challenges in aligning with research question(s) (Love *et al.* (2002). Assumptions around epistemological positions under certain methods may be different and incompatible (Dainty 2008)[4]. Hence, Knight and Turnbull (2008) advise that a methodology must be genuine and justifiable instead of using a 'pick-and-mix' of terms. Therefore, reasons for adopting triangulation include better understanding (in this case failure and Lf-PRF) and confirming results by converging different perspectives (Jack and Raturi, 2006). Hence, the section that follows gives a detailed outline of the adopted research strategy.

4.2.4 Research Philosophy and Philosophical Stance

According to Saunders *et al.* (2009), research philosophy refers to the nature and development of knowledge. To further make clearer the study's philosophy, this was achieved by establishing ontological and epistemological stand points, as now discussed.

4.2.5 Ontology

Ontology refers to the 'existence' or 'being' and nature of reality (Knight and Turnbull, 2008; Runeson and Skitmore, 2008). Accordingly, this refers to the researcher's and participants' view of the phenomenon based on divergent ontological views[5]; such as objectivism, and subjectivism/constructionism (Saunders *et al.*, 2009; Holt and Goulding, 2017). According to

[4] Denscombe (2010) adds that since multiple approaches are adopted, triangulation requires more resources, and multi-skilled researchers. It also results in complex data analysis since there will be different types of analysis to be applied, contrasted and integrate the findings and risky essence (Denscombe, 2010).

[5] Under ontology, it is argued that *"reality is subjective and multiple as seen by the participants in the study"* (Bahari, 2012, p. 23).

Saunders *et al*. (2009), objectivism argues that social actors do not influence reality while subjectivism/constructionism supports the understanding that situations are influenced by or are a result of social actors.

The importance of ontology cannot be over emphasized since it is considered as the explicit specification of objects, concepts and other variables that exist in a particular area of research and how they are interrelated (Holt and Goulding, 2017). Consequently, ontology reduces the ubiquities and disagreements in understanding specific information especially in construction management research where similar concepts are used to describe different concepts or terms since projects involve multi-disciplinary teams (Runeson and Skitmore, 2008; Holt and Goulding, 2017). Hence, this study takes a subjectivism/social constructionism approach. This allows a researcher to view a phenomenon as being influenced by social interactions and is under continuous revisions and improvements (Bahari, 2012). This is in agreement with Bahari (2012, p. 25) who contends that *"the central view of constructionism is that the researcher's role is to appreciate/interpret the different constructions and meanings based on people experience".*

4.2.6 Epistemology

According to Knight and Turnbull (2008), 'epistemology' is a branch of philosophy focused on the nature, limitation and acquisition of knowledge. The word 'epistemology' is made of two ancient Greek words; 'episteme' and 'logos' which mean 'knowledge' and 'account' respectively. Epistemologically, knowledge is considered as *'justified true belief'* (Knight and Turnbull, 2008, p. 65). This implies that true belief is not knowledge without justification. Therefore, in any research, the source and collection of knowledge are important for its 'knowledge' to be justifiable (Romme, 2003; Knight and Turnbull, 2008; Holt and Goulding, 2017). The main types of knowledge under epistemology according to Knight and Turnbull (2008) include; 'empiricism' - knowledge through experience by means of the five senses based on scientific experiments, and; 'rationalism' - knowledge from peoples' thoughts considered as prior or without experience.

Epistemology is also (regarding what is acceptable knowledge) divided as follows; positivism, realism (critical) or pragmatic and interpretivism (Saunders *et al.,* 2009; Bryman, 2012). According to Bryman (2012) 'positivism' admits knowledge that can be confirmed using the senses as being genuine. Saunders *et al.* (2009) adds that 'realism' takes the two forms; 'direct realism' – what the senses 'see' is what is portrayed as the accurate view of the world; and, 'critical realism' – what is experienced with the senses are sensations and are not the real images of the world. Thus, Bryman (2012) reasons that within 'realism' there is a very close relationship between reality and the terms that are used to describe it while 'critical realism' argues that there is a difference between objects being described and reality. Therefore, critical realists admit that social orders have influence on knowledge and understanding what the senses experience unlike positivists (Saunders *et al.*, 2009; Bryman, 2012)[6]. Critical realism is likened to interpretivism which Saunders *et al.* (2009) considers as conducting research among people instead of treating them as objects, since as actors, people play a part in interpreting and understanding the world view.

Focusing on construction research by considering the works of Holt and Goulding's (2017) and Romme's (2003), construction knowledge is generated from; science, humanities and design. The science and humanities represent positivism and interpretivism respectively while 'design' takes a pragmatic approach by combining the science and humanities type of research. Zooming out into OL, this can be related to Yeo's (2005, p. 370) argument that *"Realists, like objectivists, regard knowledge as hard, explicit and capable of being transmitted in tangible form whereas nominalists, similar to subjectivists, perceive knowledge as tacit, softer, spiritual and even transcendental based on the insight of the unique individuals*". Yet, regarding research on OL and Lf-PRF, Sage *et al.* (2013) argue that most research in P*r*F adopt the positivists approach through critical failure factors (CFFs). This is by objectifying failure and portraying it as a phenomenon that can be predicted through the cause-and-effect relationship. Yet, extant literature shows that failure remains a subjective phenomenon which is dependent on the social context and actors involved in the process (DeWitt, 1988; Pinto and Mantel, 1990; Atkinson, 1999). Therefore, instead of positivism, the interpretivism approach which views failure as a social-construct and acknowledges the

[6] Understanding based on critical realist is considered as being 'provisional' by Bryman (2012).

influence of socialized phenomenon such as managerial, power, identities and interests on failure is encouraged (Sage *et al.,* 2013). Consequently, as a philosophical stance, with respect to ontological and epistemological positioning, the study adopts social constructionism/subjective and interpretivism respectively.

4.3 RESEARCH APPROACH - INDUCTIVE AND DEDUCTIVE APPROACHES

Saunders *et al.* (2009) and Bryman (2012) contend that a deductive approach uses existing established theory and subjects and rigorous testing a theory, while an inductive approach develops theory after the collection and analysis of data. However, abductive is another approach that adopts principles from each of the two. Bryman (2012) argues that abductive is more of the inductive process only distinguished by emphasis and reliance on the participants' worldview. In contrast, Dubois and Gadde (2002) consider abductive research approach as the 'systematic combining' of the empirical (positivism) and the theory (interpretivism) world views when conducting research, as illustrated in Figure 4.2 below. This aligns with Ali and Birley (1999) who view abductive reasoning approach as the integration of deductive and inductive reasoning approaches.

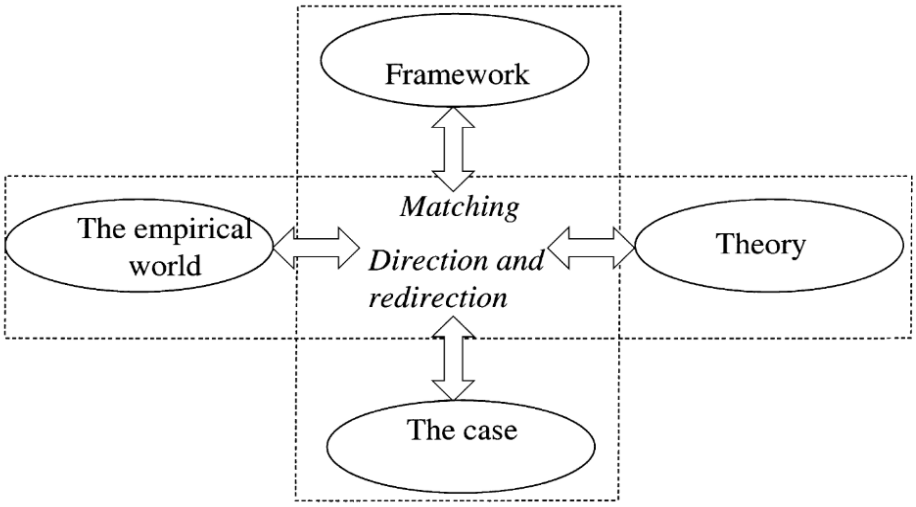


Figure 4.2 A Systematic Combination of Deduction and Induction. Source (Dubois and Gadde, 2002, p. 555).

In support of the abductive approach, Dubois and Gadde (2002) argue that it is not possible to understand theory without empirical observation and vice versa. Equally, Jogulu and Pansiri (2011, p. 688) contend that *"With matching deductive-inductive dichotomies, researchers can provide better inferences when studying the phenomenon of interest*[7]. However, worth considering is Ali and Birley (1999, p. 106) who recommend integration of deductive and inductive methods since based on that *"respondents discuss the seemingly general questions and identify constructs which are meaningful to them and explain the relationships between the constructs".* This is unlike the traditional perspective of abductive which implies testing a theory (deductive) and developing a theory (inductive). Thus, this study adopted integrated deductive-inductive approach as discussed by Ali and Birley (1999). This aligns with Dubois and Gadde (2002) who contend that abduction is non-linear and takes an integrating approach by intertwining systematically deductive and inductive approaches.

Importantly, for findings to be credible, these should be supported deductively and inductively based on an existing theory (Ali and Birley, 1999; Awuzie and McDermott, 2017). Consequently, the study adopted Neo-Institutional Theory and Situated Learning Theory for purposes of analysing the data based on an integrated deductive-inductive approach. The theories provided a structured way of identifying (inductively and deductively) the actors and activities involved in the process of Lf-PRF by considering the institutional pillars, isomorphisms and C*m*P. Additionally, Dubois and Gadde (2002) contend that multiple data (triangulation in other terms for purposes of validation) sources are advised when conducting an abductive approach[8]. To that end this study relied on 32 interviews involving 34 participants from different professions and analysis of 21 relevant documents (See Appendix 6 and 7 respectively).

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[7] This has been applied before by Aneta and Jerzy (2013) in learning and understanding alternative solutions to decision making on construction projects related.

[8]Abductive sits between inductive and deductive. The two compensate each other since a loose analytical approach (inductive) my lead to indiscriminate and overload in data collection and analysis processes whilst the fixed approach (deductive) may not allow to see other aspects of the study (Dubois and Gadde, 2002). In addition, Bahari (2012, p. 26) elaborates that *"By means of the epistemology viewed by qualitative researcher, it means that the researcher makes an effort to get as close as possible to the participants being studied. In terms of ontological assumptions the intensive/qualitative researcher carries out a study with the aim of reporting multiple realities".* Based on that understanding, the definition of failure and approaches to Lf-PRF identified in the study are not conclusive nor exhaustive. These serve as a basis for further understanding the process of Lf-PRF

4.3.1 Research Purpose

Steane (2004) observes the following several types of research approaches which are also considered as indicators of the purpose of the research by Saunders *et al.* (2009);

- **Basic research** – Tests the hypothesis to contribute to theory.
- **Applied research** – Analyzing theoretical insights and testing their application.
- **Summative research** – Assesses how previous research can be generalized.
- **Formative evaluation** – Assessment is done using the case method.
- **Action research** – Researchers join respondents in researching them.
- **Ethno-methodology** – A scrutiny or observation of the phenomenon.
- **Exploratory** – Attempts to investigate a poorly understood phenomenon.
- **Descriptive research** – Aims at understanding and describing a social phenomenon.
- **Explanatory research** – Explains the causal relationship between phenomena.

From the above, an exploratory approach, which takes a qualitative/interpretivism approach, was adopted realising that the phenomenon of Lf-PRF is poorly understood among practitioners (Ho, 1994; Atkinson, 1999; Velikova *et al.*, 2018). Saunders *et al.* (2009) also contend that using the exploratory approaches, allows the researcher to understand the problem by initially starting broader (exploratory) and then narrowing down on specific areas of the research. This corresponds with objectives (i), (ii), (iii) and (v) which address the understanding of P*r*F, OL, causes of failure and a model for Lf-PRF by PBOs.

4.4 RESEARCH STRATEGY AND RESEARCH METHODS

It is important to differentiate between 'research strategy' and 'research methods' since their understanding influences the research process and outcome (Edum-Fotwe *et al.*, 1996). According to Denscombe (2010), research methods are data collection tools while a 'research strategy[9]' is a carefully and rationally constructed research design or plan with

[9] Holt and Goulding (2017) consider a 'research strategy' as the system of methods, principles, concepts, and theories that are applied to a context or problem while 'research methods' are tools for implementing a particular

specifically identified goal(s) and problem. Examples of research strategies according to Denscombe (2010) and Saunders *et al.* (2009) include; survey, case study, ethnography, phenomenology, grounded theory and action research. Research methods may include interviews, observations, questionnaires, experiments and focus groups (Edum-Fotwe *et al.*, 1996; Holt and Goulding, 2014). Overall, 'research methods' are tools for data capture and analysis (Edum-Fotwe *et al.*, 1996) while the 'research strategy' is an outline of how the whole research will be done (Bryman, 2012) to achieve specific goal(s) (Denscombe 2010). The two work hand in hand with a range of methods being used within a strategy such as using both interviews and questionnaires for a survey (Denscombe, 2010; Holt and Goulding, 2014). Yet, it is important when selecting a research strategy and research methods to ensure that they are suitable, feasible, and ethical (Denscombe, 2010). Because of the nature of the research and the problem (Lf-PRF) in this case), a survey, with interviews as a mode of collecting primary data, was adopted for this research. This is because interviews align with the selected reasoning approach (inductive) and research purpose (exploratory approach).

4.5 RESEARCH CHOICES – QUANTITATIVE AND QUALITATIVE METHODS.

Research choices are how a researcher invokes methods and techniques. Choices could be mono-method, mixed method or multimethod. Multi-methods involve several data collection and analysis tools such as interviews, case study and questionnaires in one study. Thus, the research choice for this study was qualitative multi-method since it creates an opportunity to better answer a research question as observed by Saunders *et al.* (2009)[10]. The key methods adopted were semi-structured interviews (involved two rounds) supported by document analysis. Additionally, Creswell (2007) indicates that qualitative research takes one of the following strategies; narrative; phenomenology; ethnographic and case study. However, Miles and Huberman (1994) take a broader perspective and focused on means of data collection to include participant observation studies (ethnography, field study, phenomenology), interview

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methodological design. The research strategy also highlights the constraints placed upon the concept of 'knowledge' and the philosophical and theoretical foundations of conducting research.

[10] Variations of multi-methods include: Quantitative multi-method where data is collected using questionnaires and structured observations and analysed quantitatively, and; qualitative multi-method where data is collected using multiple qualitative methods such as interviews, observations and analysed qualitatively (Saunders *et al.* 2009).

strategies, and archival strategies. From these, the study adopted interviews (based on qualitative) since other strategies such as participant observation were not feasible due to sensitive nature of the area of study (failure).

4.6 TIME HORIZONS

Time horizons refer to the duration taken to collect data. This usually takes one of the following forms: Snapshot - one-off referred to as a cross-section or a series of snapshots - a diary of events over a long period regarded as longitudinal (Saunders *et al.,* 2009). This study adopted the cross-sectional approach realising the benefits it offers in time constrained academic studies (Saunders *et al.,* 2009).

4.7 TECHNIQUES AND PROCEDURES FOR SAMPLING AND DATA COLLECTION METHODS

In this project, data collection and analysis involved a multi methods approach since it can potentially address limitations of each method and facilitates data collection (Saunders *et al.*, 2009). Therefore, semi-structured interviews and documents were used to collect data (Saunders *et al.*, 2009).

4.7.1 Techniques and Procedures for Data Analysis

Since a qualitative multi-method research approach was adopted, qualitative data analysis methods were used. These include discourse and thematic analysis in analysing responses from the interviews and archival data. NVivo 12 data analysis software package was used to aid the analysis of qualitative data. This analysis in turn guided the development of a model which was evaluated using interviews with industry practitioners. Worth considering also for qualitative data analysis is whether to use representative or exploratory samples, and how big the sample size should be. These are discussed as follows:

a) Representative Samples and Exploratory Samples

Saunders *et al.* (2009) advises that when conducting survey research, it is important to decide and advise on the type and size of population to be considered[11]. In that quest, Denscombe (2010) argues that there are representative and exploratory sample types. The representative sample is used when gathering information in a sufficiently large survey to draw valid inferences and conclusions with enough confidence about the entire population of interest. In contrast, an exploratory sample is used in research efforts relating to underexplored topics in order to generate new information and ideas. Such research does not require obtaining an accurate or sufficient number of participants from that population (Denscombe, 2010). Since the research takes an exploratory approach in order to understand the rarely researched and understood problem of failure and how PBOs can learn from it by generating insights and ideas, exploratory sample was adopted.

b) Qualitative Interviews Sample Size

Qualitative sample sizes are usually smaller than quantitative sample sizes since qualitative in-depth interviews are focused on understanding meanings (and phenomena) instead of testing the hypothesis or (generalization of findings) (Mason, 2010; Dworkin, 2012). The guiding principle on the sample size when conducting a qualitative study is achieving 'saturation'. Saturation is defined as a situation when no new insights are discovered from subsequent interviews (Mason, 2010; Dworkin, 2012; Malterud, *et al.*., 2016). However, it is argued that saturation is mostly tied to one specific qualitative method (grounded theory) and in most cases transparency is not offered. This is because researchers simply state that saturation was reached without giving the actual number. Hence, Malterud *et al.* (2016) recommend 'information power' as the guide in selecting the sample size in qualitative studies[12]. To achieve that, Malterud *et al.* (2016) recommend the following as the key elements which have also been adopted in this study: aim of the study; sample specificity; use of established theory; quality of the dialogue and analysis strategy. Other factors

[11] Equally, Bryman (2012) argues that it is important that the sample size is sufficient or representative if you intend to generalise the findings.

[12] According to Malterud *et al.* (2016) the higher the information power the lower the sample size and vice versa.

affecting sample size include data collection methods, budget and available resources, area of study and researcher's experience (Mason, 2010; Malterud, Siersma and Guassora, 2016). Hence, the sample size for the study, coupled with an exploratory sample, was guided by saturation and the information power of participants (Denscombe, 2010). The relevance of participants' information was established by considering participants with experience on failure in the construction sector, number of years, their position or role (ranging from middle to top management roles) such as directors, project managers, commercial managers, regionals managers etc. See Appendix 6 which gives a summary of participants' information. However worth specifying is the unit of analysis (Miles and Huberman, 1994). Accordingly, the study's unit of analysis is the PBO. Therefore, professionals within PBOs were sampled since it is not possible to interview an 'organisation' per se.

4.7.2 Qualitative Sampling Techniques

Qualitative research relies mostly on nonprobability sampling methods such as purposive sampling and snowball sampling (Bryman, 2012). Therefore, purposive sampling and snowball sampling methods were deployed. Purposive sampling was favoured because it involves selecting participants (individuals, organisations etc) who are directly relevant to the research question being asked[13]. Snowball was used because of the sensitive nature of the study on failure (Bryman, 2012). This is because snowball sampling initially starts with a small sample size purposively selected. Having gained trust, further participants are selected based on the recommendations of the small group. However, it is worth acknowledging the limitation of purposive sampling since only participants that fit the research objectives or researchers' needs are selected. Therefore, Mason (2010) reasons that it is important to purposively select a variety of participants belonging to the specified target group but displaying variations. Thus, variety in participants was achieved by considering participants from small and large construction firms, design and construction firms and different professionals/disciplines (such as project managers, planners, engineers, and quantity surveyors).

[13] Additionally, unlike random sampling, purpose sampling allows researchers to get access to varied participants as much as possible in order to obtain varied perspectives (Bryman 2012).

4.8 THE STUDY'S ADOPTED RESEARCH METHODS - QUALITATIVE RESEARCH

According to Creswell (2007), qualitative research approaches are best suited for exploratory studies which seek detailed understanding from the participants instead of relying on predetermined information. Accordingly, qualitative research method was adopted since the study focused on 'failure' a term which has no standardized definition and meaning. Importantly, Miles and Huberman (1994) contend that qualitative research findings such as participants' actual 'words' are more concrete, vivid and give more meanings compared to a summary of numbers[14].

4.8.1 What is Qualitative Research.

In most instances, qualitative research is discussed as without numbers. However, this study adds an epistemological approach since qualitative narrative or text responses can be analysed quantitatively. This aligns with Selvam (2017) who reasons that a qualitative research or data analysis epistemologically holds no unitary perception of the real world since it is dependent on the participants' view. The major differences between quantitative and qualitative research methods are given in Table 4.3 below.

[14] The nature of the research question, necessitated the use of qualitative research approach in order to get deeper understanding of the subject matter (Creswell, 2007). Accordingly, qualitative research was considered since the study primarily focused on exploring Lf-PRF and gain a better understanding of the study especially that it is rarely researched upon.

Table 4.3 Difference Between Qualitative and Quantitative Research (Selvam 2017)

	Qualitative Research	**Quantitative Research**
Type of Knowledge	Subjective.	Objective.
Aim	Exploratory and observational.	Generalisable and testing.
Characteristics.	Flexible contextual portrayal dynamic, continuous view of change.	Fixed and controlled; independent and dependent variables; pre-and post-management of change.
Sampling	Purposeful.	Random.
Data Collection	Semi-structured or unstructured.	Structured.
Nature of Data	Narratives, quotations, descriptions; Value uniqueness, particularity	Numbers, statistics; replication.
Analysis	Thematic.	Statistical.

Additionally, the difference between qualitative and quantitative research methods lies in the results and analysis. Qualitative approaches are associated with inductive and abduction approaches to data analysis which emphasize using 'sensitizing' concepts instead of 'definitive' ones based on deductive (or quantitative research method) (Bryman, 2012). Sensitizing terms once developed are not fixed, as in the case of definitive', instead they offer a sense of guidance and reference (Blumer, 1954, cited in Bryman, 2012). Hence, the resulting sensitizing concepts *"give a very general sense of what to look for and act as a means for uncovering the variety of forms that the phenomena to which they refer can assume"* (Bryman, 2012, p. 388). Principally, the following steps in view of Bryman's (2012) key stages in qualitative research, were considered[15]:

i) Formulating the general research questions.

ii) Conceptual and theoretical framework (selecting sites or participants).

iii) Collecting the data.

iv) Interpretation of the data.

[15] Notable features of a qualitative research according to Miles and Huberman (1994): capture actors perceptions; Isolation of themes and expressions which serve as informants; words are analysed and organised in order to compare, contrast and create patterns from the data collected.

v) Model development.

vi) Conclusions and recommendations.

4.8.2 Qualitative Research Instruments

According Selvam (2017), research instruments should fit the data collection process, the intended use of the data and marched against the research question. Considering Table 4.4 below which lists various research instruments under qualitative research, the study adopted interviews with semi-structured interviews being used.

Table 4.4 Qualitative Research Instruments Adapted from Selvam (2017, p. 72)

Data Collection Method	Research Instrument
Qualitative Questionnaire.	Questionnaire with open-ended or vignettes.
Interview.	Interview (questions).
Focus Group Discussion.	Focus group discussion guide.
Observation.	Observation Guide.
Case study.	Questionnaire guide (open-ended questions).

Additionally, Documents Analysis[16] was adopted to get insights on Lf-PRF model. This is because document analysis aids in providing exploratory, explanatory and descriptive answers on how a phenomena has changed overtime (Saunders *et al.*, 2009). However, studies based on document analysis are constrained by firstly a lack of availability and access to data. Secondly, even when the documents are available, they may not contain all

[16] Though Bryman (2012) does not draw a clear difference between archival and secondary data analysis, Saunders *et al.* (2009) contends that the archival research differs from secondary data analysis in the sense that archival strategy focuses on products (documents) of day-to-day activities and are considered as part of the reality being studied. This is unlike secondary data which analyses data that others have collected (Bryman, 2012).

the required information or data. Hence, document analysis was based on the available/accessible data and can be applied alongside other methods (Saunders *et al.*, 2009). The study therefore relied on prominent reports and other documents that are available in the public domain[17] on past P*r*F.

4.8.3 Designing Research Instruments

Though there are several types of interviews available to researchers (e.g., group interviews, focus groups, structured interviews, and unstructured/in-depth interviews), Bryman (2012) advises that they all serve the basic purpose of eliciting information from participants. Here, semi-structured interviews were selected over unstructured interviews since they offer the opportunity of maintaining the context by using a standard set of questions for each participant. Unlike the structured interviews, semi-structured interviews also allow for further probing (Bryman, 2012; Easterby-Smith *et al.*, 2021).

4.8.4 Why Interviews?

The interviews were selected as a suitable source of primary data in order to get more insight on Lf-PRF in line with Easterby-Smith *et al.* (2021) who encourage the use of interviews based on the following three reasons: firstly, interviews assist in developing understanding of the respondents' world view on a particular matter for a researcher to influence it individually or collaboratively; secondly, interviews are suited for studies which seek to understand constructs used by respondents in order to establish their opinions, beliefs and practices on a subject matter, and; thirdly, interviews offer a logical step-by-step process of analysing a situation that is not clear or is a commercially sensitive and confidential study areas. In view of that, two types of interviews were considered; individual or one-on-one interviews which offered confidentiality for participant, and; group interviews (involving two participants) in order to elicit information on socialisation and interaction of organisational members during learning (Bryman, 2012; Easterby-Smith *et al.*, 2021).

[17] This was due to limitations associated with archival data, which are similar to the use of secondary data analysis, such as lack of consent from owners of the documents (Bryman, 2012). Therefore, only documents that are in the public domain and those recommended by researchers (from their companies) were used for the study.

Overall, the methodological benefits of using interviews over other methods such as observations is that they are, economical, easier, and faster to administer and can generate large amounts of data and insights (Hughes and Huby, 2002). To avoid common errors associated with interviews such as interviewers' poor memory and recording of responses, the study used a recorder and standardised the questions.

4.8.5 Two Waves of Interviews

The process of designing the research instruments was first informed by extensive literature review which led to the fine tuning of research objectives. Further literature review was then conducted which generated the first-round of interview questions which were then cross referenced against the research objectives as shown in Table 4.5 below. The focus of the first round of interviews was to gain understanding on the definition and measurement of failure and the practices applied in Lf-PRF by PBOs.

Table 4.5 Research Instrument No. 1 - First Round Interview Questions

Item	Questions	Relevant Literature	Research Objectives
I	How does organisational learning occur, within PBO's?	(Crossan *et al.,* 1999; Easterby-Smith *et al.*, 2000; Koskinen, 2010, 2012).	Uncover how organisational learning occurs, within PBO's (I).
Ii	What are the common, underlying, root causes of project failure?	(Pinto and Mantel, 1990; Flyvbjerg, 2014; Agaiby *et al.*, 2017; Liu *et al.*, 2017; Gupta *et al.*, 2019).	Review the common, underlying, root causes of project failure in the construction sector (III).
iii	What do you consider to be a failed project or failure?	(Pinto and Mantel, 1990; Atkinson, 1999; 2012; Liu *et al.*, 2017; Gupta *et al.*, 2019).	Review the understanding of project failure within the construction sector (II).
iv	Are past project failures currently used, for organizational learning?	(Edmondson, 2004; Cannon and Edmondson, 2005; Shore, 2008).	Explore the extent and nature of current practice, in the use of past project failures (IV).
V	How does (such) failure influence organizational learning in PBO's?	(Edmondson, 2004; Cannon and Edmondson, 2005; Shore, 2008; Shepherd *et al.*, 2014).	Assess whether failure may inform organizational learning in PBO's (V).
Vi	Who should (should not) be involved in the process of learning from failure?	(Stehlik, 2014).	Uncover how organisational learning occurs, within PBO's (I).
vii	Does your organisation have any deliberate measures that encourage learning from failures? If so, give examples.	(Edmondson, 2004; Cannon and Edmondson, 2005; Shore, 2008).	Explore the extent and nature of current practice, in the use of past project failures (IV).
Viii	How willing are individuals and organisations to share lessons learned from failures?	(Shepherd, Patzelt and Wolfe, 2011).	Address whether and how, failure does inform organizational learning in PBO's.
Ix	How do you measure or determine a project is a success or failure?	(Pinto and Mantel, 1990; Atkinson, 1999; 2012; Liu *et al.*, 2017; Gupta *et al.*, 2019).	Examine what project failure is, in the construction sector.
X	What would be the barriers to learning from project failures?	(Edmondson, 2004; Cannon and Edmondson, 2005; Shore, 2008; Shepherd *et al.*, 2014).	Assess whether failure may inform organizational learning in PBO's (V).
xi	Do you have any suggestions that may enhance the process of learning from failure in construction among PBOs?		Construct a model and evaluate whether it facilitates organisational learning from P*r*F(s) (VI).

Feedback from the first round of interviews informed the formation of the second round interview questions as advised by Hughes and Huby (2013). The second round of interviews attempted to elicit information on practices used in Lf-PRF with respect to the internal (organisational and project levels) and the external (sectoral levels) environments on learning. The second-round interview questions were further influenced by the underlying theories within the conceptual framework, as shown in Table 4.6 below. Therefore, relevant literature (on failure and learning) and theoretical information from Neo-Institutional Theory, Situated Learning and Lipshitz *et al.* (2002) five learning facets informed the design of the research instruments.

Table 4.6 Research Instrument No. 2 - Second Round Interview Questions

Item	Questions	Associated Theory	Associated Literature	Associated Objectives
1	Does your organization use or refer to any sector reports or government guidelines or procedures on learning from failures? If so, give examples.	Neo-Institutional Theory	(O'Neil, 2009; Currie, 2012; Lukic *et al.*, 2012; Milligan *et al.,* 2014; Levitt and Scott, 2016; Littlejohn *et al.*, 2017).	I, IV, V
2	Does your organization use any professional bodies' (such as CIOB, APM etc.) guidelines and publications on learning from failure? If so, give examples.	Neo-Institutional Theory	(Wiseman, 2007; O'Neil, 2009; Levitt and Scott, 2016)	I, IV, V
3	Does your organization have any networks in place within and outside your organization for learning from failure? If so, give examples.	Situated Learning	(Wiseman, 2007; O'Neil, 2009; Levitt and Scott, 2016).	I, IV, V
4	Are there any templates or documents within your organisation that are used for purposes of recording project-related failures within your organization? If so, give examples.	Structural Facets	(Sense, 2007; Sense and Badham, 2008; Littlejohn *et al.*, 2017).	I, IV, V
5	Are roles and functions clearly identified regarding learning from project-related failures within your organization? If so, give examples.	Structural Facets	(Sense, 2007; Sense and Badham, 2008; Littlejohn *et al.*, 2017)	v
6	In an event of a failure or mistake being experienced on a project, how does your organization collect and share information within and outside your organization?	Cultural/Psychological Facet	(Lipshitz *et al.,* 2002; O'Neil, 2009; Shepherd *et al.*, 2011; Grohnert *et al.*, 2017).	IV, V
7	How are employees supported before and when a failure occurs, or a mistake is made on a project?	Cultural and Psychological Facet	(Edmondson, 1999; Edmondson and Lei, 2014)	IV, V
8	Does the organization you work for allocate time for reflection and discussion on failures on projects? If so, kindly give examples.	Policy Facets	(Lipshitz, Popper and Friedman, 2002; Ellis *et al.*, 2014; Littlejohn *et al.*, 2017)	I, IV, V
9	Do you have any suggestions that may improve the process of learning from project-related failures?			VI

4.8.6 Mode of Conducting the Interviews

According to Bryman (2012) and Easterby-Smith *et al.* (2021), interviews can be conducted in person (face-to-face) or by telephone. The study adopted both since telephone or virtual

interviews allow one to reach participants in remote areas and are economical. Thus, 'Microsoft teams', 'Skype' and 'Zoom' were used for purposes of conducting virtual interviews[18]. Though telephone or virtual interviews do not offer an opportunity to assess non-verbal expressions, an opportunity offered by face-to-face, telephone and virtual interviews were considered for the following reasons. According to Easterby-smith *et al.* (2021), like the case of face-to-face interviews, telephone interviews still allow for synchronous data collection since the respondents and interviewers interact at the same time. Bryman (2012) also observes that the remoteness of the interviewer also removes participants biasness that may be influenced by their presence.

4.8.7 Computer Aided Qualitative Data Analysis Software – CAQDAS

The advancement in technology have ushered in the use of computer aided qualitative data analysis software (CAQDAS). According to Saunders *et al.* (2009) and Bryman (2012), CAQDAS offers several advantages such as transparency and methodological rigour. Though, several CAQDAS programs exist, the study used NVivo 12 to aid analysis as it is relatively readily available, compatible with several operating systems and not complex to use (Saunders *et al.*, 2009). However, Saunders *et al.* (2009) and Bryman (2012) contend that even though several processes and relationships can be run using CAQDAS programs such as NVivo 12, the researcher needs to code, input the data and interpret the results. Hence, the qualitative data analysis involved both the manual (formulation and selecting themes deductively and inductively) and the computer aided approach.

4.8.8 Research Ethics and Approval

According to Saunders *et al.* (2009), research ethics relate with the moral and responsible way in carrying out one's research which includes research formulation, data collection and

[18] With movement restrictions in place at different intervals due to Covid-19 during the period of data collection (December 2019 – October 2021), face-to-face interviews were replaced with virtual interviews. This was done in the interest of the researcher's and participants' safety and wellbeing.

analysis, findings, and storage of the data. Ethical issues have implications on negotiating for access to respondents and organisations and the data collection and analysis (Saunders *et al.*, 2009). Therefore, the initial step in upholding an ethical approach to the study was by obtaining the ethical approval from the institution (Northumbria University) which mainly focuses on ensuring that there is no harm, embarrassment or any disadvantage is suffered by the respondents as echoed by Saunders *et al.* (2009). The application was approved on 23rd October 2019 by the faculty of Engineering and Engineering Research Ethics Committee of Northumbria University. See Appendix B for the ethics approval email from the Ethics Committee. This was also done by providing dignity, confidentiality, data protection, privacy and anonymity of participating organisations and individuals (Saunders *et al.*, 2009; Bryman, 2012).

4.9 RESEARCH CREDIBILITY AND TRANSPERANCY

Paramount to any qualitative research is transparency and the credibility of its findings which hinges on reducing the possibility of getting 'wrong' findings. This is achieved by paying particular attention to 'reliability' (transparency) and 'validity' (credibility) in the research design process (Saunders *et al.*, 2009). These are outlined further in the following sections.

4.9.1 Research Transparency and Dependability (Research Reliability)

Saunders *et al.* (2009) consider research reliability as the ability of the data collection and analysis techniques providing consistent findings when used by other observers and on another occasion. Bryman (2012) also refers to the replicability of the research as external reliability and the agreement of what two or more observers in a single research on what they see as internal reliability. From a qualitative study's perspective, this highlights transparency and dependability[19] in the processing of raw data. To enhance reliability, the following measures were considered which relate to participants and the researcher.

[19] Dependability in qualitative research refers to an 'audit approach' and parallels 'reliability' in quantitative research. Bryman (2012, p. 392) further adds that *"This entails ensuring that complete records are kept of all phases of the research process— problem formulation, selection of research participants, fieldwork notes, interview transcripts, data analysis decisions, and so on—in an accessible manner".*

- ***Subject or Participant Biasness*** – Saunders *et al.* (2009) contend that in situations where participants feel insecure, they may give bias information or decline to give information. Realizing the negativity associated with failure, and to avoid subject biasness, anonymity of all participants was maintained.

- ***Observer Error*** – The researcher's action such as inconsistent list of questions may lead to errors in the data being collected. To avoid such when conducting interviews, a structured set of questions was maintained (Saunders *et al.*, 2009).

- ***Outlining Research and Data Analysis Methods*** – Transparency in qualitative data is also enhanced by clearly outlining the adopted research methods and their justification (Bryman, 2012). This includes clearly elaborating the transcription and coding process. In this study, CAQDAS was used by adopting NVivo12.

Transparency in the study was enhanced by providing Participants' Information Sheet and Consent Forms for them to have an appreciation of the study before agreeing to participate. Participants were also allowed to withdraw from the study at any time of the study. See Appendix 4 which shows Participants' Information Sheet and Appendix 5 Research Participants' Consent Form used in the study.

4.9.2 Research Credibility and Trustworthiness (Research Validity)

According to Saunders *et al.* (2009), research validity ensures that the findings indicate what they appear to be. Bryman (2012) equally considers it as the integrity of the conclusions of a particular study and related it to; 'internal validity' (correctness of the findings or causal relationship between variables), and; 'external validity' (how generalizable the results are to the external context). From a qualitative perspective validity is associated with trustworthiness and credibility[20] which aid in ensuring that the researcher is observing or measuring what they

[20] According to Bryman (2012) validity in qualitative research refers to the credibility which basically questions how believable the findings are.

say they are (Bryman, 2012). Thus, to achieve this, some of the measures that were put in place include the following;

- ***Testing*** – In avoiding what Bryman (2012) considers as becoming too familiar or experienced in the pre-test and research aims, respondents were only allowed to participate in each round of interviews once. Besides, a cross-sectional (one-off) approach was taken to avoid barriers to validity such as mortality or participants leaving (in the case of longitudinal studies).

- ***Triangulation –*** In a bid to uphold credibility and trustworthy of the results, triangulation was adopted by the use of a archival documents and interviews (Bryman, 2012).

- ***Evaluation of Findings*** - Bryman (2012) also advises conducting evaluation of findings. This is done via presenting the findings to members of society in order to assess whether the researchers findings and interpretation are in agreement with the social world or current practice.

For the purpose of achieving and demonstrating credibility, dependability and transparency, the follow section outlines the data analysis process and strategy.

4.10 ADOPTED DATA ANALYSIS PROCESS AND STRATEGY

Although qualitative research approaches offer the benefit of vivid results and meaning through words, the approaches face challenges such as biasness, reliability and validity of the findings (Miles and Huberman, 1994). Qualitative analysis is also regarded as being subjective, lacks generalisation and transparency (Creswell, 2007; Bryman, 2012). To alleviate some of the concerns regarding qualitative such as transparency and credibility of the findings, this chapter outlines the data analysis process (Bryman, 2012). Hence, as a guide, the subsection on the adopted data analysis strategy is structured as follows; qualitative data analysis methods; the selected qualitative methods; an outline of the qualitative data analysis process; the transcription process and tools and the coding process.

According to Miles and Huberman (1994), qualitative data analysis involves data reduction, data display and drawing conclusions. Hatch (2002, as cited in Leech and Onwuegbuzie, 2007, p. 564) gives a detailed definition of qualitative data analysis as *"a systematic search for meaning… organizing and interrogating data… to see patterns, identify themes, discover relationships, develop explanations, make interpretations, mount critiques, or generate theories…. Involves synthesis, evaluation, interpretation, categorization, hypothesizing, comparison, and pattern finding".* Primarily, this is done by systematically searching for meaning, themes, interpretation and drawing conclusions from the collected data (Miles and Huberman, 1994; Leech and Onwuegbuzie, 2007). To achieve that, Miles and Huberman (1994) contend that a researcher engages in two main activities. The first activity is 'describing' which involves presenting complicated data in a clear and simpler way for better understanding. The second activity is 'explaining' which involves drawing understandable relationships from complex data or information based on specific guidelines or rules.

4.10.1 Qualitative Data Analysis Approaches and Methods

According to Smith and Firth (2011) qualitative research approaches can be categorised into three groups; Social-linguistic – methods focused on analysing the meaning of language such as discourse analysis; theory development methods such as grounded theory; and interpretation of participants' views such as thematic and content analysis. Of the three approaches discussed by Smith and Firth (2011), this study adopted the method focused on interpretation of participants' views. Qualitative data analysis methods are also categorised as either being 'deductive' or 'inductive' orientated. In the 'deductive qualitative methods', codes and themes are preidentified while in 'inductive methods' they are developed during the data analysis process (Saunders et al., 2009). Inductive methods include the following (some of which can also be applied deductively):

- **Grounded Theory Analysis** – Involves a constant comparison and development of codes as the data is being collected so that the developed theory is grounded in the data (Saunders et al., 2009). Data analysis and collection proceed in tandem, thus theory is derived from the data (Bryman, 2012).

- **Discourse Analysis** (DA)– Involves understanding the use and meaning of words and language (Leech and Onwuegbuzie, 2007). According to Yates (2004, p. 231) within discourse analysis, a 'discourse' is regarded as *"a set of rules ideas, concepts and rules about how one thinks and talks about a topic as well as the knowledge a group, institution, society or culture has about that topic".* DA was adopted since it helps in understanding how same concepts or phenomena are viewed differently by analysing the text[21]. For instance, Saunders *et al.* (2009) argue that different discourses will conceive and present a similar concept or practice such as a meeting differently. DA is also flexible and compatible (can be applied as a complementary analysis method).

- **Narrative analysis** – Is used in exploring naturally occurring linkages and socially constructed explanations. These are based on stories or narrations provided by participants which may not be factual but aid in giving meaning to the facts under study (Saunders *et al.*, 2009).

On the other hand, some scholars such as Leech and Onwuegbuzie (2007) and Smith and Firth (2011) also consider the following deductive qualitative data analysis methods:

a) Thematic analysis - The identification of recurring themes or concepts from the data collected (Bryman, 2012). Smith and Firth (2011, p. 3) add that thematic analysis *"is an interpretive process, whereby data is systematically searched to identify patterns within the data in order to provide an illuminating description of the phenomenon".* Themes may be coded based on the literature review or theories (Bryman, 2012).

Overall, the several qualitative data analysis methods serve three purposes which may also be regarded as steps in the process of analysing qualitative data; firstly, categorising data (word count, constant comparison, template analysis etc), secondly, developing relationships

[21] The philosophical position also influenced the use of DA. This aligns with Saunders *et al.* (2009) who consider narrative and DA as being inductive and take an exploratory approach and subjective ontological position.

(domain, taxonomy, content analysis etc) and thirdly, making conclusions such as thematic and discourse analysis (Leech and Onwuegbuzie, 2007; Saunders et al., 2009).

4.10.2 Selected Qualitative Data Analysis Methods

Qualitative data analysis methods were selected based on two principles. Firstly, the philosophical stance adopted by the study, which is interpretivism. Accordingly, inductive approaches were considered since epistemologically, they align with interpretivism. Hence, discourse analysis method which is interpretive (inductive) oriented was selected[22]. In addition, since through the conceptual framework some themes were identified and accepted, thematic analysis which is both deductive and inductive oriented method was adopted. Furthermore, since the data involved two phases of data collection, thematic analysis was also adopted since it is suited for phased type of data collection (Alhojailan, 2012). This aligns with Braun and Clarke (2006, p. 84) who contend that when using thematic analysis *"the development of the themes themselves involves interpretive work, and the analysis that is produced is not just description but is already theorized".* DA was also selected based on its compatibility with the research lens, Neo-Institutional theory and Situated learning, for the study since it tries to highlight concepts and rules held by a group(s) and institutions around a particular idea or topic. Secondly, triangulation and compatibility of the methods was considered. Notably, some methods are similar and compatible with each other such as thematic analysis and discourse analysis in that they all involve creating or developing a list of codes/themes or categories created inductively or deductively (Saunders *et al.*, 2009).

In order to increase the rigour of a study it is advisable that (with consideration) several methods of analysis are used via methodological triangulation (Leech and Onwuegbuzie,

[22] From a philosophical point of view, DA aligns with the study based on its ontological and epistemological stand point as observed by Bryman (2012) that: firstly it is anti-realism and proposes that there no one single external reality to be portrayed by a researcher. Secondly, it takes a constructionist approach by arguing that versions of reality are dependent on members being investigated in a particular social setting.

2007)[23]. This allows for 'legitimisation' which is basically the trustworthiness, credibility and dependability of the findings. Consequently, unlike studies that discuss triangulation based on research methods, this study aligns with Leech and Onwuegbuzie (2007) who argue in favour of triangulation through multiple data analysis methods. The selected data analysis methods are summarised in Figure 4-3 below.

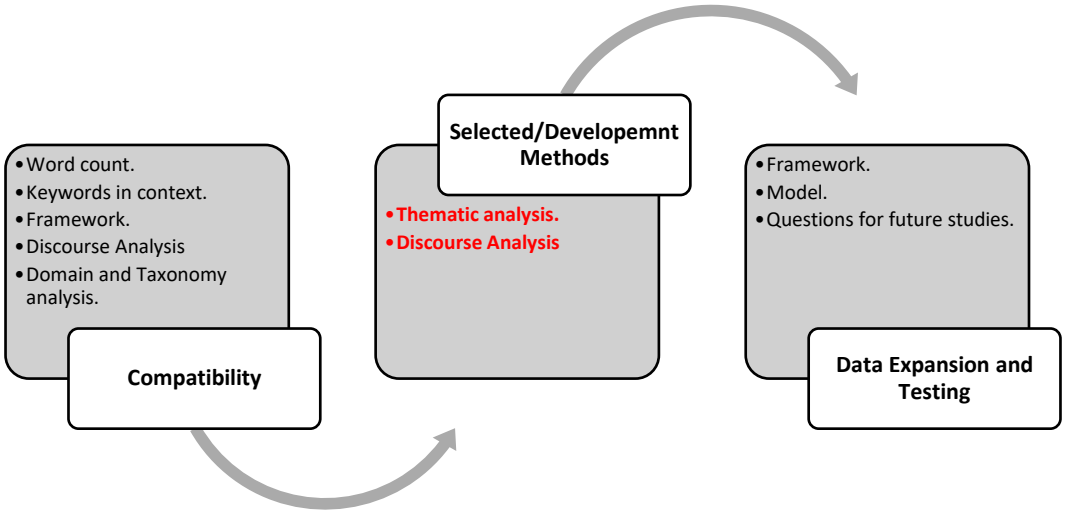

Figure 4-3 Getting more Output from the Data Through Method Triangulation

Overall, the study adopted three key data analysis approaches, thematic analysis supported by the narrative analysis which Saunders *et al.* (2009) consider as being flexible and compatible since it can be applied as a complementary analysis. In addition, some methods were combined and provided inputs for other analysis. For instance, 'framework analysis', 'thematic analysis' and discourse analysis were combined in conducting 'Thematic Framework analysis' while 'narration analysis' provided the discussion (Bryman, 2012). Table 4.7 below gives a summary of the data analysis methods that have been selected for triangulation purposes and the associated research objectives.

[23] Two reasons for triangulation: Firstly, 'representation' purposes which essentially is the ability to obtain adequate meaning or getting more out of the collected data and secondly, expansion, outputs from one method used to generate questions for another study (Leech and Onwuegbuzie, 2007).

Table 4.7 Summary of Qualitative Data Analysis Methods Selected and Associated Research Questions

Data Analysis Method	Purpose/Mid-range strategies	Associated Research Question	Associated Themes/Codes
Thematic analysis	Identify common themes or ways of learning from failure, establish relationship between themes and concepts	All	Ways of conducting learning from failure; barriers to learning; definition and causes of failures.
Discourse Analysis.	In-depth understanding of practices towards failure and learning from failure.	III, IV	Purpose of after review meetings, client feedback etc

Worth noting is that instead of applying thematic data analysis alone, it is supported by DA[24] since such approaches can pick subtilities and nuances within the text or data being analysed (Braun and Clarke, 2006; Denscombe, 2010).

4.11 QUALITATIVE DATA ANALYSIS PROCESS

The qualitative data analysis process involved the following main stages; preparation and organisation of the data, transcribing (in the case of interviews); familiarising oneself with the data by rereading; coding the data, and; linking data themes or units to create overarching themes (Creswell, 2007; Smith and Firth, 2011). More elaborately, the study adopted Miles and Huberman's (1994) process of data analysis involving the following three stages; Data reduction; data display and; conclusions.

[24] According to Yates (2004), several types of discourse analysis exist and are grouped into three categories: Discourse as social interaction (human structures and behaviours by analysing written form of text and focus); Discourse as minds, self and sense making (focused on how people understand and perceive the world around them), and; Discourse as culture and social relations (focuses on understanding ideological positions and power systems). Of the three, this study applied both discourse as social interaction and discourse as a cultural and social relations.

a) **Data reduction** – This involves focusing, summarizing, simplifying, or paraphrasing the collected field data and is a continuous process throughout the study. As the process continues, themes and codes are further developed by making clusters and relationship. The data in this process is reduced or condensed into short texts, quotes and codes (Miles and Huberman, 1994).

b) **Data display** – This is an organized and compressed presentation of the data for analysis and drawing conclusions. Forms of display include extended text, matrices, graphs, charts, and networks.

c) **Drawing conclusions** – This involves taking note of meanings, relations, and patterns, causal flows, and possible configurations. The conclusions are drawn from the very beginning of analyzing the data and developed inductively as the data collection and analysis progresses (Miles and Huberman, 1994).

4.11.1 The Transcription Process

Having collected data via interviews, the initial stage of analysis was transcription. According to Halcomb and Davidson (2006, p. 38) transcription is *"the process of reproducing spoken words, such as those from an audiotaped interview, into written text".* The main types of transcription are verbatim (naturalised) and the denaturalised. Verbatim approach involves transcribing word-for-word or utterances in as much details as possible including vocalised and involuntary responses (Halcomb and Davidson, 2006)[25]. Its advantages include facilitating an audit trail, reliability and validity. In the denaturalised method, according to Oliver *et al.* (2005) less attention is given to involuntary vocalization. Instead, its accuracy is focused on trying to uncover meanings and perceptions that are formed and shared during the interview or conversation[26]. Accordingly, this study adopted the denaturalised transcription method due to the following reasons. Firstly, the study focused on the

[25] Such an approach is also referred to as the Jefferson Transcription since it pays attention to pitch, volume and movements of respondents (Hepburn and Bolden, 2013).

[26] Its focus is not on how perceptions are communicated but instead on what the perceptions themselves are and has been applied in discourse analysis and grounded theory studies (Oliver *et al.,* 2005).

'understanding' and 'meaning' of a particular study area via interviews instead of focusing on participants' syntax or grammar. Similarly, Poland (1995, p. 295) observes that *"Clearly, an obsession with transcript quality to the exclusion of other aspects of rigor would be a case of misplaced emphasis".* Secondly, realizing that the study focused on a sensitive topic of failure, the denaturalised approach allows for confidentiality since names of individuals and companies, or any identifiers are removed. Thus, identifiers were replaced with 'letters' such as 'company X' or completely omitted instead of transcribing word-for-word (McLellan *et al.*, 2003; MacLean *et al.*, 2004; Oliver *et al.*, 2005; Stuckey, 2014). From a theoretical point of view, denaturalised method was considered, particularly as the study adopted discourse analysis which is more focused on linguistic content (meanings and topics) instead of linguistic form (grammar, cohesion, etc) (Yates, 2004). The complex technical dilemmas associated with the verbatim method also render it highly susceptible to errors and misinterpretation of contents (Halcomb and Davidson, 2006).

4.11.2 Transcribing Tools and Equipment

The data collection process via interviews involved the use of handheld recorder, mobile cell phone (call recorder), and a laptop which served both as a recording and transcribing equipment. NVivo 12 was used as a tool for transcribing and analysing the recorded interview. Instead of auto transcription or engaging a third party to do the transcription, the researcher did all the transcriptions since this offers the opportunity of engaging further and familiarising oneself with the transcripts or interview content (Halcomb and Davidson, 2006). Transcriptionists (third parties) may also not be familiar with some terminologies and context (MacLean *et al.*, 2004)[27].

To allow for high quality in recording interviews, the following tools and strategies were adopted based on Poland (1995): 1. Equipment – Check recorder before each interview, take along extra batteries and recording equipment e.g. mobile phone; whenever possible use a suitable microphone; 2. Before the interview **–** Choose a quiet place; place microphone as

[27] In addition, automated technologies still fall short in handling accents, noise and channel distortions and do not appreciate context of the interview (Halcomb and Davidson, 2006; Moore, 2015).

close as possible to respondent, set recorder on a stable surface, test the recording system; 3. During the interview – Speak clearly and not too fast, avoid rustling with papers, cups, bottle etc near the mike, avoid using voice activation, allow participants to ask questions at the end (and during) if they need any clarification, and; 4. After the Interview - Listen to the recordings, label the recordings/deidentify them with numbers or pseudo-names. In summary, the process of transcription and data analysis based on Halcomb and Davidson (2006) and Stuckey (2014) involved the following:

- **Step 1** – Recording the interview.
- **Step 2** – Reflective journaling/contact summary of the interview.
- **Step 3** – Listening to the audio recording and transcribing Using NVivo 12.
- **Step 4** - Deidentifying the data.
- **Step 5** – Data analysis (thematic analysis, and discourse analysis).

4.11.3 Data Coding in Qualitative Research

The stage that follows transcription in qualitative data analysis is coding (Fellows and Liu, 2015). According to Miles and Huberman (1994) and Creswell (2007) coding is the sorting, differentiation, and combination of the collected data into categories and the reflections made on the very data. This involves the formulation of codes which are essentially tags or labels used as units for assigning the collected information[28]. Therefore, codes or themes represent what is expected to be found in the study, surprising findings or indeed conceptually interesting information and relationships (Creswell, 2007). Sharing in the understanding and guidance offered by Miles and Huberman (1994) and Creswell (2007), the initial codes in the study were created deductively from the initial literature review (conceptual framework) and

[28] Fundamental activities considered in the coding process according to Creswell (2007) include counting the themes (to understand participants' interests and areas of importance); use pre-existing codes as a guide; develop code labels or names (could be actual responses or developed by the researcher). Creswell (2007) further advises starting with a lean coding structure (5 maximum) and then develop other codes not exceeding 30 to avoid a complex matrix of codes which should then be condensed to 5.

research objectives[29]. Consequently, the study adopted the 'five facets of learning' from Lipshitz *et al.* (2002). These facets are structural; psychological; policy; cultural, and; contextual discussed earlier in the conceptual framework chapter. Neo-institutional Theory concepts such as isomorphism and the institutional fields also informed the coding process. See Appendix 9 for details. Figure 4-4 below gives a summary of the data analysis process supported by NVivo 12. Besides being used for transcribing and coding, NVivo 12 was also used in analysing the data through the use of word clouds and hierarchy charts.

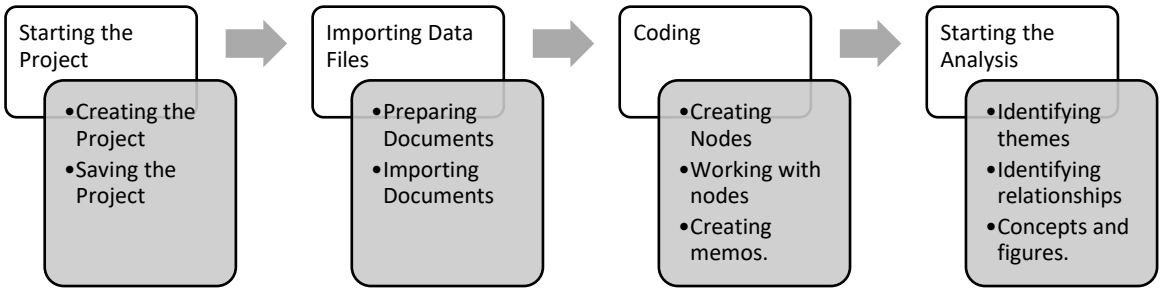

Figure 4-4 Process of Data Analysis with NVivo 12 - Adapted from AlYahmady and Al Abri (2013).

Eventually, all the codes (identified inductively or deductively) were processed using NVivo12[30] as shown in Figure 4-5 below.

[29] According to Miles and Huberman (1994), there are two main types of codes: Descriptive codes (low interpretation by only attributing or assigning a phenomenon/tag) to a section of a text, and; Pattern codes (more explanatory and inferential since the codes include the inferred theme or pattern).

[30] NVivo 12 was adopted since it offers several benefits such as sorting, storing, recording and coding the qualitative data. It also offers the opportunity of comparing the codes or categories and allows for conducting several types of qualitative data analyses (Leech and Onwuegbuzie, 2011; AlYahmady and Al Abri, 2013).

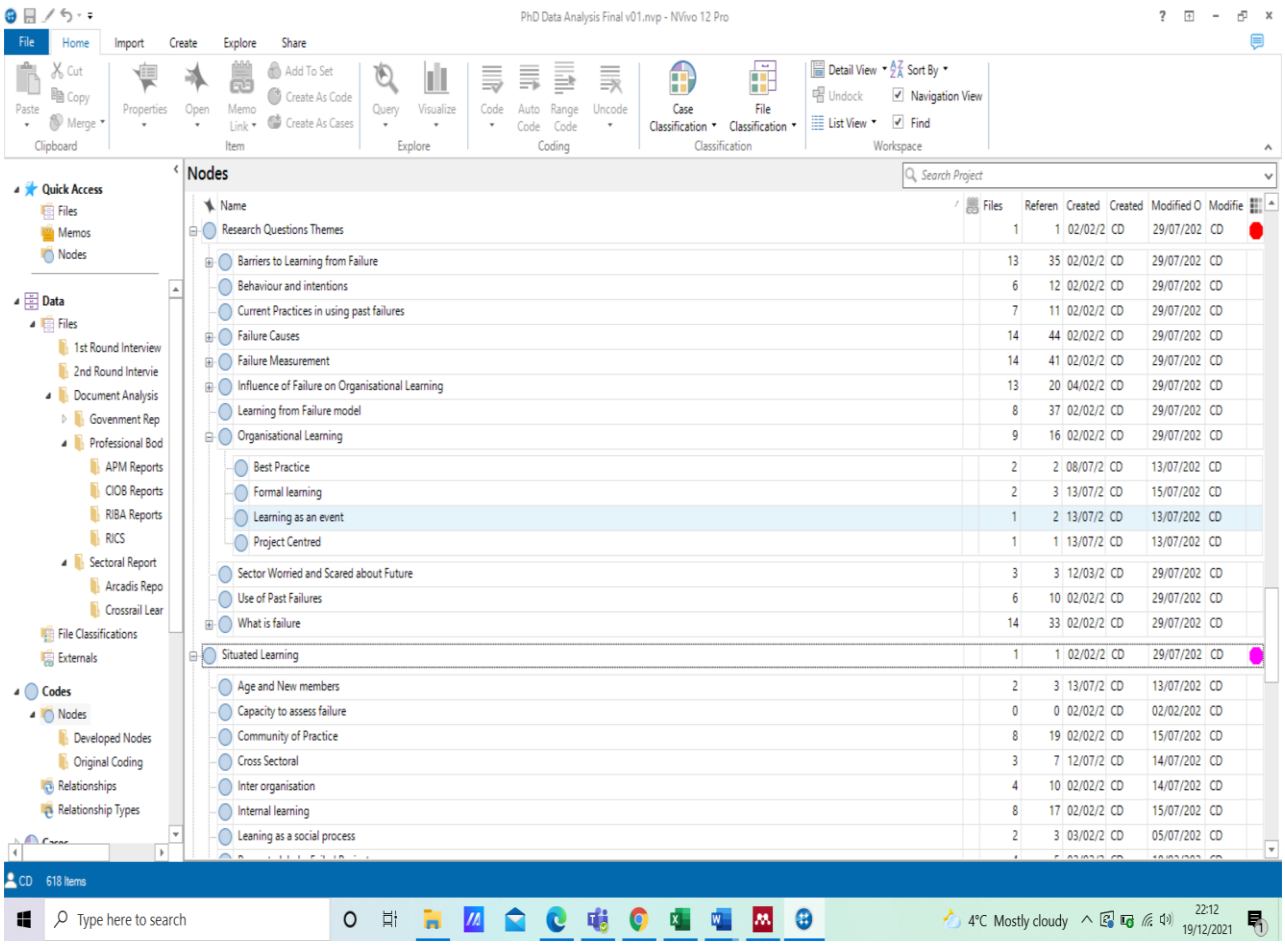

Figure 4-5 Extract from NVivo 12- Coding from First Round of Interviews

Additionally, besides the 'learning facets' which were deductively identified, taking an inductive approach, the following codes were also identified:

- **Events** – Lessons learnt meetings and project review.
- **Records** - Reports/Documents – story telling.
- **Actors** - individuals, organizations.
- **Evaluations/Rituals** – client's feedback; lessons learnt meetings.
- **Technology** – Tools for collecting and sharing failure-related information.

4.11.4 Mid-Range Strategies for Qualitative Data Analysis

Besides developing codes, Creswell (2007) advises qualitative researchers to look for stories, processes, interactions, cultural themes or detailed descriptions of certain cases or phenomenon. Creswell (2007) further adds taking a deconstructive stance which highlights matters of desire and power. Strauss (1987, cited in Miles and Huberman, 1994) also advises using mid-range strategies during data analysis by looking for conditions (words such as since, because); consequences (phrases such as 'as a result of', 'because of'). Therefore, the following mid-ranges summarised in Table 4.8 below were considered.

Table 4.8 Midrange Strategies for Data Analysis - Adapted from Miles and Huberman (1994).

Midrange-Strategy	Relevance to the Study
Noting what is omitted or silent.	Identify factors that are not considered, assess the main themes and patterns. Inform model development.
Note peculiar or alien terms/themes.	New leads or hypothesises, what is conceived and permissible.
Interpreting metaphors.	In-depth understanding of failure and other meanings.
Definitions, detailed descriptions and examples.	Perceptions, meaning, definitions and understanding of failure and learning.
Activities (Regularly occurring/common).	Understand the process of learning
Perspectives.	Participants' perception of failure and the industry.
Processes.	Understand the practices and formal approaches in learning from failure.

4.11.5 Data Coding and Display Process

The coding or analysis of the data was two staged based on Miles and Huberman (1994). The first stage was the early stage done during the data collection stage and the second stage was done after the completion of data collection process. The two stages are outlined in as follows:

First Stage of Analysis (Reduction and Display)

Miles and Huberman (1994) advises commencing qualitative data analysis during the data collection process. This is important since it allows researchers to keep a 'back-and-forth' check on the data which enables a better understanding of the data. This also helps to generate and improve strategies for data collection and avoids creating blind spots in the data. Early analysis also informs the development of interim reports and possible hypothesis, and conclusions contends Miles and Huberman (1994). Main outputs from the early stage of data analysis relevant to this study included the following:

a) Contact summary – According to Miles and Huberman (1994) this is a summary of questions and feedback on each participant. Results from the contact list helps in developing new or revising themes and codes for further data analysis[31].

b) Memoing – Miles and Huberman (1994) regard these as notes taken by a researcher on ideas and relationships as they develop codes and are considered as ideal for sense making. Memos also help in developing clusters from different data sets and may also provide insights on the methodology.

c) Document summary form - The document summary form provides the relevance and explanation of the documents that have been collected in the field study. See Appendix 7 for details.

Second Stage of Analysis (Reduction and Display)

The second stage built on the early stage of data analysis and involved developing conceptual order models[32]. The focus is to establish conceptual coherence in the themes being discussed in relation to Lf-PRF. These were informed by the study's lenses such as Neo-institutional Theory (e.g., isomorphic forces) and Lipshitz *et al.* (2002) learning facets. To

[31] A variation to the contact summary is the interim cases summary which synthesizes the findings on a particular case, the quality of the data supporting them and indicates what remains to be found out on the very case (see Miles and Huberman (1994) for details).

[32] According to Miles and Huberman (1994) such models are constructed based on variables or concepts. Examples include conceptually clustered matrices, themes and taxonomies based on empirical (discovered from the data inductively) or conceptual (pre identified deductively) themes.

avoid an extensive list of themes, some research interview questions were also clustered together. The coding discussed above is summarised in the three-staged coding involving 'open coding', 'axial coding', and 'selective coding' discussed by Yates (2004) shown in Figure 4-6 below:

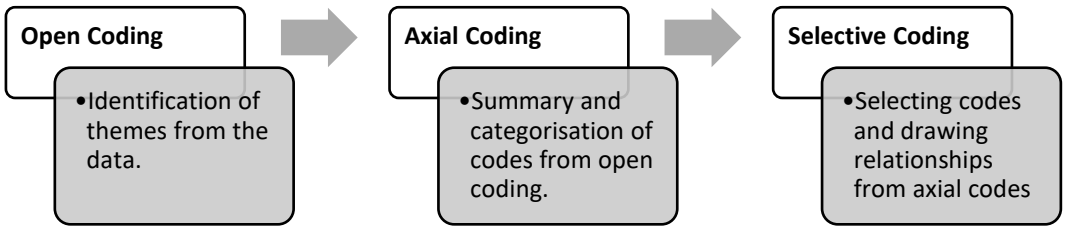

Figure 4-6 Summary of the Coding Process - Adapted from Yates (2004)

4.11.6 Drawing Conclusions – Deductively and Inductively

Drawing conclusions from qualitative data relies upon in-case and cross-case analysis (Miles and Huberman, 1994). Saunders *et al.* (2009) also recommend the use of pattern matching and a thematic framework which were also adopted in this study:

a) **Pattern Matching** - According to Saunders *et al.* (2009) pattern matching involves predicting variables or outcomes before the study commences which are letter matched[33]. Explanation building is also used and unlike in pattern building, a theory or pattern is built as the data is collected and tested at the end via building an explanation iteratively.

b) **Thematic Framework** – The study followed the following stages: Data management (rereading and becoming familiar with the data, identify themes, develop a coding

33 Saunders et al. (2009, p. 500) note that "In this approach, you will need to develop a conceptual or analytical framework, utilising existing theory, and subsequently test the adequacy of the framework to explain your findings. If the pattern of your data matches that which has been predicted through the conceptual framework you will have found an explanation, where possible threats to the validity of your conclusions can be discounted".

index, assign data to the codes); Descriptive account (synthesizing the coded data) (Smith and Firth, 2011).

Additionally, researchers may take an interpretive approach with their associated findings being regarded as tentative (Miles and Huberman, 1994). Hence, by taking an interpretivist approach, the findings from this study are not absolute. Instead, these are only a part of other options/factors to be considered for Lf-PRF. Overall, the data analysis process, which mostly focused on thematic and discourse analysis, is summed up in Table 4.9 below. The lenses (Neo-institutional Theory and Situated Learning) offered the building blocks when analysing the data. This is in agreement with Braun and Clarke (2006) who discuss 'Thematic Discourse Analysis' and recommend anchoring thematic analysis within a particular theory in order to provide a meaningful interpretation of the findings.

Table 4.9 Thematic DA Framework - Adapted from Mullet (2018, p. 122) and Fairclough (2013).

Stages	Description	Example
Stage 1 – Selecting the data collection method and discourse.	Selecting source of data on Lf-PRF.	Interviews with the construction professionals; recommended industry reports
Stage 2 – Locating and preparation of data sources.	Selecting data sources and preparation for data analysis	Interview transcripts, reports, feedback forms archival documents.
Stage 3 – Coding and identification of overarching themes.	Identify themes, subthemes using qualitative coding such as barriers to Lf-PRF.	Thematic analysis, inductive and deductive coding, open and axial coding.
Stage 4 - Analyse the external relations in the texts (interdiscursivity)	Examine social relations controlling production of text, reciprocal relations.	Dominant social practice with respect to Lf-PRF and norms and structures (institutions, actors etc)
Stage 5 - Analyze internal relations in the text.	Examine indications of representations of social events for Lf-PRF, actors and social context.	Leading statements, structural organisation, use of metaphors etc.
Stage 6 – Content Analysis	Counting how often they created codes have been used.	Hierarchy chat for facets.
Stage 6 – Interpret the data	Interpretating meaning of major themes-based stages 3, 4 and 5.	Drawing relationship among themes and linking them to the wider discussion.
Stage 7 – Identify ways of overcoming barriers	Takes a positive criticism and building on stage 6.	Developing mechanism and strategies to overcome barriers to Lf-PRF and developing a model.

4.12 RESEARCH PROCESS SUMMARY

The focus of any research methodology ensuring that trustworthy and credible results and conclusions are drawn by reducing biasness. This was done by considering the appropriate philosophical positioning since the worldview influences eventual research outcomes. This was by taking a social constructionist ontological and an interpretivist epistemological approach/stance. These were influenced by the nature of the research question (and the study) which focused on Lf-PRF, a phenomenon which is subjective and dependant on the context (and actors). Considering Creswell (2007), the qualitative research involved the following steps; introduction; research questions; data collection; data analysis, and; conclusion. The whole research process is summarised in Figure 4.7 below.

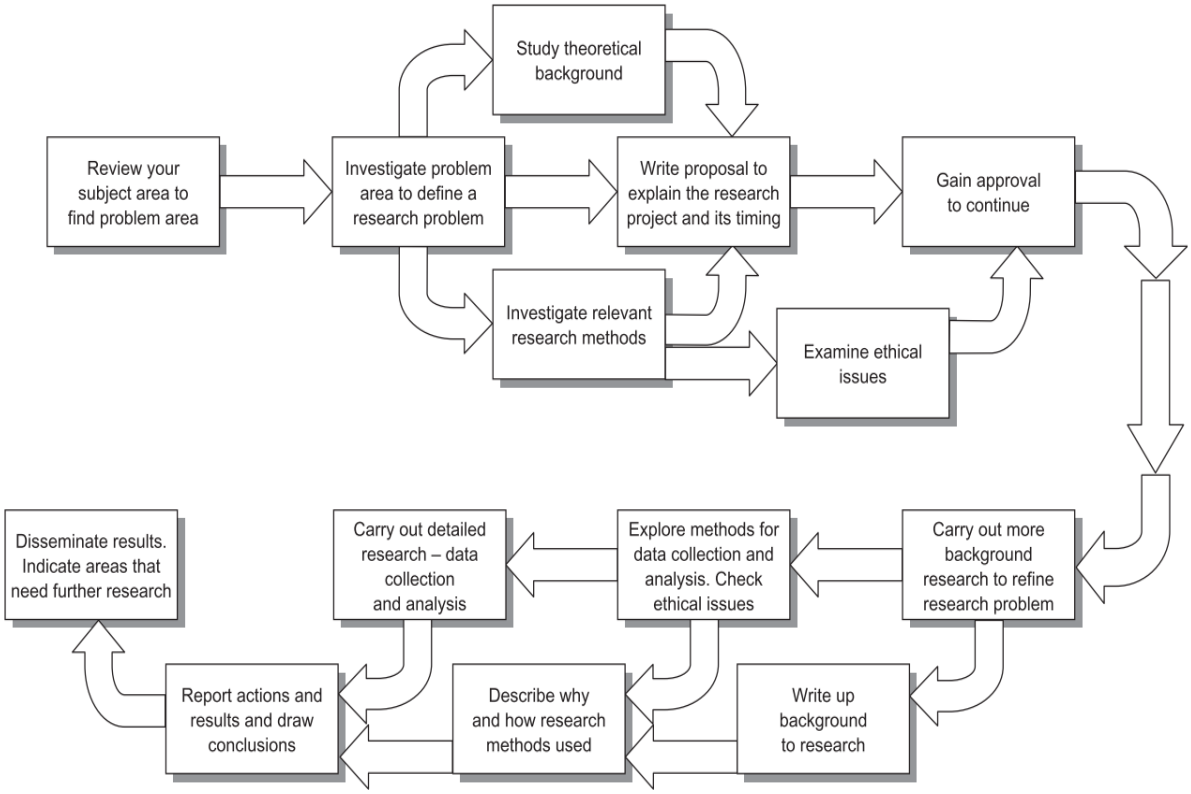

Figure 4.7 Research Process Summary - Adapted from William (2006, p. 6)

Chapter 5: Findings and Data Analysis

5.1 INTRODUCTION - EXPLORATORY DATA ANALYSIS

The study's data analysis and findings are divided into the following two chapters. Chapter 5 takes an exploratory data analysis approach (EDA) which organises and explores the data from the first round of interviews (Saunders *et al.,* 2009). Data in here is analysed using thematic data analysis method in response to questions which elicited for the following information from the participants: their perception of failure; their practices and intentions towards OL and Lf-PRF; their use of lessons from failure, and; any barriers to Lf-PRF. Building upon this, Chapter 6 as the second part of data analysis, then further probes; the context and its influence on perception of failure; the influence of institutions (and institutional barriers) on Lf-PRF; practices in the use of lessons from failure, and; dualities and dilemmas faced by PBOs when Lf-PRF. In chapter 6, thematic and discourse analysis methods are applied. In each of the two data analysis chapters, the findings are presented based on the following subheadings:

- Interview questions and responses;
- Emerging themes, and;
- Summary and conceptual implications.

Thereafter, a model and framework for Lf-PRF is presented in Chapter 7. The data was collected from 32 interviews across two phases involving 34 participants. The first round of interviews involved 19 participants while the second round involved 15 participants. See Appendix 6 for more information on the participants.

5.2 PERCEPTION AND MEASUREMENT OF PROJECT FAILURE

Scholars contend that defining and measuring 'failure' are paramount in the process of Lf-PRF (Cannon and Edmondson, 2001, 2005; Edmondson, 2011). Therefore, participants were asked the following questions regarding the 'definition' and 'measurement' of P*r*F: "***What do you consider to be a 'failed project', or, a large or small 'project-related failure' (any examples)?"***

Responses reveal that project failure remains subjective and dependent on the type of organisation and profession. For instance, Participant 3 reasons that *"...failure is going to be different from different perspectives…. it does show that failure needs to be understood from the point of view of whoever's failure it is"*. Similarly, Participant 4 notes that: *"There is no standard definition of what constitutes a failure or whether the failure is small or large… each organisation, you tend to come up with your own interpretation".* This aligns with other scholars who had similar findings earlier (DeWitt, 1988; Pinto and Slevin, 1989; Pinto and Mantel, 1990; Müller and Jugdev, 2012). Accordingly, McConnell (2015) advises taking a 'failure for whom?' approach when 'defining', 'understanding' or 'measuring' failure.

Taking a commercial perspective, Participants 12 and 17 as a Director and Quantity Surveyor respectively, contend that a failed project is one that does not generate profits or does not achieve financial margins, while Participant 1 from an architect's perspective cites any need for reworks, and not meeting clients' objectives[1]. Participant 18, a services engineer reasons that it is when a project or product fails to do what it is intended to do regardless of it making profit. Participants 1 and 14 also cite loss of subsequent projects or repeat jobs and reworks. However, Participant 19, from a government agency reasons that *"…failure [is] not achieving value for money* [this happens on any] *project where the level of cost outstrips the benefits that have been delivered. Because* [in the public sector] *we are dealing with taxpayers' money".* Participant 15 similarly referred to massively 'delaying benefits' or being 'delivered with excessive cost overruns' and a 'project being abandoned' as a failed project[2]: *"Some projects… spend anywhere around 50, 60 million pounds and then you find out actually…. it's going to take too long, it's going to cost too much and the project gets cancelled or the benefits get stripped down and you have wasted a lot of [resources on] design".* Such a perception of failure may be referred to as 'voluntaristic' as discussed by Schwarz *et al.* (2021) with failure being avoided since it is viewed as being terminal and detrimental. Instead of a 'voluntaristic approach', project

[1] Similarly, Participant 11 observed that: *"you could be success for your client and you have not made any money, so you would be a success in your client's eye but you would not be very successful in our MD's mind, and we have got nothing because you haven't made anything [no profit made]. So, money is quite an important one*".

[2] In contrast, Participants 7 and 8 reason that even when a project has suffered delays and cost overrun if it has not been abandoned, then it is a success. This also shows the subjective nature of project failure and a focus on project outputs. Participant 8 adds that *"they may overspend, it might be on a job to build a new school, to create school places and you might miss the start term, those are project failings or project shortcomings, for a project to fail, it will be abandoned, very rarely happens".*

actors are encouraged to adopt Syed's (2015) 'growth culture' which perceives failure as a learning point and not the end point.

Participant 13 further notes the dynamic nature of failure over a project's life cycle: *"…the definition of success and failure changes throughout the project as things kind of develop as they go forward. But there should be a tracking of that somewhere".* McConnell (2015) refers to this as the 'variance of failure over time'. From a social constructionist perspective, this illustrates how 'project failure' is reconstructed depending on the project stakeholders and the social context. This aligns with Desai *et al.* (2018, p. 10) who reason that *"the targets that define failure are often mobile, albeit sluggish, reflections of past historical and social performance".* Hence, Jugdev and Muller (2005) and Holgeid and Thompson (2013) regard failure as a 'multidimensional' phenomenon that 'evolves over time' and is 'dependant' on the stakeholders involved'.

Accordingly, based on the various responses, main themes in relation with defining P*r*F are summarised in Table 5.1 below.

Table 5.1 Themes on Definition of Project Failure

Perspectives of Failure.	Participants' Response	Associated literature.
Theme 1 - Client's Expectations.	*"a failed project is one which has not met the expectations that has been set through it at the start... one which does not meet the expected attributes, once its completed"* Participant 4.	Müller and Jugdev (2012).
Theme 2 - Project Performance.	"*if, whatever they wanted for their building or whatever their basis of design was for certain area, if that product, project, that building doesn't meet their requirements or the design that they said it would that will probably count as a failure"* Participant 18.	Pinto and Mantel (1990); Lindahl and Rehn (2007).
Theme 3 - Project Profitability.	"…*when it goes up higher management, they look at what profits did you make*" Participant 4.	Jugdev and Muller (2005)
Theme – 4 Reworks and Product Quality.	"…*if you feel you have finished your package of work… and you feel you have been asked to make more changes because there is an inconsistence between the different packages and different disciplines, the contractor hasn't built things in accordance with the drawings"* Participant 1.	Love *et al.* (2011); Love, *et al*. (2013).
Theme 5 -Project Objectives.	"…*the client not being happy and… not fulfilling the objectives that were set out in the initial brief at the beginning, be it budgetary or quality or time. If you don't achieve, from a contract what you are paid to do, that's a failure really"* Participant 16.	Atkinson (1999); Davis (2014).
Theme 6 - Planning Approvals and Regulations/standards.	"…*that project might go through scoping, might go through planning without actually going through statutory planning"* Participant 7	

With scholars arguing against 'output' based approach in measuring project failure or success, project actors should consider Participant 8's reasoning that *"a failed project is a project that has not delivered its objectives".* However, instead of considering the clients' side alone, a successful project should also be profitable to the parties involved as observed by Participant 9: *"If you have a satisfied client…, that doesn't necessarily mean it's been a successful project, the client has been delivered what he [or she] asked for but that contractor may have suffered huge financial losses which the client may not be aware of or is particularly [not] concerned about it".*

Since Atkinson (1999) contends that a wrong measurement criteria may lead to project failure, participants were also asked on how they measure P*r*F: ***How do you measure or determine a successful or failed project?***

Participant 3 reasons that: *"……those attributes are going to be so variable, so vast and wide ranging that whilst the measurement of that determination of what failure should be straightforward is probably less so because of the vastness of that range".* Therefore, Desai *et al.* (2018) argue against measuring failure using 'hypothetical' and 'what if' scenarios and simulations which in some cases are difficult to achieve. In line with that, Participant 9 indicated that *"We have key deliverables on any project at starting probably in its order, satisfied client, health and safety, quality, program and financial return"*[3]*.*

Participant 14 summarises what is to be measured as quantifiable (PM outputs in form of time and cost mostly) and the benefits (non-quantifiable and quantifiable) associated with project outcomes and impact which can only be measured after 2 to 3 decades. This aligns with other scholars who advise measuring project outcomes and impact at multiple times whilst involving multiple stakeholders (Jugdev and Muller, 2005; Müller and Jugdev, 2012; Turner and Zolin, 2012; McConnell, 2015). Notable themes (for measuring failure) observed are summarised in Table 5.2 below.

[3] Participant 10 also adds that *"we have sub KPIs that we introduce on any live project where we deal with our impact on their operations, our impact on cleanliness, our impact on their safety and security".*

Table 5.2 Attributes for Measuring Project Failure

Measurement Attributes	Responses	Related
Theme 1 - Key Performance Indicators.	*"you are looking at those Key Performance Indicators to be set up early and then you can actually capture data to monitor your project against them".* Participant 19.	(Atkinson, 1999; Nelson, 2005).
Theme 2 – Finance related.	*"…but the overall piece of work has become something that is no longer going to bring in any income stream"* Participant 7	(Atkinson, 1999; Nelson, 2005).
Theme 3 – Clients'/Stakeholders' Requirements.	*"you can also look at to what extent is the project meeting the requirements, it met 70% of the requirements, if it met 80% of the requirements okay".* Participant 4.	(Jugdev and Muller, 2005; Müller and Jugdev, 2012; Davis, 2014).
Theme 4 – Benefits.	*"But I think it's a measure focused on delivering benefits not just that cost".* Participant 19.	(Müller and Jugdev, 2012; Badewi and Shehab, 2016).
Theme 6 Team Members' Assessment.	*"That's another objective to make sure your staff are happy…So those reviews will give you a feel of how happy the workforce that's very important".* Participant 11.	(Pinto and Mantel, 1990; Atkinson, 1999).

Worth noting is that Table 5.2 above is inconclusive realising the subjective nature of failure. For instance, other methods or themes of measuring projects failure include, 'ISO certification', industry awards such as 'health and safety' (Participant 6), 'repeat business' (Participant 1) and 'environmental standards' (Participant 7). This demonstrates the multidimensional and subjective nature of failure. Therefore, PBOs are encouraged not to adopt a standardised criterion. Instead, Participant 4 advises that: *"I don't think there is a one unit which fits all, but it should be at the discretion of management [who] can came up with a formula to say for these projects let us accept, this is not acceptable, and these ones are acceptable"*[4]*.* This is also in line with social constructionism/interpretivism epistemological stance which acknowledges that how we come to 'know', in this case measuring and defining project failure, is dependent on the (social) context. Overall, the predominant mechanism for assessing project-rlated failure involves 'client's feedback' and 'financial targets' of the project assessed after project completion (Participant 11, 18). For instance, Participant 12 cites conducting a 'customer care survey' done midway and

[4] In addition, Participant 13 advises involving other key stakeholders to identify common goals: *"Not everyone will have the same view of success others or some people at the end, they cannot create common goals at the beginning. But there will be goals that will spread across the people so that's how measure success because you have to say this is what we are aiming for, and this is what we are trying to do".*

after completion[5]. Though it does not include other stakeholders such as end-users, this shows a shift from the iron triangle as encouraged by other scholars.

5.2.1 Summary and Implications

The definition of failure remains contested between functionality and profitability[6] (project outputs). However, functionality remains the key determining factor as echoed by Participant 18: *"the financial one is probably the biggest one from the business case, but as an engineer anything that does not meet what it's meant to be doing, we would consider that as a failure".* Thus, for a better understanding of failure among team members, it is important that KPIs, 'project objectives' and 'benefits' are identified as early as possible and remain unique for each project[7]. From a theoretical point of view, the emphasis on 'output' by respondents when defining and measuring failure shows a greater influence of institutions on the perception of failure. This is evidenced by participants referring to terms such as 'ISO certification', 'awards', and 'project output-related factors' (time, cost and quality) which relate to the Regulatory and Normative pillars of Institutional Theory. Consequently, faced with the external influence from the Coercive and Normative forces of Neo-Institutional theory (in form of isomorphism), PBOs mostly view failure via the outputs or meeting the set standards/specifications. Participants also indicated that a failure remains a failure regardless of it being small or large as indicated by Participant 4 that: *"the size of the project [failure] does not matter, what matters is, what were the objectives, what were the expectations, and what were the requirements that you were trying to meet".* However, deciding on whether a P*r*F is small or large equally remains debatable. For instance, Holgeid and Thompson (2013) contend that the losses that may seem large for a small firm may be regarded as being small by large firms. In general, the guiding principle when measuring and defining project-related failure remains achieving the clients' objectives or project goals as indicated by several participants.

[5] Accordingly, Participant 8 observed that: *"good projects have very clear objectives and outcomes, and you measure a project success or failure on its ability to deliver against those objectives".*

[6] As an example, Participant 5 reasons that: *"What you do see is the Millennium Dome, which everyone thinks was a failure, because it cost a lot of money and it wasn't on time extra. But as a construction project it went brilliantly so, where is the failure?".*

[7] In setting those, Atkinson (1999) cautions that attributes should be beyond the iron triangle but kept to no more than 16 elements to maintain clarity in the measuring criteria.

5.3 THE UNDERLYING ROOT CAUSES OF PROJECT-RELATED FAILURES

In the process of Lf-PRF, scholars contend that it is vital to identify the causes of failure (Wilkinson and Mellahi, 2005; Carmeli, 2007). Similarly, Participant 5 reasons that: *"…project organisations and project failure and learning from project-related failures is linked to understanding why projects fail in the first place so that you can stop them failing and that's fundamentally project learning".* Accordingly, participants were asked to identify main cause of failure: ***What are the Main Causes of Project Failure?***

From the responses, prominent causes include poor communication[8], lack of problem analysis, mismanagement, omissions, and lack of detailed designs (Participant 2, 9, 10, 11, 14, 16, 17, 18). The industry's low profit margins, risks and fragmentation were other factors identified (Participant 12, 14). Participant 15 also observed contractual requirements such as rigid time scales and budgets[9]. Other causes may include inefficiencies in the initiation process of a project influenced by insufficient scoping and business case development, unrealistic objectives, overpromising/overambition and optimism biasness which were cited by Participants 13, 15 and 19. This aligns with earlier findings by Flyvbjerg *et al.* (2002) who contend that cost estimations may be understated for purposes of securing project funding or approval. Participant 13 reasons that: *"….what is common across engineering construction projects is that it's not the technology that causes the failures, they have technology simulations, it's the management side of things, It's the people side of things and probably managing expectations".* As a summary, causes may be associated with the organisational-, project- and individual-related factors (Participant 3, 9). Individual-related factors such as lack of sharing failures and confidence to openly discuss problems and overpromising/making big promises (Participant 2; 13). Organisational-related causes may include PBOs financial challenges and supply chain management challenges (Participant 6) while tight contract schedules and poor stakeholder management are associated with project levels. Participant 9 also highlighted not having a right criterion for measuring failure as one of the causes of failures which was also observed by Atkinson (1999). In addition, sectoral factors have also been identified

[8] Participant 11 associates poor communication with generational differences and the reliance on emails which people rarely act upon especially when addressed to 8 or 10 people.

[9] Participant 15 further elaborates that *"…time is something that can cause an issue because the industry is funded in these 5 [months] cycles and you have to deliver the project by the end of the cycle and if your project does not fit within your initial estimate, if you say it's going to take a little bit longer, people to incentivise you will say it's going to finish in time don't worry you can go ahead and sort force you".*

such as competition and low profit margins (Participant 7, 15). These selected causes of project failure are summarised in Table 5.3 below.

Table 5.3 Major Themes of Causes of Project Failure

Subtheme of Causes	Response	Theme
Theme 1 - Poor Planning, Time and Cost Estimation.	*"Underestimation of the scope of work……. you have got inadequate planning and scheduling.... it's going fail at some point".* Participant 4.	Project
Theme 2 – Lack of Details.	*"not getting the program right leads to failures, due to lack of details in the programme*" Participant 6;	Project
Theme 3 – Poor Financial Challenges.	"*Contractors go on burst, into receivership"* (Participant 6)"	Organisational
Theme 4 - Optimism Biasness.	"…..issues of unrealistic [cost] estimation… even if they have done the job before, they tend to think that, it can be done within a certain amount of money and it can be done within such a short time". Participant 4.	Individual; Organisational
Theme 5 – Short Tendering Periods.	*"we used to get ludacris tender periods were you are tendering for a job which might be multi millions in 12 weeks, 6 weeks and then you get two and half years to build it… you get guys getting 3 to 4 weeks to understand the job and then produce the plan."* Participant 5.	Sectoral
Theme 6 Fragmented Sector.	*"the fragmented nature of the industry means that other than design and build types of projects, you rarely get the team coming together"* (Participant 5).	Sectoral

Sectoral factors in Table 5.3 above may also be associated with institutional causes such as change in governments and policies; client financial problems (Participant 7); tight tendering periods (Participant 6), and; inadequate training of architecture, engineering, and construction (AEC) professionals or managers by universities (Participant 9).

5.3.1 Summary and Implications

Though the study variously identifies individual-, project-, organisational- and sector-, related 'causes', 'change' and 'poor communication' remain the major influencers or causes of failure. Accordingly, instead of focusing on the technical-related causes of failure (by adopting normative approaches) via professional training, project

methodologies, tools and techniques, the industry needs to realise that there are social or people-related factors such as communication and cognitive (optimism) biasness that need to be addressed. Institutionally, the study argues that instead of focusing on the normative pillar (adequate planning and risk management) and regulatory pillar (rules, standards, guidelines), attention should also be given to the cultural-cognitive pillar which highlights factors such as 'poor communication', 'competition', 'power' and 'profitability' and their influence on project actors' behaviour. This entails acknowledging that projects do not operate in a vacuum (Engwall, 2003; Sage *et al.*, 2013, 2014). Importantly, this calls for a shift from a reductionist perception of failure which is mostly attributed to a single source or individual as highlighted in Text Box 5.1 below in order to discourage the blame game which hinders Lf-PRF. Notably, majority of the highlighted causes keep reappearing on projects as observed by Participant 6 that *"They are all common factors on every project I have done, one of them has happened"*. This raises questions whether any learning takes place from past P*r*F and associated causes. Therefore, the following sections discuss the practices and tools used by PBOs when Lf-PRF.

Text Box 5.1 From Reductionist to Diverse Perception and Response to Failure – Dekker's Insights

Sidney Dekker in his 2011 book, 'Drift into Failure' argues against traditional and reductionist perception of failure. This is a situation where accidents and failures are modelled as a sequence or liner events (actions-reactions). In such instances, causes are condensed to one particular part. Correspondingly, correction and mitigation measures are equally reduced to specific actions or individual parts of a system. This is common across several sectors including construction where causes of project failure are associated with specific teams (e.g. contractor or supplier) or individuals such as the project manager. To counter such, Dekker contends that instead of an outcome approach to failure, an emergent approach should be considered based on the understanding that *"the behaviour of the whole cannot be explained by, and is not mirrored in, the behaviour of its constituent components. Instead, the behaviour of the whole is the result of – emergent, cumulative result of all local components…. and interact with each other in numerous ways".*

Furthermore, Dekker reasons that if we are to get any benefits or opportunities from failures, we should desist from using the reductionist approach since it only takes a snapshot of a system, in most instances, who to blame. Thus, if PBOs are to understand and analyse failures and draw lessons, Dekker encourages to consider *"the interaction between diverse, interacting and adaptive entities whose micro-level behaviours produce macro-level patterns, to which they in turn adapt".* From Dekker's perspective, this essentially means that *"an organisation has different ways of dealing with situations and has a rich store of perspectives and narratives to interpret those situations".* Similarly, the need for PBOs to adopt multiple teams and a multilevel approach in analysing and reviewing failures cannot be over emphasized. Accordingly, instead of the typical listing of success and failure factors by project actors which are mostly focused on project management tools, PBOs are encouraged to consider a wider perspective that encompasses social and cultural-related factors that may influence the outcome of a project.

5.4 PRACTICES AND MECHANISMS USED IN ORGANISATIONAL LEARNING AND LEARNING FROM FAILURE.

To get a better understanding of OL practices, PBOs were asked the following questions: ***"How is organisational learning conducted, within your company?".***

Traditionally, it seems PBOs rarely engage in OL. On this, Participant 5[10] notes that: *"there is a long history of very poor project-based, and organisational-learning certainly".* However, in recent years the sector has seen an increase in PBOs engaging in OL because this is believed to be key for the success and survival of any organisation (Chan *et al.*, 2005). Accordingly, Participant 14 notes that: *"…things have progressed massively since the 1990s. …there are things like shared staff briefings… meeting all levels of staff. Contingency program meetings were created, reviewed old performance reports, knowledge sharing".*

Based on the responses, most company learning takes an 'internal only' perspective without engaging in external or cross-organisational learning. As described by Levinthal and March (1993) the learning mechanisms PBOs rely mostly on the exploitative approach as opposed to exploration. In addition, learning takes an 'event perspective' by engaging in annual-, or structured-types of learning or training which remains a preserve of the Human Resource Department (Participant 6 and 18). For instance, Participant 4 notes: *"organisational learning… is run under the human resource department. And they are the custodian of all learning, and they try to link learning with performance management".* Besides being linked with performance management, OL within PBOs is structured based on a task's requirements and CPDs instead of picking lessons from failure (Participant 7). Junior staff also have separate 'learning' from senior employees. For instance, Participant 2 indicated that for their junior staff: *"…we introduced… the concept of the skills passport where everybody gets a number of accolades… once you have done the training and you have passed, tested you get the stamp, and if you are found doing anything where you don't have stamp, you get kicked off the job".* Such an approach may not allow for true Lf-PRF because any failure here is related to a perceived

[10] On this, Participant 3 also adds that: *"At that time, there were no systems in place, no means of centrally recording the knowledge. It was done I think on an ad hoc, a very variable level I would think from project to project and not all knowledge was captured that's for sure".*

lack of competence. Emphasis on ‘training’ instead of ‘learning from failures’ is reinforced in the word cloud in Figure 5.1 below, with words such as ‘organisation’, ‘training’ ‘university’, and ‘graduate’ appearing. This also demonstrates the internal focused and structured nature of learning in the sector[11] and an indication of the ‘Regulatory’ and ‘Normative’ pillars' influence at the organisational level’. The influence on learning from the sector (regulatory pilar) is evidenced through ‘skills passport’, ‘universities’, ‘training centres’ and ‘professional bodies’.

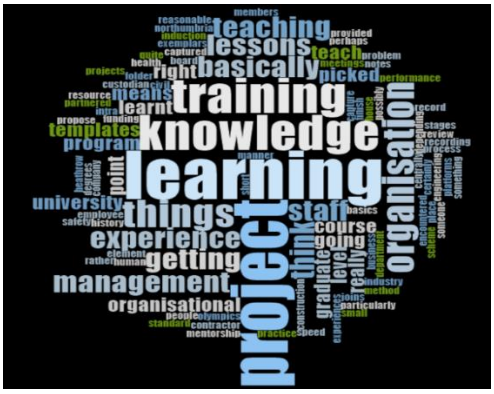

Figure 5.1 Organisational Learning Practices Word Cloud

Though PBOs may practice OL, Participant 5 observed a mismatch between the image of a learning environment presented to students in universities and that of the project environment: *“what we used to teach was the idea that, whenever you finish a project, you do a project review and you look at lessons learnt, and you capture those lessons learnt.... but when it came to practice, the speed of construction and the lack of organisation, particularly at the small level, [organisational learning] is quite poor”.* This aligns with Friedman's *et al.* (2005) argument against the utopian presentation of OL as though it is a straightforward process. Yet, learning is complex and at times may be accompanied by organisational crisis and conflicts in cases where failure occurs (Carmeli and Schaubroeck, 2008).

[11] At a personal level, Participant 12 indicated that they conduct annual personal development reviews (PDR) based on which individuals are seconded for training organised by the human resources department.

In order get a better picture of the sector's mechanism and practices, the study built upon Lipshitz' *et al.* (2002) original 'five facets' for effective OL; structural facet, cultural facet, policy facet, psychological facet, contextual facet. Based on the data analysis, responses revealed a further three facets: 'technological', 'governance' and 'the Nth' facets. This is evidenced by the hierarchy chart shown in Figure 5.2 below, produced with NVivo 12, showing PBOs' reliance on the structural facet. Thus, the study proposes a multifaceted approach to Lf-PRF (see Chapter 7 for a detailed discussion) instead of the simplistic approaches which mostly focus on structural facet-related mechanisms such as lessons learnt meetings and past project reviews. For instance, Participant 15 indicated that: *"We have sort of a regular team, monthly meetings and monthly project updates between different projects and sort of share lessons learnt on what's been going on…".*

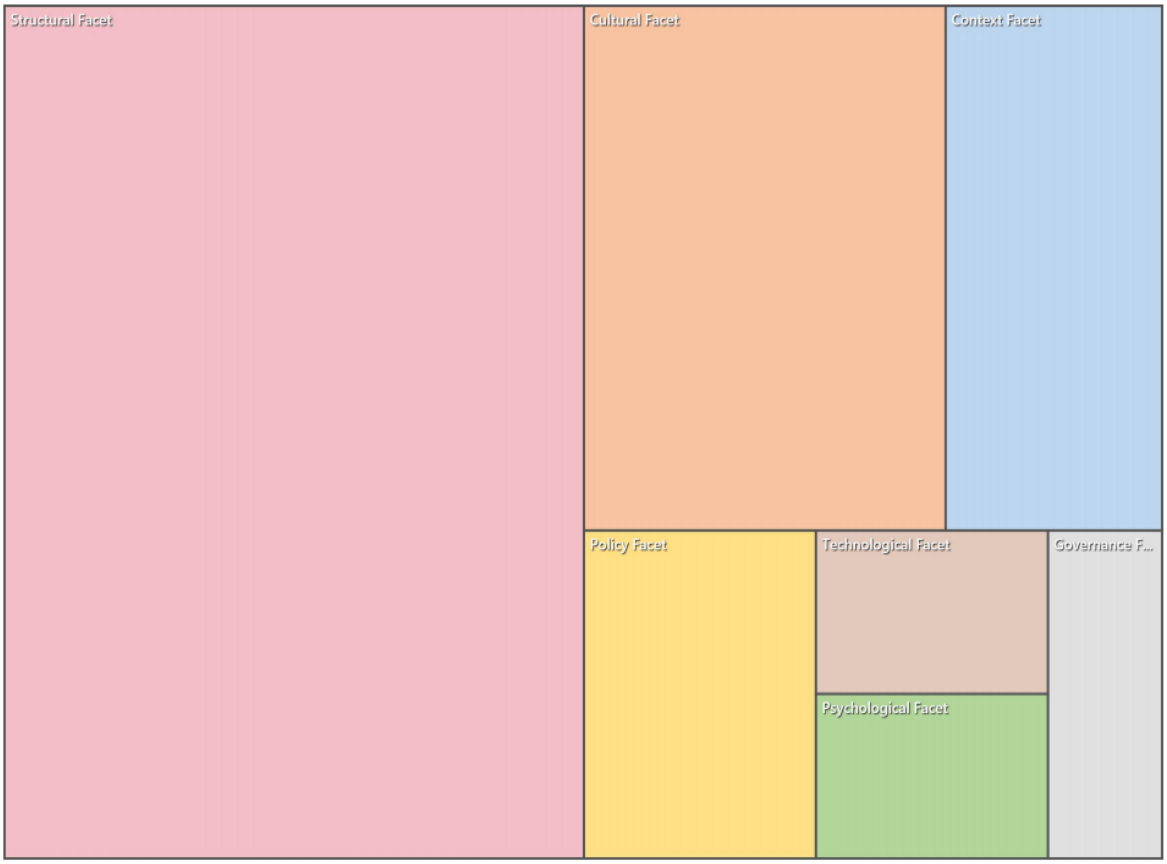

Figure 5.2 Hierarchy Chart of the Facets Considered for Organisational Learning using NVivo 12.

To probe further and to also understand PBO's practices in their attempt to Lf-PRF, participants were asked the following question: ***Does your organisation have any deliberate measures that encourage learning from failures? If so give examples?***

The findings indicate that some PBOs have no deliberate measures for Lf-PRF for it to be differentiated from typical OL (Participant 1, 4 and 7). For instance, Participant 4 notes that *"To be honest, there is nothing, some of it is individual initiative".* However, Participant 18 cites informal discussions and chats being conducted locally (department and organisational levels). This aligns with findings by Pemsel *et al.* (2018) which include informal events such as coffee breaks and self-driven initiatives and formal mechanisms (lessons learnt meetings and trainings). Participant 8 indicated that though they do not have any specific deliberate measures on Lf-PRF, they instead rely on governance: *"…good project governance, would identify project failings and force learning from them and our governance arrangements certainly have that… good project governance should intervene as the project is failing and correct the failure and …the learning is continuous".*

In contrast, Participants 9 and 10 highlight the deliberateness of their firms which highlights the importance of getting everybody involved and creating an open culture through human resource practices such as interviews[12]. Participant 14 cites the use of incentives or rewarding employees monthly for suggesting new ideas and reporting failures or 'putting their hand up' (or whistle blowing) before failures happened[13]. Participant 14 also referred to the use of visual representation of information such as 'lost time incident' and displaying the number of days since the last incident. In addition, Participant 19 indicated the use of case studies while Participant 18 referred to anonymised projects within the company being used for lessons. To summarise the PBOs practices regarding Lf-PRF, several themes have emerged:

[12] Participant 9 notes that: *"we will emphasize at interview stage that we prefer you put the problem on the table, openness, candid approach to issues that go wrong because otherwise people have a tendency whether they think they are going to get wrong or otherwise they will hide it".*

[13] Participant 2 also indicated the use of whistle blowing *"there is a whistle blower section and so if you can see anything going wrong on the project and you are not really sure about who to tell, you can click on the whistle blower thing and anonymously, raise it to someone senior".*

Theme 1 – Events

Participants mostly referred to OL occurring at some 'event'. Events include 'post-project review' and 'lessons learnt meetings', 'knowledge hub sessions', 'local seminars', 'lectures', 'lunch time meetings', 'regulated training', and 'national training', and 'company annual reviews' (Participants 1, 2, 6,18 and 19). Participant 17 reasons that monthly evaluations also serve as opportunities for Lf-PRF, especially on the commercial side which are easier to detect compared to structural failures. See Table 5.4 below which shows learning-related events concentrated at the 'project level' and 'project initiation' and 'completion' stages.

Table 5.4 Associated Events for Learning from Project Related Failures

Project Stage	Pre-tender	Project Delivery	Project Completion	Use
Sector Level	Regulated training; Predesign meeting.	Regulated training.	Client review/Feedback.	
PBO Level	Project Pitch; Knowledge hubs; Annual reviews; workshop/training; seminars; Past Project reports			
Project Level	Contingency program meetings; past project reviews, predesign meetings	Quality alert meetings.	Project reviews; lessons learnt meetings.	Customer care survey.
Individual Level		Informal chats; personal initiative.		

Most of the learning events from Table 5.4 above, serve more as failure detection activities instead of encouraging wider learning, within projects and across other projects, in an organisation. Participant 12 for example, refers to a pre-design meeting as a 'clash detection' meeting instead of it being an opportunity to refer to past projects for lessons in order to improve current design works.

Theme 2 – Use of Documents

Main form of documents used are reports and minutes (Participants 6, 16 and 17). Participant 19 also submitted that they produce 'knowledge products' to explain issues

such as ‘optimism biasness’ and guidelines on challenges associated with costs[14]. Participant 11 also referred to ‘daily handover sheets’ which highlight any challenges that the previous teams (shift) may have experienced. ‘Customer reports’ based on ‘customer care surveys’, including with subcontractors, are also conducted mid-way the project and after completion (Participant 6, 12). Participant 13 also cites the use of ‘stories’ and ‘newsletters’. Table 5.5 below shows some documents noted as opportunities for Lf-PR.

Table 5.5 Documents Associated with Learning from Failure

Project Stage	Pretender	Project Delivery	Project Completion	Use
Sector Level	Knowledge products; Reports.		Knowledge products; Reports on failed projects.	
PBO Level	Method Statement.			
Project Level	Method statement.	Daily handovers[15]; Quality alert.	Lessons learnt	
Individual Level	Personal initiative – chats etc.	Personal Diary		

Worth considering is Sage *et al.* (2010) who contend that the ‘project report’ is rarely read and favoured having ‘boundary documents’ that can be used across C*m*P[16]. This is equally important for PBOs since some of the documents are either kept within a project or department and rarely cross such ‘boundaries’.

Theme 3 – Learning Space - Physical and Virtual

From the responses, virtual and physical places or combination were observed as being important which aligns with Grabher's (2004) earlier observations. Notably, the ‘office’, ‘university’ (Participant 1), ‘online portal’ (Participant 6), and the ‘project’ (Participant 2)

[14] Participant 19 further highlights that *“…we will try to publish what we call knowledge products and share our overview of government projects back with the departments…”.*

[15] Participant 14 highlights that *“Daily handover sheets that is another one we do. So on a daily basis if we are doing night and day shifts… we do get the customer to give us a bit of the sheet of the day, after that, what went well last night, was there anything that was causing a problem as well”.*

[16] Notably, Participant 1 discourages learning alone in front of a desktop in favour of mentorship and interaction with other team members since that generates more and better solutions. This reinforces the study’s social approach to learning from failure based on situated learning theory in form of a C*m*P.

were cited as areas or learning places. Such learning includes team members within an organization and on the project and the wider supply chain as observed by Participant 19: *"they will get like manufacturing and they will talk to us about the different elements of their product and how it works things like that".* However, majority learning involves teams within a project or PBOs.

Theme 4 – Technological Tools

To support both the physical and virtual spaces, technological mechanisms are also deployed by PBOs. Participant 6 indicated that they have online portals where lessons from past failures are shared to the wider organisation and regional level. Similarly, Participant 13 indicated that failure information is shared through webinars and videos.

Theme 5 – Training Based Processes and Routines

Routines and processes typically again revolve around the internal environment and actors within a project or a PBO without engaging external organisations except for health and safety (H&S) related failures. For instance, Participant 17 reasons that *"if something has gone wrong on a project… the team will put together a report and which can then be sent around the team, where we went wrong, what we did to put right and what can we do in now going forward so that we don't make that mistake again".* Evidently, there is no change in the existing 'routines', 'processes' or 'systems'. Instead, training is recommended without explicitly citing the changes that were made or needed to be made. However, the identified processes and routines within some PBOs point to the existence of guidelines on the learning process which could be associated with 'governance' highlighted by Participant 8[17].

Theme 6 - Focused on Compliance and Good Practice

Learning is often focused on embedding good practice with an emphasis on upskilling team members (i.e., compliance and competence) based on relevant statutory,

[17] Participant 2 echoes that*: "We have got the project DNA which consists of roles and responsibilities, employers' requirements, the brief, employers' information requirements, the programme, the cost plan… that sets out the ground rules of a project. So, we have a, we have basically processes and standards we keep central to the business. And whenever we encounter an issue, we try to mitigate that next time".*

professional and regulatory bodies' requirements[18]. This type of learning, can be likened to 'professional bodies network' for learning discussed by Kululanga *et al.* (1999). On the contrary, Dekker (2003, p. 238) advises that *"Rather than simply increasing pressure to comply, organizations should invest in their understanding of the gap between procedures and practice and help develop operators' skill at adapting…"*. This highlights the need for professional bodies and regulatory bodies to pay attention to failures (and possibly learn from them), instead of PBOs alone, so as to improve each respective practice/ profession.

Theme 7 – Internal Learning is Common

Internal learning appears to be more common compared to external learning amongst PBOs. This also evidences a lack of external networks for learning and sharing of failures between contractors within the sector noted by other scholars such as Kululanga *et al.* (1999) long before. In rare occasions when cross-organisational learning is practiced, this is mostly between main-contractor(s) and subcontractor(s). For instance, Participants 6, 16, and 17 note how as main contractors they engage with subcontractors for purposes of Lf-PRF. This type of relationship is similar with Kululanga's *et al.* (1999) 'collaborative learning' approach between the main contractor and the subcontractor[19]. Participants 9 and 10 also refer to cross-sector learning by introducing lessons from projects they have done in the banking and retail sectors.

5.4.1 Summary and Implications

Organisational learning within PBOs, including Lf-PRF, mostly takes the form of past-project reviews or post implementation reviews. Lessons learnt are shared via minutes and reports through different media such as emails and share point-type portals.

[18] Examples statutory-related training include those identified by Participant 6: *"…the government's training as in the CSS cards and J5 test, CITB, health and safety which is constantly updated".* Equally, Participant 8 observed that: *"Some are statutory, some of them are just best practice in your particular area…".*

[19] Kululanga (1999) identified 6 learning arrangements amongst construction organisations namely; Learning mechanisms based on collaborative arrangements; Learning mechanisms based on noncollaborative arrangements; Learning mechanisms based on networks; Learning mechanisms based on in-house research schemes, team learning, reviews, benchmarking, shows, and exhibitions, and; Learning through individual employees. Under collaboration, the following relationships were further identified; corporate mentoring, partnering, alliancing, consortia, joint-venturing, engineering and subcontracting work agreements, Joint research and research contracts, ad hoc team learning between firms, license agreements, agreements for communication of expertise.

Participant 13 identified a wider range of technological (virtual) applications (such as webinars and videos) and physical sessions such as seminars and newsletters in their firm. This shows how uniquely OL is structured by each PBO. For instance, mentorship was cited by Participant 1 while Participant 2 referred to professional coaching and mentoring for senior members of staff. Structuring of separate training for senior staff demonstrates the siloed nature of learning where senior members of staff attend board meetings and coaching with junior staff attending practice-oriented training. From a Neo-institutional Theory perspective, the focus on good practice and regulations shows a high influence of the Normative and Regulatory institutional pillars on learning within PBOs via the Normative isomorphism (good practice) and Coercive isomorphism (regulatory) through compliance. The lack of cross-organisational learning shows that the least of the isomorphic forces is Mimic force (cultural-cognitive pillar), as exhibited by the lack of sharing lessons from failure(s) across PBOs within the sector.

Overall, though participants highlight several practices for OL, these are applied on an ad-hoc basis or applied singly. Evidently, Participant 18 reasons that *"Because we occasionally have a like a lessons learnt forum but that [is] not, It's kind of local and it's not like a set in stone thing, it's ad-hoc, as it happens as and when".* Deliberate measures are also not put in place by PBOs to differentiate between typical 'OL' and 'learning from failure'. Thus, instead of the typical 'business as usual' approach to Lf-PRF (mostly through lessons learnt meetings) this study builds upon Lipshitz *et al.* (2002) five facets by identifying 'technological', 'governance' and the 'N^{th} Facet' as extra facets to facilitate the process of Lf-PRF. This is shown in Table 5.6 below.

Table 5.6 Learning Facets Needed for Learning from Project-Related Failures.

Lipshitz et al. (2002) Related Facets	Participants' Responses	Related References
Structural Facet	*"we have a regular team, monthly meetings and monthly project updates between different projects and sort of share lessons learnt on what's been going on"* Participant 15.	Lipshitz *et al.* (2002); Friedman *et al.* (2005)
Cultural Facet	*"it's just an open culture, it's clear that we should share failures as fast as possible"* Participant 15.	Cannon and Edmondson (2001, 2005)
Psychological Safety Facet	*"people are free to share their experience and even come out with their own opinions and the like without fear of being victimised".* Participant 4	Edmondson (2011); Edmondson and Lei (2014)
Policy Facet	*"it's one process which requires executive support [through budgeting and time allocation] and executive review every time"* Participant 4.	Lipshitz *et al.*, (2002); Friedman *et al.* 2005)
Contextual Facet	*"What tends to happen is it depends on the severity of a failure".* Participant 2.	Lipshitz *et al.,* (2002); Friedman *et al.* (2005); Chinowsky *et al.* (2006)
Author-Related Facets		
Technological Facet	*"we have our own website… what we do, lessons, good practice bad practice we put them onto a portal"* Participant 6.	Sivagayinee *et al.* (2017); Baker et al. (2019b, 2019a)
Governance Facet	*"…good project governance should intervene as the project is failing and correct the failure and… so the learning is continuous"* Participant 8.	Sense (2007); Pemsel (2012); Pemsel *et al.*, (2014); Pemsel et al. (2016)
Nth Facet	The need to continuously review the process and mechanism for learning from failure.	

From the responses, there was less emphasis on the psychological and policy facets. This is shown in the hierarchy of coded nodes for each facet shown in Figure 5.3 below. Figure 5.3 below further highlights a reliance on the structural facet evidenced by reference to 'lessons learnt meetings', 'post project reviews' and 'reports'. With the 'policy facet' being lowly ranked, which should provide the time and resources for Lf-PRF this aligns with other scholars' observation that there is little or no time allocated for learning on projects (Dutton *et al.*, 2014; RICS, 2016).

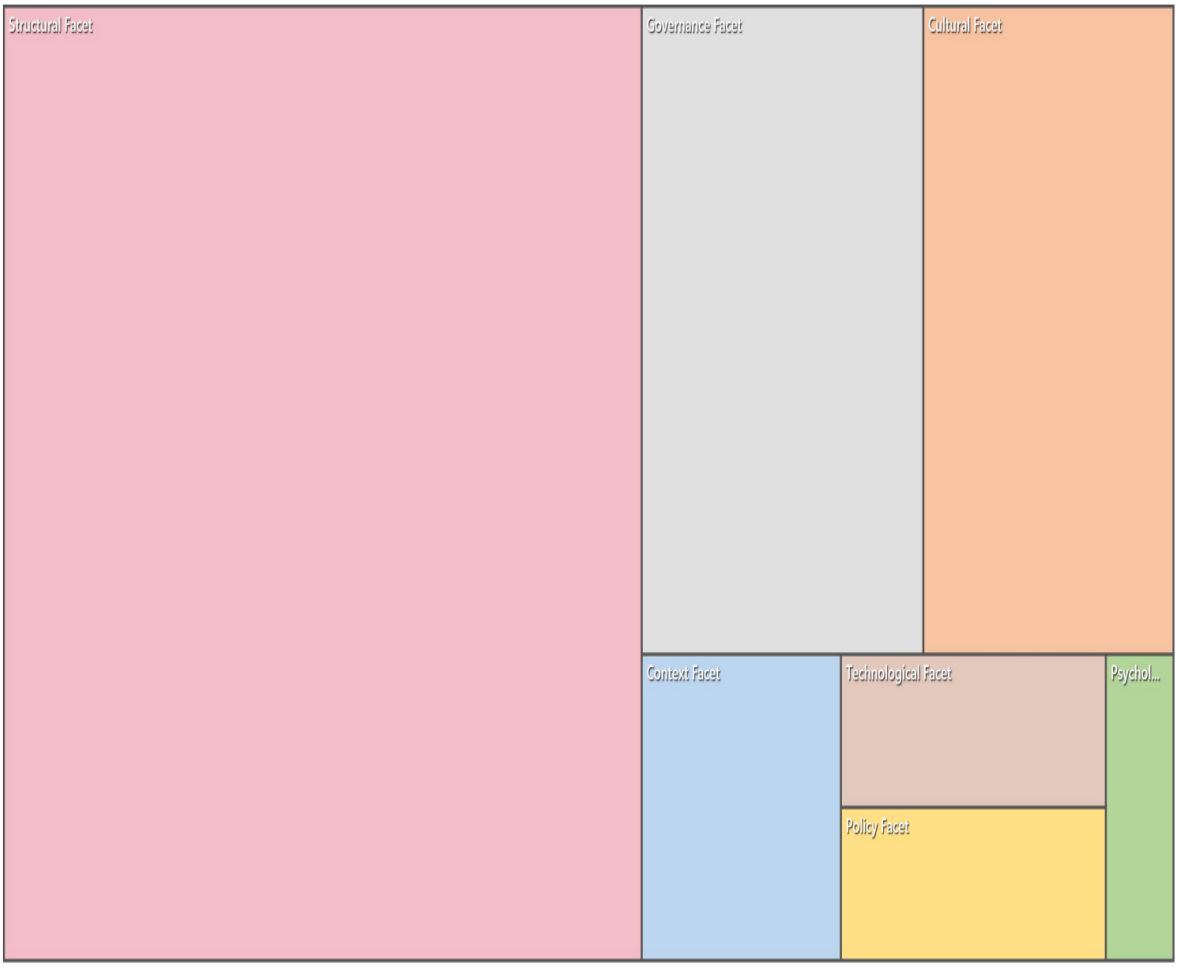

Figure 5.3 Hierarchy of Coded Nodes for Each Learning Facet

Therefore, for effective Lf-PRF, it is important that the identified mechanisms used for purposes of OL are applied consistently (instead of being, for example, annual events) and avoid being implemented individually. This also serves as the basis for adopting a multilevel approach as presented in the conceptual framework. However, realizing that there is no single best approach for Lf-PRF, the 'Nth Facet,' besides the facets identified in Figure 5.3 is included. This also echoes the importance of continuously reviewing the process of Lf-PRF by PBOs.

5.5 INFLUENCE OF FAILURE ON ORGANISATIONAL LEARNING

According to Desai *et al.* (2018), Lf-PRF is highly dependent on how an organisation identifies, interprets and responds to failures. Hence, to understand whether and how failures inform OL within PBOs, the next set of questions focused on this, the first being: ***Are past project failures currently being used for organizational learning?***

From the perspective of Participant 12 and 15, instead of being used for purposes of learning, failures are instead mostly used to scrutinise or assess individuals' and PBOs' performance[20], business cases and setting up measures to prevent such failures from happening. This is by taking a simplistic approach (based on project reviews) as echoed by Participant 8: *"…we learn from where we do have challenges… by taking stock of what happened, what went wrong, and what was the causes of it, and where in the process was that allowed to happen and how do we prevent it going forward… it's basically project review stuff, nothing complicated**".***

Probing further with the following question: ***How does such failure influence organisational learning in your organisation?*** Participants' responses reveal that P*r*F rarely influence OL. Instead, failure is associated with blaming someone or worse, as a basis for terminating their employment. This is echoed by Participant 4: *"…especially at contractor level and for small organisations, a failure can lead to victimisation… witch hunt and whoever is unfortunately labelled to be behind that, you end up being fired…".* If those involved in a failure are retained, training is recommended or CPDs conducted with professional bodies such as APM (Participant 7, 19). In fear of such responses, failures may be hidden or rarely discussed leading to their lack of use or influence on the learning process. Thus, Participant 4 observes that: "*few organisations tend to be using the past project failures but of course… there is quite some noticeable efforts to ensure that past project information is recorded and it is kept somewhere. But [what] one cannot easily tell, is whether that information is… being accessed by other staff".*

[20] Participant 12 indicated that *"If we have a product or a company failure, we would implement a sort of do not use this product or be aware of this product, or you know or ban it all together, or ban that subcontractor or together. Is that kind of make [sense]".* This does not reflect Lf-PRF since failure is externalised by only considering the subcontractors or suppliers as being at fault.

Though Participant 8 indicated that lessons from monitoring their capital investment programs informs how project initiation and delivery are executed, other responses (from Participants 8, 11 and 15)[21] indicate a focus on 'failure mitigation' and 'good practice'. This may not result in meaningful Lf-PRF which should lead to system wide changes such as policies or behaviour based on the failure as advised by Argyris (1976). However, the sector appreciates the importance of Lf-PRF as echoed by Participant 11 that *"Sharing…, any kind of poor experience would hopefully make you a better person for the next time, make you a stronger person for the next time... But if you are not learning from it, maybe you are not the right person in the business because you are not willing to take stuff [failures] on board".* Participant 14 further assets that failures should prompt an organisation to consider 'what we do', 'what we did wrong last time', 'how could we do it better next time' since the lessons were learnt. Unfortunately, this hardly happens due to PBOs focusing on the current job, failure mitigation and a lack of willingness to share failures.

The lack of willingness to share information on failures was evidenced by responses to the following question: ***How willing are individuals and organisations to share lessons learned from failure?***

Giving a historical perspective, Participant 16 reasons that: *"In recent years, it's become more acceptable to discuss failures… historically nobody discussed that because they didn't want to be associated with the failure.… in current times it's become more acceptable and open to discuss those thoughts [failures] and pass it around to everybody and that's both externally and internally".* On the contrary, from a cross-organisational learning perspective, Participant 11 observed that[22]: *"There is no construction company that wants to tell another construction company about their failures… they do want to share some success, but they wouldn't want to share their failures and we don't want to share any failures as such with any of our competitors either".* Therefore, cross-

[21] Participant 15 for instance echoed that: *"…it really drives the agenda around what we can, what we teach our staff and how we all get trained up and just… making sure we are up to date with why things have gone wrong and how we can stop that happening again".*

[22]Participant 3 submits that: *"individuals and organisations are not willing to actually own failure, they are not willing to even accept the notion of failure to be a subject, they would rather not talk about failure… in some organisations there is an unwillingness to even accept that failure is a thing, later move on and share their lessons from such failures".* This was attributed to the blame game by Participant 19'

organisational discussions are centred on 'how to work together' instead of 'discussing or learning from each other's failure' as echoed by Participant 14*: "…there is a big culture change in construction and civils were you actually have a lot more meetings, a lot more openness, clients being involved… I don't know if it's about, you mentioned failure, probably more about how to work together better, be more efficient... outside the organisation, sharing of failure isn't really there".* The lack of sharing information about failures also exists at cross-departmental level within an organisation with Participant 4 indicating that: *"you will not be surprised that you can still have another business unit… facing a same problem and not knowing that a similar unit has had a similar problem previously".* Participant 5 attributes the unwillingness to share lessons among units to a lack of defined processes and custodians of failure information within organisations, time pressure and the external influence from politics. Overall, the major themes arising from the influence or use of failure by PBOs can be summed up as shown in Table 5.7 below.

Table 5.7 Use of Failure and Its Influence on Organisational Learning

Theme	Participants' Responses
Theme 1 – Assessing Performance.	*"Maybe we use a contractor, and that subcontractor has done something wrong on a project, causes a big problem… it's a simple one, that might be an email that goes round the organisation, please be aware when placing an order with this subcontractor going forward".* Participant 17.
Theme 2 – Focus on Good Practice and Control Measures.	*"We are just from the, a couple of projects where we haven't made much money as we would have liked so, we have learnt by that and we have, introduced more spreadsheets for checking things, checking costs, where we have delved into a lot deeper than we used to with the [quantity] surveyors".* Participant 13.
Theme 3 – Avoidance and Mitigation of failures.	*"But I am not convinced that that is what we classify as organisational learning [from failure]… that is quite simply understanding what went wrong and not doing the same again"* Participant 3.

5.5.1 Summary and Implications

The findings reveal that failure rarely influences OL. Instead, failure is mainly used for assessing whether 'the right thing has been achieved or not' as echoed by Participant 19 without translating into changes within the system or teams' behaviour. Similarly, Wong and Cheung (2005) observe that mostly data on projects is collected for monitoring

purpose and rarely applied in the process of OL[23]. This may be associated with the understanding that PBOs feel unsafe to share information on failures since it may affect their competitiveness while individuals fear being fired. Though some Participants (6; 9; 10; 11) acknowledge the use of lessons from failure, it remains difficult to ascertain whether that really happens, or it is done for the sake of gaining acceptance or competitiveness. For instance, Participant 2 reasons that: *"All you have to do is talk to somebody about the project and then read the case study to know the difference between the reality of project delivery and what companies put out there as marketing".* This is because in most cases, the main contractors associate learning with being offered a job (or performance assessment). Evidently, Participant 12 noted that suppliers risk not being used if they are not willing to engage in learning. This further highlights the main contractors' power and influence on initiating the process of Lf-PRF[24].

From a Neo-Institutional Theory perspective, this demonstrates the influence of the Regulatory and Normative pillars evidenced by a focus on 'good practice' and 'training' as a response to failures. Such responses have also been echoed by the CIOB (2018, 2021) which encourages the engagement of both regulatory and professional bodies in their 'Code of Quality' guidelines in a bid to improve quality delivery in the UKCI. Consequently, PBOs create C*m*P focused on delivering successful projects, in most cases through continuous improvement, by sharing good practices (successes) and less of failure-related information. Accordingly, if failures are to have an influence on the learning process within PBOs, it is incumbent upon the actors within the industry, to demonstrate how PBOs would benefit from learning from such failures[25]. Importantly, barriers to Lf-PRF need to be addressed which are discussed in the following section.

[23] For instance, Participant 6 indicated that: *"… when other projects are coming up, either QSs or project managers can look up and see what people have scored and what their ratings are and if it's a descent score they go and pick up a phone and ask me what did you think of that company, they were good or I wouldn't use them... if you have got a low score".*

[24] It is therefore important to understand the power differences that exist amongst the learners in the learning process and definition of failure. For instance, Participant 5 notes that *"there is a lot connected, going back to the beginning, that understanding of who the stakeholders are, who has the ability to decide whether the project has failed or not and how the project team understands that and puts it into action."*

[25] Worth noting is that establishing benefits of Lf-PRF is beyond this study's scope. However, some participants (6; 12; 17) did highlight benefits such as using past failures to prepare better bids and improving performance of future projects.

5.6 BARRIERS TO LEARNING FROM PROJECT-RELATED FAILURES

Though Lf-PRF is being encouraged, it is not an easy process because learning is complex and involves conflicts at times especially if failures are involved (Cannon and Edmondson, 2001, 2005; Friedman *et al.*, 2005)[26]. Accordingly, since any learning model ought to surmount barriers to learning (Carmeli, 2007), participants were asked to highlight barriers that may hinder Lf-PRF based on the following question: ***What could be the barriers to learning from failure?***

In response, Participant 19 notes that: *"most organisations struggle quite badly to ensure that you are learning consistently… I wouldn't be able to say that we learn every lesson or that all teams know what went wrong with the other project... But we are trying quite had, but… it is quite difficult".* To elaborate the difficulty of learning, Participant 5 cites several barriers ranging from the sector[27], PBOs and the client: *"the fragmentation of the industry, it's the cost driven nature as opposed to the value driven nature of the industry; it's the low profits; not allowing investments in the systems to improve, it's clients not understanding the difference between value and cost. And it is 'head down butt up crash on' the nature of the industry. It's the belief that movement means progress".* Known for transient teams and high employee turnover, new team members find it difficult to access past project information as echoed by Participant 4. Participant 14 also highlights the uniqueness of projects and team members when compared with the manufacturing sector *"…in construction we do know it's different environment, different teams, different scenario, different client, different supplier, different contractor and so forth".* In contrast, Participant 17 argues in favour of team members leaving and joining other organisations as an opportunity for sharing lessons: *"…that's a good thing to work with other teams and you pick up other things because you are hearing them for the first hand and you are learning from other peoples' experiences".* Thus, instead of considering the fragmentation and transient nature of team members as barriers, these must be regarded as sources of lessons as recommended by other scholars (Scarbrough *et al.*, 2004).

[26] See Stark and Head (2019) who also discourses institutional or organisational amnesia, a situation where actors do not remember policy-related lessons learnt from the past intentionally or unintentionally.

[27] Participant 5 adds that: *"It's my definition of classic construction and it is 'head down, butt up, crash on' ……when you watch construction in practice you would think it's a no think operation, it's always the pressure of what's happening now, what's happening now".*

Participant 2 also cites the commercial negative effect of failure: *"the commerciality of the construction sector means that any business open enough to talk about failure in a direct way risks the opportunity of working with that client again on the next project, because it could be reputational damage for them and the client".* This leads to the externalisation (and a lack of ownership) of failure and none sharing of failure-related information in order to remain competitive. Failure(s) at times may be accompanied by chaos, disputes and litigation in some instances and individuals may not manage their emotions during such events (Participant 6, 18). Shepherd *et al.* (2011) made similar observations that employees experience grief during times of failure and recommends managing their emotions for effective Lf-PRF. Project team member's (and leaders') vying interest and loyalty to either the project or the PBO was cited by Participant 5[28]: *"… the individual project managers have power within their projects and their interest is their project. The interest is not necessarily the overall company's objective".* Accordingly, Participant 9 and 10 observed that there is a lack of implementing lessons learnt due to the human factor. Similarly, Desai *et al.* (2018, p. 9) contend *"that failures involve events that are attended to and interpreted negatively by observers, introduces the issues of power, conflict, and bargaining into the organizational learning process, since different groups with distinct or even competing interests might experience a certain event and contest its interpretations".*

Participant 19 also notes that focusing solely on success (and being successful) acts as a barrier. This also aligns with De Keyser *et al.* (2021) who contend that the 'success paradox' hinders Lf-PRF. This is a situation where an organisation does not consider learning from other organisations' failures since it is blinded by its own existing 'good practices' or 'success'. Lack of incentives for sharing failures and organisational biasness in order to be awarded future schemes was cited by Participant 15.

These responses reveal several and varied barriers to Lf-PRF which can be related to the following: the nature of failure; individual level[29]; project level; PBO/organisational level, and; sectoral level as shown in Table 5.8 below.

[28] Considering the institutional field, this highlights the sub-institutions in form of the many various projects and departments that exist within a PBO.

[29] Other individual related barriers include lack of confidence, being too confident, being young or new on the job as observed by Participant 11.

Table 5.8 Summary of Types of Barriers to Learning from Failure

Theme	Sub Theme(s)	Example of Participants' Response
Theme 1 – Nature of Failure.	Complex in nature; Negative consequences and morale of team members; size of a failure and its impact.	"*Project failure sounds… like an easy topic but when you really dig into it, it's really complex".* Participant 13.
Theme 2 – Individual Related.	Emotions; grief; lack of experience in managing failure; fear of being fired; know it all type.	*"If you have had a hard time on it [project], it can affect you in lot of negative ways. Bringing it up again and talking just brings you back to that position in life where you were not happy." Participant 16.*
Theme 3 – Project Level Related.	Time constraints, transient teams.	*"…that's down to time, you have finished your project and then you get straight into the next one, you kind of hopefully am not making the same mistakes"* Participant 1:
Theme 4 – PBO Related	Lack of governance; Blame culture; profitability, managing multiple projects; productivity; leadership.	*"an organisation that does not have right governance system to ensure that failure is identified and understood"* Participant 8.
Theme 5 – Sectoral Related.	Competition; low profit margins; different clients;	*"…you will trip over commercial confidentiality, people trying to maintain their competitive edge and they would not want to reveal everything"* Participant 19.

Additionally, participants (8; 9;10) identified, 'communication' and 'change' as other key factors that hinder the process of Lf-PRF. Similarly, in a recent study Brookes and Flores (2021) found that 'change' acts as a barrier to sharing infrastructure projects' data analytics. This due to the fact that in some cases, the scale and complexity of change[30] puts extra pressure on organisations and may equally affect Lf-PRF. Therefore, for PBOs to effectively Lf-PRF and possibly mitigate failures, it is important that efforts are evenly balanced by addressing barriers at each level supported by collaboration between the 'units' or 'departments and project parties' and effective communication[31]. Thus, as a way

[30] *Participant 1 elaborates that "it's managing how that change is implemented in each project as well, because obviously nearly every project is at different stage, some are on concept, some are on technical designing, some are on construction, commissioning, so it's trying to implement that change at the right time of that project".*

[31] This aligns with Participant 10 who reasons that: *"When you root cause, any failure is generally down to a miscommunication somewhere or a misunderstanding of information or a full blatant miscommunication or noncommunication of key information. All these go back to poor communication".*

of enhancing the process of Lf-PRF, the conceptual framework, discussed in Chapter 3, is based on a multilevel approach instead of solely focusing on a PBO(s).

5.7 SECTION SUMMARY

From a historical point of view, the construction sector's engagement in both OL and Lf-PRF has been increasing. Common practices applied by PBOs in learning include project learning via lessons learnt meetings, past project reviews and training (including CPD, workshops and seminars). However, the process still faces challenges, such as competition and a lack of standardised definition and measurement criterion of failure. The wider construction sector does not also provide a safe environment for Lf-PRF as observed by Participant 7:

> *"the whole construction scene, field is littered with companies that are working to budgets that don't possibly make any money… the work that we do sometimes gets squeezed and.... I am trying to be diplomatic here, the amount of money people are putting into construction at the moment, and doesn't make for either particularly well considered and developed projects or to give people the opportunity, other than in their nightmares when they are asleep, to think about failures or potential failures".*

At PBO level, Participant 1 and 5 also observed the challenge of managing several projects (productivity and the need to complete present tasks) which are also at different stages and requiring different needs within a single business. Equally, Newell (2004, p. 16) reasons that *"…given that projects are all in different phases, the sharing of learning is problematic because people on other projects are not at the same stage of a project when they would want/need to learn from the other projects' experiences".* However, instead of seeing these as barriers, projects at various stages and involving different parties present an opportunity for sources of lessons that may be shared or applied onto future projects (Scarbrough *et al.*, 2004; Swan *et al.* 2010)[32]. Interestingly, Participant 7 reasoned that the lack of failure experience(s) hinders the process of Lf-PRF which aligns with Maslach's *et al.* (2018) dilemma of learning from failure. This is a situation whereas an organisation's success increases, the failures available to learn from diminish. To overcome such, Maslach *et al.* (2018) recommend vicarious learning from other PBOs failures. Bearing in

[32] Therefore, Newell (2004) recommends using IT based tools with a searchable database of lessons learnt documents to make it easy for someone to access information without needing a direct input of others.

mind the several barriers that influence Lf-PRF which can variously be related to the individual, project, organisational and sectoral levels, it may not be sufficient to enhance learning via a single mechanism such as IT tools. Worth highlighting is the focus on profitability and competition within the sector which is highlighted in Box 5.2 based on the Charles de Gaulle International Airport collapse case study. Therefore, instead of taking a single approach, the study recommends the adoption of the identified facets as a way of enhancing the process of Lf-PRF. This also serves as a basis of developing the model presented in Chapter 7.

Text Box 5.2 Charles de Gaulle International Airport Collapse, 2004 – The Race to the Bottom in Interdependent Systems.

Early in the morning of 23rd May 2004, a part of the concrete roof of France's Charles de Gaulle International Airport collapsed killing four people and injuring three others. Investigations revealed that this was a result of procedural and structural related failures. Besides that, the roof was weakened by external temperature changes in a period of less than a year after its completion. The inquiry further revealed that majority of the organisations within the supply chain worked so much towards reducing costs resulting in minimal considerations of margins for safety. Evidently, most of the failures within the sector may be associated with the 'race to the bottom' type of operation focused on reducing costs in order to increase the profit margins. Having had supply a chain of over 300 companies, it is therefore important that benefits, besides apportioning the risks, accrue to all the involved parties.

Lessons and Influence - On the world construction scene, lessons from the collapsed roof encouraged organisations to improve the process(es) of sharing construction details/drawings and multiple professional oversight of the design process and outputs. The failure also encouraged the use of software packages in reviewing designs such as BIM.

Chapter 6: Exploratory Data Analysis of Second-Round Interviews

6.1 INTRODUCTION

According to Saunders *et al.* (2009), exploratory data analysis focuses on understanding 'what is going on' or 'understanding a problem'. Accordingly, this chapter presents the exploratory analysis of data from the second-round of interviews with respect to learning from failure. As a guide, this chapter is divided as follows:

a) Participants' Perception of the UKCI, 'learning' and 'failure'.
b) Thematic analysis of second round interviews.
c) Discourse analysis (DA) of the second-round interviews.

In comparison with the first round of interviews which focused on PBOs' internal practices and the understanding and definition of terms such as 'failure' and 'organisational learning', the second-round of interviews explores organisational-, and sector-, level practices. This is done by analysing the influence of other institutions from the external environment on Lf-PRF such as professional bodies. Consequently, this chapter addresses the following: the context (institutions and institutional barriers) and its influence on the perception of failure and on Lf-PRF; practices in the use of lessons from failure, and; dualities and dilemmas faced by PBOs associated with Lf-PRF

6.2 UKCI IN PERSPECTIVE – SOCIAL CONSTRUCTION OF LEARNING AND FAILURE.

Since Engwall (2003), contends that PBOs do not operate in a vacuum, it is worth analysing the actors' perception of the sector and the context within which 'learning' and 'failure' occur. This aligns with social constructionism ontological positioning of the study which argues that reality is influenced by the context (external world) (Saunders *et al.*, 2009). Evidently from the first round of interviews, both 'practices adopted for purposes of

Lf-PRF' and the definition of 'failure' are unstandardized (subjective) and unique to each PBO. The subjective nature of failure[1] and different approaches to Lf-PRF may be associated with the 'context' and social interactions[2] between actors within and across PBOs[3]. These include contractual relationships or partnerships such as joint ventures as observed by Participant 20: *"When a failure occurs it [Lf-PRF] will vary project-to-project in that we have a lot of joint ventures so there are differences in every of project".* Therefore, to understand behaviour and response to failure based on the social constructivism, metaphors were identified in reference to 'failure' as shown in Table 6-1 below.

Table 6-1 Actors' Behaviour and Response towards Failure Based on Metaphors

Response/Behaviour	Metaphors Response	Comments
Fear and dislike of addressing or discussing failure.	*"Burry your head in the sand…"* Participant 14; *"people stick their heads in the sand".* Participant 8; "Should have raised the flag"; "brave to stick our hand up" (Participant 31);	Demonstrates how actors are not free to share failures within the sector; lack of psychological safety.
Consider failure to be a normal occurrence.	*"No one is perfect, we all make mistakes"* (Participant 24).	May brood bigger failures since it may not encourage deeper analysis and Lf-PRF.
Not sharing failure openly.	*"Want to keep things under arms in terms of that*" (Participant 29); *"I bet they want to keep it low key"* (Participant 24).	Failure associated with negative consequences e.g., competitiveness or dismissal.
Tendency to forget negative past experiences.	*"it's all hunky-dory [after completing a project]"* (Participant 25).	The sector is more focused on celebrating success than analysing failure.
Blaming each other.	"[in case of a failure], *much sits on our door*" (Participant 31)	The blame game; Mostly the contractor is blamed.

[1] Thus, Participant 19 refers to measuring and defining failure as *"It's like looking for a needle in hay-stack"* while Participant 10 referred to success and failure as *"Its success in the eyes of the beholder if you like".*

[2] *From a DA perspective, knowledge is socially constructed "that is, that our current ways of understanding the world are determined not by the nature of the world itself, but social processes" (Gill, 2000, p. 173).*

[3] See also Saharn (2016, 2018) who discusses how such interactions create institutional waste.

Such responses in Table 6-1 above could be associated with the external influence from the sector mostly in form of 'competition'. This further demonstrates how the competitor relationship within the sector among PBOs influences the behaviour towards failure by hiding it. Considering Table 6-1 above further, it can be inferred that there is a lack of psychological safety within PBOs and across the sector demonstrated by 'fear of sharing failures' or 'stating situations as they are'[4]. Therefore, team or collective ownership of failure(s) should be encouraged instead of solely blaming an individual(s) or PBO. This may be achieved by apportioning the blame appropriately as encouraged by other scholars (Edmondson, 1999, 2004; Carmeli and Gittell, 2009).

Zooming out of the PBOs and taking a more sectoral level analysis of how PBOs' perceive the sector and Lf-PRF, metaphors as a way of getting deeper insights on Lf-PRF were observed from the responses and are summarised in Table 6-2 below[5].

[4] This could also be observed from Participants 30 and 31 who indicated that as a company, they should be bold enough to tell the client that it was not possible to meet the deadline.

[5] To further understand how actors respond to failure, metaphors were selected from the responses. This reveals that the most common response and behaviour towards failure is not sharing as evidenced by other responses using metaphors such as: *"you not [want] any dirty washing out in the public"* by Participant (24); *"You don't want to wash your dirty linen in public"* (Participant 21); *"people do not to want to air the dirty washing"* (Participant 10); *"we wouldn't want to have anybody else have our dirty washing"* Participant 23.

Table 6-2 Participants' View of the Construction Sector

Perception/Theme	Participants' Response/Metaphor	Influence on Lf-PRF
Competitive, winning at all cost; disregard regulations to be profitable.	*"There is almost race to the bottom in the construction sector in the UK"* - Participant 7; *"as long as it works and its cheap it will do*" (Participant 23).	Regulations or standards may be disregarded to remain profitable; Lf-PRF may not be considered to cut costs.
Focus on Financial benefits and profitability.	"You need to take care of your business; cash is king" (Participant 14); *"we are here for business."* (Participant 27).	Lf-PRF may not be considered to cut costs; focus on productivity and profitability.
Lack of trust.	*"We don't really work with a shake of hand anymore*" Participant 7; *"clients are a bit sneaky, and their advisers are a bit sneaky"* (Participant 23).	For Lf-PRF to occur, trust is essential.
Perceptual differences among parties.	*"[Clients manage projects] as they would manage a stacking of the shelves process, like ordering the beans process."* (Participant 31).	Reality (including failure) is influenced by different factors such as, sector of operation, profession and background.
Challenges in Project Management.	*"We are constantly chasing tales"* (Participant 9); *"It's an ever-moving fence"* (Participant 9); *"we are fire-fighting trying to get the job done." (Participant 24).*	More focused on problem solving, hence little or no time given to Lf-PRF.
Increasing Project Size and Complexity.	*"Projects within the UK are quite sizeable; they are quite chunky"* (Participant 27).	Leads to more stakeholders, complex and fragmented structures making it difficult to Lf-PRF.
Low Profit Margins.	*"The whole construction scene is littered with companies that are working to budgets that don't possibly make any money. The work that we do sometimes gets squeezed"* Participant 7.	Cost focus, may not engage in Lf-PRF; Productive or revenue generating activities.
Administration or documentation overload.	*"I have got over a thousand of QA forms to do, it's… just a hell of a lot to do"* (Participant 24).	Busy actors with no time for Lf-PRF.
Unsatisfied with the client's role.	*"The clients are sitting lay back waiting, have you finished…?"* (Participant 23).	Low clients' participation in Lf-PRF .

Evidently, the participants' perception of the sector in Table 6-2 above (mostly associated with competition) may negatively influence Lf-PRF. Yet, these factors in Table 6-2 above receive little attention with PBOs focusing more on their profitability and reputation or competitiveness. Similarly, the Green Book (2020) identifies focus on 'reputational risks', 'business risks', 'optimism biasness'[6] as factors leading to the business-as-usual syndrome[7] instead of focusing on improving their systems or Lf-PRF within the sector. Commercial related factors such as competition, profitability and productivity (doing things cheaply and quickly) instead of focusing on stakeholders' benefits have also been cited as causes of failure (Hackitt, 2018; CIOB, 2019, 2021). Within the sector, the BIS (2010, p. 3) also highlights producing expensive '*Gold plated solutions'* a situation where extra money or features are added without translating into increased value or benefits. Hackitt (2018), in reviewing the Grenfell Tower fire disaster also sums up key features within the sector that may lead to failure as: ignorance and misunderstanding of regulations; lack of clarity on roles and responsibility, and; inadequate regulatory oversight and enforcement tools. See also Sarhan *et al.* (2018) who highlights how norms that have been taken for granted within the sector resulting in institutional waste.

Essentially, if Lf-PRF is to be enhanced among PBOs, the identified concerns at the sectoral level should be addressed. This also highlights the fact that Lf-PRF cannot be left as a sole responsibility of PBOs, instead, sector-wide mechanisms which involve all key players should be sought. Within the sector, the main contractor also assumes power over their subcontractors when Lf-PRF. This also aligns with Sarhan *et al.* (2018) findings on how Tier 1 contractors may assume bargaining power. For instance, Participant 12 observed that *"People… are generally willing to learn from failures. If a supplier wasn't willing to learn, they run the risk of not being used again and you know what I mean*"[8]. Accordingly, the study agrees with Participant 8 who reasons that to encourage PBOs to Lf-PRF, industry actors should: "*…think about the competitive nature of the industry, the adversarial nature of the industry.. there is also organisational complexity… the industry…*

[6] For instance, the RICS (2019) note that *"the fear of consultants to say 'no' can lead to unrealistic expectations from clients. This makes it very difficult for project teams to deliver, resulting in unsuccessful projects".*

[7] The Green Book (2020) defines the business-as-usual syndrome as a continuation of current practices and processes even after new proposals have been given.

[8] This also highlight the influence of the coercive isomorphic force on the learning process within the sector and serves as an opportunity for the main contractor to initiate and encourage Lf-PRF across the supply chain.

has developed the adversarial culture and when the client comes along says I want to partner with my contractor, the contractor says oh yes here is the opportunity to rip the client off". Realizing how such factors within the sector influence Lf-PRF, the following section analyses institutional factors' influence on actors' perception and behaviour towards failure (and learning from it).

6.3 THE INFLUENCE OF INSTITUTIONS ON LEARNING FROM FAILURE

Based on the multilevel and multifaceted conceptual framework on Lf-PRF, the influence of the institutional pillars on learning and failure needs particular attention. To get more insights on this, and appreciate the factors leading to 'training' as a major form of Lf-PRF as observed in the first-round of interviews the following questions were asked. Firstly, participants were asked: ***"Does your organization use or refer to any sector reports or government guidelines or procedures on learning from failures? If so, give examples".***

Some participants (20, 21) indicated that they use or learn from industry reports. Participant 31 highlighted lessons and directives from the Grenfell Tower fire disaster's[9] findings: *"… coming from that, are many learnings, of course for our industry including the need for all of our organisations to revisit every single scheme where we have fitted cladding".* However, other participants indicated that they do not use industry reports. Participant 26 reasons that reports are not used "*probably because government reports and guidelines are so far behind what we are doing. They have not worked out the guidelines yet"*. Similarly, Participant 29 indicated that: *"I don't think so or that I am aware of. Not in my sector at least, the building services area of the company".* This aligns with the observation made by Participant 20 of how discussion on failure focuses on 'big failures', particularly health and safety ones. Similarly, Participant 24 notes a lack of guidelines on failure lessons at the site level: *"…one of them are sector guidelines [CIOB's Code of Quality]. I couldn't see what we do on learning from failures and what we do on a*

[9] Use of international reports was also cited. Participant 25 indicated that their organisation also learns from other construction sectors within Europe and world over. Participant 20 also indicated the use of internal guidelines to distil the sector lessons and ISO standards.

site level….". Participant 33 also indicated that they do not use industry reports*: "if I am honest, I do not think there is any publication out there a book… that could probably tell me much more than I know already because of what I have been through".*

Considering Participants 33, 22 and 20, it may be argued that government and sector reports have the following limitations. Firstly, there is a lack of first-hand experience of the negative consequences of failure, and; secondly the industry reports, standards or guidelines may not adequately address all concerns since failures are unique. Therefore, Participant 28 referred to the uniqueness of projects and clients for not using reports: *"…there will be guidelines and reports out there but, you know like I said previously every job is different, isn't it?"*. Participant 32 also expressed methodological and data collection concerns with some reports: *"..there is [a report] and now [they] go projects fail because of this one thing. But no one actually knows the underlying data, nobody knows how projects [participants] have been interviewed, no one knows the type of projects... it's not contextualised and that's what tends to shy people off a little bit".*

A similar question was asked on the use of professional bodies' related reports on failure. Participants referred to several professional bodies within the sector such as CIOB, APM, RIBA and RICS (Participant 20, 21, 22, 23, 24, 25, 26)[10]. Participant 25 indicated that they learn from the APM's publication of 'successful' and 'disastrous' projects: *"… there are lessons learnt publications, whether it's a failure in terms of performance in a building or poor performance in terms of delivery and delays to the project or cost over-runs etc… especially this theme… where people have to learn from failures on a project so that they are not repeated elsewhere".* However, other participants (29, 30, 31) indicated that they are not aware of any reports from professional bodies on failure in their profession such as building services. Participant 33 also submitted that they take guidance from professional bodies *"with a pinch of a salt"* attributed to the fact that there is over emphasis on technology as a solution to most of the industry's challenges. Such limitations of professional body related reports and guidelines such as the Project

[10] However, such referencing exists at individual or department level influenced by one's professional body affiliation. Thus, as recommended by Participant 23 there should be collaboration between professional bodies. Participant 33 also reasoned that: *"I am a member of the RICS, I read RICS journals, I am still of the opinion they still have not grasped really what actually leads to failure, leads to breakdown of communication".*

Management Book of Knowledge (PMBOK) have been noted by Winter and Smith (2006) who note a lack of attention to project complexity and teams' behaviour. Similarly, Morris *et al*. (2006, p. 719) observe that *"Drafting a formal Body of Knowledge brings with it risks…. Over-emphasis on didactic methodology suggesting the rote application of best practices diminishes the role of judgement that managers need in applying knowledge in different contexts".* Thus, reliance on such reports leads to PBOs' focus on training or learning the listed skills without attempting to Lf-PRF or develop new ideas. Participant 33 also indicated that many reports are focused on 'processes'[11] when failures are mostly caused by people-related factors such as improper training. Similarly, some scholars such as Cooke-Davies (2002) and Winter and Smith (2006) contend that there is a huge focus on the process of 'project management' while Farmer (2016) criticises the training of the sector's labour force. In contrast, Participant 28 indicated that they have their own bespoke standards: *"The company does not necessarily refer to any reports really. We have got bespoke standards within the organisation… [provided by] the directors and the senior managers".* This also highlights the influence of the 'Regulatory Pillar' at an organisational level from leaders.

To avoid some of the factors that have led to a low of use of government and professional body related reports, collaboration amongst PBOs, including with those preparing such reports, must be encouraged. This is in order to get first-hand account of lessons and information on failure. Essentially, the sector should encourage collaborative learning amongst PBOs which aligns with the Isomorphic Force of 'Mimicry' (i.e., peer PBOs sharing lessons) than relying mostly on the Normative and Coercive Isomorphic forces through government reports and guidelines. The major themes arising from industry reports on failure (and their limited use) are summarised in Table 6-3 below.

[11] This can be appreciated from the industry's focus on project delivery methodologies. Thus, a balanced approach should be approached by considering the 'people', 'process' and 'technology' (PPT).

Table 6-3 Themes on the Use of Reports

Theme	Response	Comments
Theme 1 - Focused on Regulations and Compliance.	*"…we do keep an eye on… registration, health and safety being a primary one but also in terms of technical compliance, building regs [regulations], because that's often something which can be a failure…".* Participant 23	Reactive approach to Lf-PRF; Focus on failure mitigation, quality, supervision and health and safety.
Theme 2 - Robust Report Preparation Compared to Implementation.	*"I think there are processes that are robust in the way they're written, but not in the way that they're followed".* Participant 20	Suggests a focus on failure analysis and documentation instead of learning from failures.
Theme 3 – Limited Scope and Generic.	"*If you're looking for something that says learning from failure guideline, then you won't find it. It will be hidden in the whether we follow the …bodies' guidelines and an accreditation for other processes…. there's nothing called…. learning from failure…"* Participant 20	Does not meet all sector's demands/learning focused on large failures.
Theme 4 – Bureaucratic and take long to Produce.	*"Usually when it comes to lessons learnt from things like the National Audit office report etcetera, those can take quite a while to come out".* Participant 27	Recommendations may be overtaken by time. Consider phased approach to releasing reports.
Theme 5 – Failure Discussed under the Guise of Quality and Continuous Improvement.	*"Learning from failure tends to come under the guise of continuous improvement… a lot of the guidance from the sector and from the industry about learning from failure is branded in a way as a continuous improvement processes".* Participant 20.	Limits searching for lessons on a particular failure; Gives a hint of fear to state situations as they are.

Furthermore, findings reveal that professional bodies operate in silos (or C*m*P) influenced by affiliation of actors as observed by Participant 25[12]. To a certain extent, the industry's actors display what this study terms as 'professional myopia'[13] by focusing more so on lessons from professional bodies that they are affiliated to.

[12] Besides siloed professional bodies, collaboration among members of a same professional body is equally rare. Participant 34, as an architect observed that there is a lack of collaboration amongst architects.

[13] 'Professional myopia' in this study refers to team members' focusing on learning from their own experience, professional bodies, or department.

6.3.1 Summary and Implications

The actual use of reports for purposes of Lf-PRF and benefits arising from such remains contested. For instance, Participant 32 shared concerns on how much the reports influence decision making*: "In terms of industry failure, they are now filtered down but I don't know how much they inform decisions… I have seen lots and lots of reports but to be honesty people now only take a few headlines now of them".* However, it is evident that the reports do have an influence on the learning process through, isomorphic forces, the 'Normative force' (providing quality guidelines) and the 'Coercive force' through the provision of regulations such as those arising from the Grenfell Tower fire disaster. Thus, the role of professional bodies remains critical through structuring and legitimizing the content of Lf-PRF (DiMaggio and Powell, 1983). Similarly, Morris *et al.* (2006, p. 719) note that such standards: *"…influence industry views on competence, best practice, and training and development…. since any such attempt to define the 'discrete body of knowledge and related skills' raises questions about the validity of the knowledge base in the subject being discussed or taught, both in epistemological terms and in terms of what is deemed to be covered by the subject area".* This also explains why PBOs engage more in training (good practice-related), CPDs and other regulatory-related training compared to engaging in Lf-PRF[14] due to the influence of the industry's norms via the Coercive and Normative isomorphic forces.

Essentially, Lf-PRF lacks 'validity' and 'epistemological efficacy' which should be developed by engaging professional bodies and regulatory bodies in that endeavour. This also highlights the fact that PBOs do not exist and conduct business (including Lf-PRF) in isolation. Overall, reports seem to take a reactive approach, mostly in form of guidelines and regulations in response to big failures or disasters, (public funded projects in most cases and on health and safety related failures). As observed by the participants (19, 21, 26, 27 and 33), such reports lack details and may be outdated, or may take long to be released. Some press release may be biased and at times misinterpret facts. Therefore, it is inevitable that PBOs collaborate with each other in order to increase the depth and

[14] Worth noting is that reports appear more to 'report failure(s)' without outlining how lessons from failures can be learnt by PBOs. Instead, the discussion of failure from the reports focuses more on quality (and good practice) as submitted by Participant 23 who referred to the CIOB's quality commission report as the *"bible on everything to do with quality in terms of setting up your systems so that you don't fail so…".*

value of information from failure by learning from those with first-hand experience. Hence, the next section discusses the types of networks that exist and are considered as possible sources (and options) of lessons from failures.

6.4 PBOS' NETWORKS FOR LEARNING FROM PROJECT-RELATED FAILURE

The importance of networks[15] in Lf-PRF cannot be overemphasized since they serve as sources of knowledge/lessons (Inkpen and Tsang, 2005; Carmeli, 2007; Maurer *et al.*, 2011; Bartsch *et al.*, 2013). Earlier, Baum and Oliver (1991) also encouraged organisations to develop institutional linkages for purposes of organisational growth and survival. Thus, participants were asked: ***"Does your organization have any networks in place within and outside your organization for learning from failure? If so, give examples".***

Responses reveal how PBOs engage more in internal networks for Lf-PRF compared to external networks (Participant 22, 24, 27, 29, 34). Participant 22 indicated that they do not have any external networks externally for Lf-PRF because everyone operating within their sector is a competitor. Essentially, the Cultural-cognitive Pillar, due to competition, influences PBOs to not share failures. Instead, PBOs mimic each other or copy others behaviour of not sharing information on failures. The few external networks are based on those they 'work with' or have running contracts instead of collaborating on the basis of sharing lessons from failures. Some of the external networks are informal and as indicated by Participant 33, are focused on future job opportunities. Participant 32, in contrast, indicated that for information on failure from the external environment, they rely on government reports and industry trends[16] instead of establishing networks.

[15] Networks are also regarded as 'social capital' which is defined by Maurer *et al. (2011*, p. 165) as *"the actual and potential resources provided by and derived through actors' social relations".* For instance, Participant 33 submitted that *"…I will meet probably another person that has a construction company and we will talk… for example, what you are you doing to tackle covid? And we will [have] that conversation.*

[16] Learning networks are also influenced by the industry's discussion of failures in the guise of continuous improvement or safety failures as indicated by Participant 20. Hence, such reports mostly focus on health and safety as discussed area.

Participants were further asked on who is engaged in learning in an event of a failure occurring: **Q6.** ***In an event of a failure or mistake being experienced on a project, how does your organization collect and share information within and outside your organization?***

Participants from both the first- and -second- round of interviews indicated that 'everyone' within a PBO and working on a project should be involved in the process. Participant 7 notes that *"It just makes the system work. Whether it's an apprentice or a client, if everyone is alert to the potential, improve the system then it just makes it a better system".* Participant 15 further elaborates that *"it has to include not only those directly involved in the project but also leaders, clients' leaders and the wider supply chain and stakeholders, especially end users since they have a better view of failure".* This allows for the generation of several ideas and solutions since many people are involved (Participant 1; 5).

Yet, Participant 13 cautions that engaging everyone may take long and difficult to implement and suggest extracting specific lessons for specific departments. However, to narrow down who should be involved, Participant 3 reasons that: *"This comes down to, defining failure from a point of view, from whose point of view… So, anyone involved in trying to meet those expectations should be involved in the process of learning from failure".* In summary, the study identifies the following themes as networks (and opportunities) for Lf-PRF (categorised as internal and external) in Table 6-4 below.

Table 6-4 PBOs Networks for Purposes of Learning from Failure

Type of Network Relationship	Participants Response	Opportunities/Barriers
Internal Relations - Interdepartmental, interproject and project level.	*"Internally we have a risks and opportunities workshop… we have a big event every year when, like all the senior people, all the project managers of different teams will come together and there will be presentations"* Participant 32.	+ve - Access to information and people involved in a failure. -ve - Hampered by structures within the organisation via departments.
Client/customer Related.	*"We will share a lot of how, in the last year where the biggest points of failure to keep on peoples' radars. So when we did last year… we went straight to a client to go and talk about these issues"* Participant 30.	+v - Client benefits from other PBOs' failures. -ve – Limited lessons for the contractor or consultant.
Contractual or Framework Related.	*"…we are part of a number of frameworks and part of those are shared learnings, that could be quarterly, group sessions… members coming together and sharing their experience and learnings in terms of development process, procedures around specific topics"* Participant 30.	+ve Allows for first-hand sharing of information; offers continuous learning. -ve Limited source of information since it is within a smaller circle.
Professional Body/Affiliation Related.	*"I am a member of the Society of Construction Law, SCL, and anything to do, any of that kind of big platform the CIOB, RICS ICE"* Participant 21.	+ve Structured information -ve Lacks first-hand experience and lessons.
Regulatory Related (including when in breach).	*"you have got the EA external body similar to safety [HSE] who mandate that you have to record it formally and it's shared"* Participant 20.	+ve Supported with reinforcement, everyone is engaged. -ve – May not be up to date; Does not encourage innovation and new ideas.
Non-construction Professional Service Providers.	*"we have insurance companies, they work for us as well… have a briefing and they will get that kind of people to present And the lawyers as well, and these tend to be trusted network…."* Participant 32.	+ve – Gives an opportunity for unbiased and independent view. -ve – Limited technical knowledge.

From Table 6-4 above, participants (30, 31) regarded framework-related networks to be suitable for Lf-PRF since they offer the opportunity of continuity. Nevertheless, the study contends that PBOs should consider establishing several networks for sources of lessons and opportunities for Lf-PRF. For instance, professional bodies remain a good opportunity for influencing and sharing failure lessons as it was evident that almost all the participants

were affiliated to one or more professional body[17]. Considering regulatory-related networks which come in effect in case of breach, failure ironically also initiates networks as echoed by Hod *et al.* (2018) that failure brings learners together[18]. However, such a practice or mimicry is rare within the sector due to competition as indicated by the participants (21, 22, 24, 33). Worth considering also are 'boundary spanners' regarded by Eggleton (2021) as individuals or organisations belonging to several communities who may bring new knowledge and ideas. In this regard, the study considers PBOs to leverage on professional bodies and regulatory bodies as 'boundary spanners' since they interact with most construction management professionals and organisations as indicated by Participant (3). The other form of 'boundary spanning' based on time-horizon tensions between parties is 'framing' which Stjerne *et al.* (2019, p. 353)[19] define as *"…the use of various measures that extend or shrink the time horizon of the interorganizational collaboration… in order to increase trust, knowledge sharing, and collaborative stability."* These include sharing future prospective works and establishing frameworks (as recommended by Participant 30 and 31) to work on solving common construction problems. Such practices could also be used for purposes of overcoming the challenge of temporal teams when Lf-PRF. It should be emphasized that the networks identified are not exhaustive, since it is difficult to highlight all relationships and networks of an organisation priori (DiMaggio and Powell, 1983; Inkpen and Tsang, 2005).

6.4.1 Summary and Implications

Participants' responses indicate that though PBOs interact with various actors or institutions in the process of Lf-PRF, internal learning (networks) are considered more which aligns with Newell's (2004) earlier findings. Therefore, instead of the common practice of learning being centred on a PBO or a single project, learning mechanisms or

[17] The use of the reports is mostly dependant on the affiliation of the leaders or organisations as indicated by Participant 28: *"we use some guidelines because our director is RICS and some of the senior guys are members of the royal institute of chartered surveyors. So we do get quite a lot of information from RICS".*

[18] Participant 26 also submitted that their organisation was created in response to the *"failure in housing for older or multi-generational occupants"* in the UK housing market. In response to that, their firm has been working with RIBA and the elder's council.

[19] Stjerne *et al.* (2019) also discusses 'hyping', as a form of 'boundary spanning' which involves bringing changes to routines and daily activities without disrupting continuity. This mostly involves collaborating and sharing knowledge across different project which are at different stages.

approaches should endeavour to engage the identified networks. This aligns with Engwall's (2003) reasoning that learning does not occur in a vacuum since learners are influenced by the external environment. Consequently, the study argues in favour of an 'institutional field of learning' instead of a 'C*m*P' which has been criticized on the basis that the word 'community' presents the interactions of team members as though they are cordial (Grabher, 2004; Macpherson and Clark, 2009). Yet, Stjerne *et al.* (2019, p. 344) notes that in most cases, the cross-organisational interactions when delivering projects *"are likely to be characterized by conflicting pressures and priorities, as they involve actors and organizations with different temporal understandings and temporal regularities"*. From a Neo-institutional Theory perspective the identified themes or types of networks are further summarized in Table 6-5 below.

Table 6-5 Summary of PBOs' Networks in the Process of Learning from Failure

Actors and Institutions	Isomorphic Force/Mechanism	Examples	Role
Regulative Pillar Associated.	Coercive.	Client, government, regulatory agencies; framework parties.	Provide external motivation.
Normative Pillar Associated.	Normative - Good practice, compliance.	Professional bodies, learning institutions.	Structuring and legitimizing Lf-PRF; Source of lessons
Cultural Cognitive Associated.	Mimic.	Project teams, other PBOs, supply chain members; end users.	Structure internal mechanisms, motivation; PBOs' sources of lessons.

Considering Table 6-5 above, Lf-PRF and networks for learning in the sector are mostly influenced by institutions from the Regulative pillar (the Coercive force) and the Normative pillar (Normative isomorphic force)[20]. Cultural-cognitive pillar related actors rarely influence learning since cross-organisational learning is rarely practiced due to the perceived negative influence of failure on PBOs and competition. As much as participants encourage 'everyone' to Lf-PRF', the most referred to group of learners is mostly 'project

[20] This is evidenced by Participants 3 and 20 who note that PBOs learn more from health and safety-related failures due to enforcement by the HSE which also aligns with earlier findings by Baker *et al.* (2018).

team members' with emphasis on a project a manager. The client remains involved only by means of providing feedback on the project team members' performance. Thus, key actors are encouraged to build and sustain the identified networks at both organisational and sectoral levels. See also Yin and Jamali (2021) who discuss competing institutions among organisations and contend that such organisations should 'collaborate' or 'collide'[21].

6.5 MECHANISMS, TOOLS, AND PRACTICES FOR LEARNING FROM FAILURES

To get a better understanding of practices within PBOs on Lf-PRF, mainly centred around the collection and sharing of failure information, participants were asked the following questions: ***"Are there any templates or documents within your organisation that are used for purposes of recording project-related failures within your organization?"***

Participants referred to several documents such as 'lessons learnt trackers' (Participant 27, 28) 'project reviews' (Participant 22, 27) 'lessons learnt logs', 'project closure documents', 'clients' feedback logs' (Participant 28), 'post implementation reviews'. 'Defects and snag lists' were also cited by Participant 25 while Participant 23 referred to 'defects notices' and 'quality alerts'. Participant 20 also highlighted several templates for purposes of recording different forms of failures[22] with a bias towards collecting 'quality' and 'health and safety-related' failures: *"…safety observations, quality observations, environmental incidents".* Participant 34 indicated that besides using documents, BIMx, which cuts on travel time since files can be shared digitally, is used to identify 'issues', capture, share and store project information. Participant 24 in contrast submitted that they do not have specific documents or templates for recording failures, instead they hold meetings to review the project and rely on meetings' minutes. Equally, Participant 26 indicated that due to the small size of their organisation (1 – 49 employees), mostly these

[21] Sub-institutions within a PBOs should equally be encouraged to collaborate and avoid colliding. This can be appreciated from Participant 2 who notes that they learn at the organisational level (involving non-project members and project team members) and the project level (project team members). The organisational level is further divided based on the operatives and senior management (taught by professional coaches and mainly focused on behaviour and psychology) while operatives' training is focused on skilling them.

[22] Interestingly, Participant 20 observed that *"for collecting anything to do with money or delay it's a lot harder, it's really up to individuals to be able to capture that*" since cost overruns can only be observed after a period.

are discussed in the board meetings and shared as minutes. Participant 28 reasoned that failures are recorded or shared depending on their duration and impact on a project with emphasis on who is affected[23]. Larger companies are also viewed as having more outlined mechanism compared to smaller companies. This illustrates how the company size influences Lf-PRF. Table 6-6 below gives a summary of some of the documents associated with Lf-PRF used during the life cycle of a project.

Table 6-6 Documents Used for Recording and Sharing Failure Information

Level	Start	Construction	Completion
Project Level	Risk register	lessons learnt tracker; defects notice and quality alerts; safety observations, quality observations, environmental incidents	meetings' minutes; project closure document; Defects and snag lists; post implementation reviews.
PBO Level			Lessons learnt; project report
Sectoral Level			

Table 6-6 above highlights how learning is focused on PBOs and post completion since the documents associated with Lf-PRF are concentrated at the project level. With no documents being produced at sectoral level, this shows a lack of sharing of failure information across PBOs.

Participants were also asked on whether they have specific roles assigned for purposes of Lf-PRF: ***"Are roles and functions clearly identified regarding learning from project-related failures within your organization? If so, give examples".***

Except for health and safety-related failures which have robust reporting systems, the recording and sharing of failures is not assigned to any specific individual (Participant 20, 24 and 33). Nevertheless, even when no specific roles and functions are defined, it is still

[23] This is evidenced by Participant 28: *"the contract is going to say how best to fix that failure isn't it. But if it impacts our job or other sectors or our business, obviously it still gets logged in and best way to sort it out on future projects"*. Thus, the 'whoever is affected to fix it and learn from it' approach should not be encouraged.

expected or implied that those leaders involved in the delivery process, share the failures as observed by Participant 28. In contrast, Participant 20 notes that in most cases, this is left as 'a responsibility for everyone' which leads to failures not being recorded or shared because individuals may think that the other person will take care of it[24]. For purposes of better identification of failures, Participant 20 recommends that instead of leaving that task to only one person, who may find it challenging to identify failures, everyone should be involved. The reasons advanced for not having specific individuals tasked to manage the process of Lf-PRF include organisation size (1 – 49 employees and mediums size, 50 – 249 employees); the nature of failure, and; pressure to move to the next task (Participant 26, 27, 33). Consequently, PBOs resort to informal ways of managing failure without proper documentation. For instance, to reduce costs, quicken the process and lessen the pressure on those involved in the 'failure', Participant 33 favours having informal discussions[25].

6.5.1 Summary and Implications

Similar with findings from the first-round interviews, Lf-PRF is mostly considered as an event instead of it being a process. This is mostly done via monthly meetings and project review meetings. At individual level, team members engage in activities such as keeping a personal diary or reflection (Participant 26), attending training events (workshops, seminars) and informal chats to save on time (Participants 33)[26]. The study further establishes that several types of documents are used for purpose of recording incidents on site. These documents range from standard word documents, meeting minutes to online portals such as share point and live spreadsheet (Participant 23; 24). Mostly, the content include *"what was the project, what happened [what was the failure], what could we do to learn"* (Participant 27). Roles are not clearly outlined, instead it is implied that

[24] Participant 20 further reasoned that *"by sort of lumping it in with everybody's responsibility, it also at some the same time becomes nobody's responsibility".*

[25] Participant 33 elaborates that "*, it was an informal thing because, I don't think we are big enough an organisation to do things formal, we like to do things quickly in doing so, if you start putting things on a formal footing, I don't think you can do things quickly, I don't think you can react to things as quickly. So that's why we don't*".

[26] Though templates, including other practices such as, reports emails and alerts, are used for purpose learning from failure, Participant 29 reasons that they are not companywide. Instead, they are used within teams which demonstrates a siloed approach to learning internally.

those involved should be able to report failures. For, effective capturing of lessons, it is important to have specific individual(s) responsible for facilitating the engagement of others in the process of Lf-PRF. Such an individual or team would assist project team members who are busy with 'completing the present task' or moving to a new project. Table 6-7 below suggests some roles to be performed by those overseeing the process of Lf-PRF.

Table 6-7 Responsibilities and Roles of the Learning from Failure Team

Responsibilities	Participants' Response(s)	Opportunity
Manage Documents.	*"…like lessons learnt documents are owned by someone on each job so, that person's role is to manage that document and review monthly"* Participant 28.	**+ve -** Not biased -**ve** – Lacks first-hand information on failures.
Coordinate internal and cross project learning.	*"would see to it… all new projects… or in projects there are meetings, these are all cascaded down the chain"* Participant 28.	**+ve** – Assists with breaking the silos by moving across projects, Act as a Boundary Spanner. **-ve** – Lacks first-hand information or experience on the failure.
Offer after care services to clients/external actors.	*"take note of any concerns that the client may have that something has not worked right… will collect all that and set in live spreadsheets which is there for everyone to see in our portal"* Participant 24.	**+ve** – Undivided attention; enables continuity; opportunity to collect data on performance. **-ve** – Many not have first-hand experience and information.

Regarding assigning roles, Participant 20 further elaborates that *"…it's more about having links back to probably, is there somebody in charge? Is there somebody looking at this? Is there somebody organizing periodic reviews of what's happened in the last month*[27]*".* Similarly, Participant 24 indicated that they engage an 'After Care Manager': *"…who will be over the period maybe it's the first year of the project being handed over, he would go out".* In addition, standard procedures or guidelines should be provided to team

[27] Deliberately, identification of failure is not included as a role in Table 6-7 since PBOs would benefit by engaging everyone in the failure identification process instead of engaging a single person.

members[28] involved in the process of Lf-PRF. This is supported by Participant 20 who contends that *"If you want to learn from frequent, medium, low inconsequence failures, but you implement a change to procedure every time, people will just give up because the procedure will change every two days".* This is also aligns with Scholten *et al.* (2019) who advise establishing routines to learn from non-routine events such as failures. Considering Participant 20 and findings by Sage *et al.* (2010), presence of these practices (including tools and documents) does not prove that they are used for purposes of learning from failure. Participant 20 also cautions of human biasness in report preparation which emphasize positives more than negatives: *"The problem with them [project reports] is they are self-invested in that project, appearing to be going well… the information contained within it is bias… you have got to be really aware of that if you're trying to use that data for any kind of predicting analytic or any kind of insights.… it might be completely unconscious bias… these reports get more positive towards bonus time and then after bonuses are awarded, become a little bit, maybe more honest".* Therefore, instead of introducing technological means of Lf-PRF and documenting failure, the study contends that motivation at the individual level or people-related factors are needed to encourage the capturing and inclusion failure in such documents or reports[29]. Thus, the next section discusses PBOs' response to failures.

Overall, considering participants' emphasis on the importance of 'communication' and the common practice of 'event approach' to learning (from both rounds of interviews), this supports the understanding that learning is indeed a social process as observed by other scholars (Lave and Wenger, 1991; Carmeli, 2007). Thus, for the identified mechanism and networks for Lf-PRF to succeed, it is important that communication channels are properly outlined with appropriate events put in place for exchanging lessons from failure. See Text Box 6.1 below which highlights the importance of continuous Lf-PRF via 'praxis' and 'reflection' on projects unlike the structuring of learning at the end of a project.

[28] Contrasting Participant 23 from a large firm (+250 employees) and Participant 33 (medium sized company 50 – 249 employees), the former indicated having a technical team document and sharing failure information with the latter relying on appointing individuals informally..

[29] Several documents are used across the different stages of the project and different levels of the organisations. It is recommended that a single document or lessons learnt log is set up at inception until completion so that the failures are stored in 'one place' and avoid having several documents to avoid creating extra administration responsibilities.

Text Box 6.1 When Should we Learn from Failure and What is Praxis?

The need for continuous learning instead of an 'event' approach mostly scheduled at completion cannot be overemphasized. This is evident from some participants' response: *"…that learning has to happen right at the very beginning of every project… you learn from reviewing at the end but unless you get them right at the beginning, then you exacerbate the problem and that you are not thinking about how they failed at the end"* Participant 5.

On the other hand, Participant 19 reasons that: *"One thing we see very little often, it is improving but its desperately slow, is evaluation, that's reflection on a project and that's a big barrier to learning. If you don't evaluate a project that you undertook, then you don't know whether it's a success or whether it has [failed]".*

The above responses echo the need for the sector to have a continuous process of learning instead of the typical lessons learnt meeting at the end of a project, in most instances lasting 1 or 2 hours. This is mostly influenced by the perception held by most industry actors that such activities (learning or reflection on failure) do not result in meaningful productivity. This however requires the need to redefine 'Praxis' which in most instances is related with activities or practice. Hence, this study perceives 'Praxis' as both theory/reflection and activities. With such an approach, actors will appreciate that stopping work to reflect on a failure(s) is as 'good' as working, being 'productive' or 'active'.

6.6 PBOS' RESPONSE TO FAILURE

To assess if failure influences OL, participants were asked on how they respond to failure and whether time is allocated for Lf-PRF on projects. This was also to assess whether the identified facets such as 'Policy' and 'Psychological' facets are in place to support team members' Lf-PRF. Therefore, the following question was asked: ***"How are employees supported before and when a failure occurs, or a mistake is made on a project?"***

Most participants indicated 'training' and (more) 'supervision' as responses to failure, before and after it occurs (Participant 20, 27, 28). Participant 20 for example submitted that: *"…the support before failures happened is in terms of training… it's making sure that we're putting our employees into a position that they are trained… competent, and they are supervised to do [the job rightly]".* This shows a lack of using lessons learnt from past-related projects by focusing on prevention/mitigation of failure through training. Goodman *et al.* (2011) contends that such response to failure does not amount to learning but instead regarded as 'prevention mechanisms'. Such an approach does also not offer the 'psychological safety' to team members. Instead, this puts pressure on employees who may in turn hide failures since they are trained in order to not make mistakes.

Support mechanisms are also reactive since mostly these are offered after a failure has occurred (Participant 28, 29). However, some PBOs have support mechanisms before and during or when a failure occurs such as Participants 23 and 32 (both from 249+ employees company size) who indicated that they offer counselling and a free toll call line for team members to call anonymously. Participant 28 also gave an insight of 'peer support', though it was rarely referenced, and the need to understand each employee's needs. The responses are also dependant on the company size, nature and size of failure and employees' level of experience which also highlights a contextual or situational approach to Lf-PRF (Participant 28)[30]. To appreciate superiors' support during a failure, it is worth considering Participant 33, who does not *"like the word failure"*[31]*,* and

[30] Participant 28 adds that*: "It depends on the size of that failure… if some of these failures will potentially make the company go burst…. But again if the failure is too small, how the company has dealt with previously… they will take you to training to educate you more on that particular failure".*

[31] Participant 33 suggested that instead of using the word failure, which is very limiting to persons, drags them down, does not allow them to take risks and affects their learning, Participant 33 proposed referring to failure a

recommends focusing on solving the 'problem' instead on the 'individual': *"….the individual concerned will have an idea of why it happened, and they do not need anybody else saying… why it happened when we can focus on getting the issue sorted out. And by sorting out the issue with that person, so they are part of the process of sorting the issue out, means that they will see how to get around it, how to overcome it rather than sinking into the feeling of 'I am a failure because I have not done this properly'... forget the failure, that's just the process… sort of thing happens… Let's focus on how we get around it…".* Similarly, Syed (2015) contends that this calls for the redefinition of failure which should not be viewed as means of highlighting weakness or limitations, instead failure should be perceived as a learning opportunity. Accordingly, Participant 31 as a Director echoes that *"Our part in the process is we deliver the product, with a team around us. It is encouraging the guys opening-up, look inwardly and being more pragmatic around what we could have done better".* To probe further the practice of reflecting on failure when it occurs, participants were asked the following question: ***"Does the organization you work for allocate time for reflection and discussion on failures on projects?"***

Participants indicated that time is allocated for purposes of Lf-PRF (Participant 20, 21, 22, 23, 24, 25, 30 and 31), albeit it being mostly at the end of the project. However, Participant 28 submitted that they have two ways of Lf-PRF, supported by weekly scheduled meetings: "…*we do it in two ways. Before a project kicks off… the project manager will come and run through previous failures and why they happened... but again the guys on site, toolbox talk, sort of health and safety stuff....".* Yet, this shows a siloed approach to Lf-PRF, emphasis on health and safety, with the project team members learning separately from the wider PBOs' members. In addition, even if time is allocated for learning, PBOs face the challenge of having adequate time and the right people to discuss failures as echoed by Participant 20: *"…time for lessons learned process is at the end of projects… construction is time poor. Which means that you often end up with time set aside, but the wrong people in the room... Or times set aside, but [right] people end up talking about the wrong thing".* In contrast, instead of allocating time formally, Participant 33 preferred informal chats in order to avoid discussing what is in the past and get over it

'process of learning': *"That's all failure is, it's a process of learning. You put your hand in boiling water, you, it's a process of learning you, failed that you have burnt yourself, you haven't failed really. What you have done is actually learned a process of not to put your hand in boiling water again. That's all it is and if you learn from that, then great, you know. You going to be you know you will stop hurting yourself in the future".*

quickly since it may dampen the team member's morale. Even if Participant 33 reasons that past project failures should be forgotten since they are in the past, similar failures keep recurring as indicated by Participant 32[32]. Hence, it remains important that PBOs allocate adequate time for learning from such past experiences to avoid them recurring on future projects. This aligns with Atkinson (1999) who recommends the use of hindsight in managing errors.

6.6.1 Summary and Implications

Instead of failure influencing wider learning within a PBO, the common form of response and support for team members when a failure occurs is training. Newell (2004) refers to this as 'need-based learning' approach. Such an approach does not align with OL as espoused by scholars such as Argyris (1977) and Bateson's (1972, as cited in Tosey *et al.*, 2012) who instead view learning as having corrective changes within the working environment or system and considering alternatives choices. Accordingly, Ramanujam and Goodman (2011, p. 85) contend that there is a difference between 'learning from failure' and 'failure analysis' since the former requires *"a change in the repertoire of behaviours in the entity that stems from the analysis activities".* Conversely, 'failure analysis' focuses on solutions and failure mitigation without any changes within the system. In addition, sufficient time for Lf-PRF on projects is rarely provided which also highlights failures' limited influence on OL[33]. Hence, Participant 20 contends that PBOs struggle with having the 'right people' at the 'right time' with the 'right agenda' to discuss failure. Considering cross-organisations (in case of a contract), a typical response is enforcing contractual guidelines and Lf-PRF is left for those affected or those deemed to have caused the failure as indicated by Participant 28. This may not encourage Lf-PRF since it focuses on 'who to blame'. Consequently, failures may be hidden with a dispute(s) ensuing which further hampers the process of Lf-PRF. Thus, it can be argued that the

[32] This is evidenced by Participant 32: "*You probably don't want to hear this coming from two business leaders, not much has changed… But I think it is worth pointing out that the same failings we have had, the same reasons for the failings we have had in the past are still the same as they are now".*

[33] Meetings with other PBOs, such as quality community of practice are infrequent and are mostly in response to big failures which does not allow for establishing relationships amongst actors as echoed by Participant 20 that: *"If you sit in a room with strangers… you know that you see twice a year. You're not going to have as productive working relationship and as productive a community than you would if you were meeting, every six weeks and being able to talk to people on a lot more of a personal level*

three key components of a 'triangle' for Lf-PRF are; sufficient time; right people, and; failure (having a Lf-PRF agenda). This is shown in Figure 6:1 below with an emphasis on allocating time for Lf-PRF.

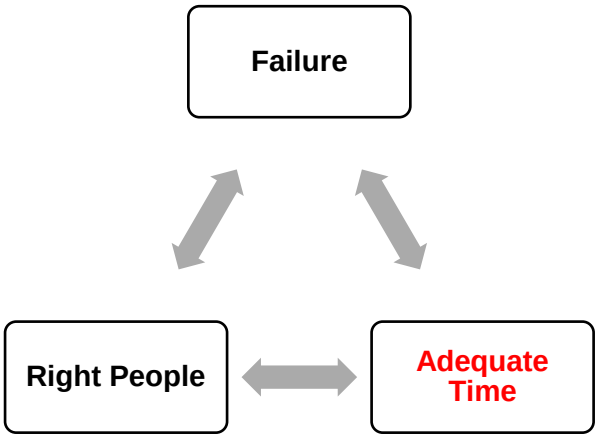

Figure 6:1 The Three Sides of a Triangle for Learning from Failure

In summary, Table 6-8 below contrasts the 'failure prevention-related responses' against 'Lf-PRF' responses to support members when a failure occurs.

Table 6-8 Response to Failure – Mitigation vs Influencing Learning

Failure Stage	Common Failure Prevention Related Measures	Recommended Learning from Failure Enabling Mechanisms
Before	Training; competent staff (Participant 28).	Whistle blowing; reassurance that these are team efforts (Participant 23; 32).
During	Blaming; training; technical support, supervision (Participant 27; 28).	Focus on the problem, its causes; sit around the table etc (Participant 21; 30).
After	New rules, systems and technology (Participant 24; 22).	Involving everyone; emotional support, counselling; review learning processes (Participant 23, 33).

Though support to team members is provided via the identified mechanisms in Table 6-8 above, Participant 20 reasons that *"I say try because I myself have not experienced whether the espoused values are the same as those experienced by those who make mistakes".* In addition, without considering wider changes within the PBO but instead opting for training of employees, as evidenced in Table 6-8 above, it can be argued that the sole cause of failure is assumed to be the 'employee' who is not adequately trained or incompetent. The focus on training also associates failure with 'poor training' by universities and institutions involved in training AEC professionals. This study therefore contends that there is 'employeeification' of failure'[34].To avoid blaming the employees, similar with Syed's (2015) recommendations, Participant 20 advises those leading PBOs' to borrow from the aviation industry's 'just culture': *"just culture… used in aviation… is really a valuable tool in learning from failure because it acknowledges failure and own it in that they are penalized in the same scale as the intention that they had, so you know if they were genuinely making a mistake, they don't get the same penalization as in if they done something deliberately malicious".*

Overall, responses show PBOs focus on 'training' and 'supervision' as a common mode of response to failure. This is unlike other studies that encourage a multifaceted approach to learning such as Madsen and Desai's (2018) population level learning and Lipshitz *et al.* (2002) five facets (structural, policy, cultural, psychological safety, and context) which have been found lacking from the responses.

6.7 DILEMMAS, DICHOTOMIES, DUALITIES AND DECOUPLING – A DISCOURSE ANALYSIS

Discourse Analysis (DA) was adopted since, unlike thematic analysis, it enables one to identify nuances and subtle information from the collected data (Yates, 2004; Saunders *et al.*, 2009). In order to limit the scope of DA, the following mid-range strategies were considered based on recommendations from Yates (2004) and Creswell (2007):

[34] 'Employeeification' of failure in this study refers to the common practice of solely focusing causes and mitigation measures of failure around an employee(s) evidenced by the common response to failure 'before' and 'after' being employee training or supervision/support.

- **Dichotomies** - Identifying and exposing the dichotomy such as public/private and establish the prevalent one.
- **Discourse and accessibility**[35] - Focused on *"who is allowed to say/write/hear/read what to/from whom, where, when and how"* (Van Dijk, 1993, p. 257);
- **Metaphors** - Interpreting metaphors which offer a rich source of multiple meanings.
- **Power and dominance**[36] - Based on Neo-institutional Theory such dominance is exhibited via normative and regulatory-related institutions.

These mid-range strategies reveal that PBOs are presented with dilemmas and dichotomies which lead to decoupling tendencies when it comes to Lf-PRF. These are outlined in the following sections.

6.7.1 Dilemmas and Dichotomies when Learning from Failures.

Several practices for Lf-PRF were identified from the exploratory data analysis which include past project reviews, lessons learnt meetings and client reviews. From a DA point of view, the following dichotomies, which also present themselves as dilemmas in the process of Lf-PRF, have been identified. These are analysed from a Neo-institutional Theory perspective of 'institutional factors' such as isomorphism, actors' profession and seniority and internal organisational-and-external demands. Further consideration is made on how these influence learning by either limiting or granting access to communicative events and documents related to Lf-PRF. Thus, based on the participants' responses, the following are some of the dilemmas faced by PBOs in their attempt to Lf-PRF:

[35] According to Van Dijk (1993, p. 256), since DA involves identifying communicative events *"the more discourse genres, contexts, participants, audience, scope, and text characteristics they (may) actively control or influence, the more powerful social groups, institutions or elites are".*

[36] Considering Van Dijk (1993, pp. 249–250), dominance is *"the exercise of social power by elites, institutions or groups…. May involve such different 'modes' of discourse – power relations… direct or overt support, enactment, representation, legitimation, denial, mitigation, or concealment of dominance among others".* For instance, the passport training within the sector gives power to training institutions. Attention will also be given to the bottom-up type of dominance in form of acceptance, compliance and resistance.

- **Continuous productivity vs stopping to reflect on failure dilemma –** When a failure occurs, PBOs are faced with the dilemma of not stalling the works (productivity orientation) or stopping the works to reflect on the failure. Of the two, PBOs tend to concentrate more on 'continuous productivity' instead of learning from the failure or reflecting upon it. This was submitted by Participant 5 who reasons that PBOs are focused on getting the job done quickly and rarely spend time to reflect, by having instead a *"head down, butt up, and crash on"* mentality. In view of this, Participants 30 and 31 contend that more can be done on a project by stopping the works and analyzing the failure.

- **Informal vs formal learning dilemma -** Participant 32 observed that formal processes of analyzing failure through the human resource department take long, are costly and dampen team members' morale. Therefore, Participant 32 favors informal approaches where a matter is dealt with quickly and everyone moves onto solving the problem. In contrast, Participant 20 reasons that taking an informal approach does not keep stock of the lessons learnt. This also raises another dilemma for leaders; 'blaming employees vs not blaming employees'. In view of this, the study agrees with Participant 31 who contends that instead of 'blaming', they prefer to hold their team members 'accountable', which reduces the blame culture.

- **Individual reflection vs collective reflection on failure**[37] **-** Participant 32 reasons that individuals know exactly when they have failed. Therefore, learning and reflection on failure should be left to individuals and there is no need of bringing up the 'issues' again since it dampens their morale (Participant16; 32). However, collective learning is encouraged by Participant 1 who argued that learning should not be centered at an individual learning on a computer alone. This may further bring to light the dilemma of having 'local vs system wide' measures in responding to failure, similar to Saunders' *et al.* (2016) findings on the challenges of analyzing uncertainty on projects.

[37] See also Saunders et al. (2016) who discuss the dilemma of 'individualism vs collectivism' in managing uncertainty on project.

- **Income generating vs non-income generating activities dilemma.** The findings reveal that PBOs are more focused on activities that generate income. For instance, Participant 19 reasons that: *"That time for reflection is really important but it's really difficult, because it doesn't pay the bills".* Consequently, PBOs focus on perceived 'income generating activities' instead of Lf-PRF even if they appreciate its importance. This highlights the fact that PBOs, like any other organisation, have internal business goals to meet (Agyabeng-Mensah *et al.*, 2021; Yin and Jamali, 2021).

- ***Present vs future orientation dilemma*** - The findings show that PBOs, and the sector at large, are more worried about their 'future tasks/existence' than their present tasks (projects). This was observed from the participants' (25, 28) desire to move onto a new project and the fear of the negative impact of failure on their competitiveness and reputation if shared openly. Consequently, failures may be hidden so that (future) businesses relationships are maintained by ending a project on a good note, in a way avoiding disputes. Participant 1 observed that: *"as we want that the client to be happy, all the players, and everybody to be happy, so usually its more that, when going out, we ensure that everybody leaves a project feeling as if it hasn't been a failure*"[38]. This aligns with the RICS' (2016) findings that construction teams want to end a project on a good note. Accordingly, to protect their reputation, PBOs engage in 'impression management' tendencies observed by Kibler *et al.* (2021) such as externalizing or not accepting the failure.

6.7.2 Dualities in Learning from Project-Related Failures

Besides the observed dilemmas, PBOs are also presented with dualities in the process of Lf-PRF. These include the following:

- ***Senior and junior staff duality -*** Participant 8 indicated that deciding who to engage is dependent on the size and scale of a failure with significant failures involving directors or the very top (senior members) such as the chief executive.

[38] Though this is aimed at meeting clients' needs and other stakeholders, this is a form of face saving which may hinder the process of learning. Hence, instead of discussing the failures, project actors may hide the failures to end the project on a good note and maintain future job opportunities.

Similarly, Participant 32 indicated that *"I don't know if just because, it might be my pay grade.. And they will be like why is that guy looking at that, it's not my project".* This also highlights the siloed nature of Lf-PRF based on job position/seniority.

- ***New and existing employees duality***[39] **-** Participant 12 reasons that: *"if you have got high standard and you have employed somebody from another… from a competitor who did not have such a high standard, that is a big barrier… the fact that they have worked with one standard and they have come to work with another company that has a higher standard, they don't know anything other than what they have learnt".* New employees in most cases may also not know or have access to documents on past project-related failures (Participant 4).

- ***Elderly and young generations duality*** - Participant 11 reasons that even at the age of 58 years old, mistakes are made, and he is not shy to share them unlike young ones who fear that they *"are going to be chucked out by your superiors".* This shows how failure is perceived differently by the young and older team members with the former being worried about the consequences such as losing their job while the later may not feel as threatened about the occurrence of the failure. In contrast, Participant 12 reasons that: *"…most people are willing to learn no matter how old you are. It is easier to influence and get through to younger people because they don't know, …they haven't been in the industry that long, they are keen to learn…".* Participant 29 also referred to 'young engineers' and 'mechanical engineers' forums which shows a siloed approach to learning.

- ***Threat and opportunity (perception of failure) duality–*** Findings also highlight the 'threat' and 'opportunity' duality where participants present sharing failure as a 'threat' to their competitiveness and at the same time offers 'opportunities' for learning. Thus, Desai (2016) contends that the conflicting understanding of failure as source of 'opportunities' and as a 'threat' for organisations acts as a barrier to learning from it. Consequently, Lf-PRF differs depending on its severity[40]. In most

[39] Participant 23 also observed the challenge of new managers in the industry and may not be aware of past failures in the industry *"New managers come on that may be coming in the industry, know nothing about that, then it's relearning again so".*

[40] Instead of viewing failure as a threat, Desai (2016) contends that failure should be regarded as a buffer against future threats.

cases, as observed earlier by Argyris (1976, 1977), the more severe the consequences (threat), the less failure is shared or learning is considered since it may be hidden or merely engage in a blame game

Evidently, Lf-PRF is socially constructed based on several factors such as actors' job position and age and organisational needs. From a DA's perspective, this aligns with social constructionism of how norms and social practices shape and structure specific knowledge or discourse (Sharp and Richardson, 2001).

6.7.3 The Underlying Influence of Institutions on PBOs' Dilemmas and Dualities when Learning Failures

The study contends that the identified dilemmas and dualities are a result of the influence of institutional factors. This is illustrated in Table 6-9 below which provides other institutional factors or practices at the PBO level that influence Lf-PRF by either granting or excluding actors from accessing or participating in the learning process. These in most instances are considered as normal practices or are taken for granted without realising that they hinder the process of Lf-PRF.

Table 6-9 Institutional Factors at PBO Level Affecting Learning from Failure

Institutional Factor	Implication	Suggested Approach
Regional Structures and Learning (Participant 5, 6, 23).	Information or lessons remain in one region.	Conducting regional monthly, quarterly meetings to share failures/lessons; Reports and bulletins shared across regions regularly.
Departmentalised learning. (Participant 4, 25, 30).	Lessons kept within departments.	Encourage cross-department learning.
Training/meetings Linked to job position (Participant 2, 23).	Information rarely reaches juniors from superiors with little or no participation in such meetings.	Include all those that may have influence; share lessons with those that may cause failure or may be impacted by the failure.
Head office vs project members (Participant 2, 24).	Lessons remain contained within the respective teams while excluding other PBO employees.	Encourage interactions via meetings and report exchange between the two.
Various Projects within a PBO (vying values among PMs) (Participant 5).	Focus is on delivering or meeting individual project's needs without considering organisational needs.	Need to align the various project leaders' vision to that of the wider PBO.
Regulations and Codes of Practice (Participant 23).	Reliance on tested practices; Limits innovation. New ideas are challenged; Failure seen as non-conformance.	Create psychological safety by accommodating reasonable and intelligent failures.
Product/Service Oriented Networks (Participant 26).	Only interacting with actors or institutions that PBOs conduct business with; creates a myopic learning approach.	Encourage cross organisational and cross professional learning; establish learning networks beyond normal business partners; Learn from industry reports and from other sectors.

Besides institutional factors at the organisational level, PBOs will also need to circumnavigate institutional factors at sectoral level summarised in Table 6-10 below. These factors may also lead to PBOs experiencing some of the highlighted dilemmas.

Table 6-10 Institutional Factors at Sectoral Level Affecting Learning from Failure

Institutional Factors	Description	Comments
Affiliation and siloed Professional Bodies (Participant 25, 27, 28).	Limited access to learning, documents and events; dependant on membership and subscription.	Cross professional body learning via workshop/conference and collaborative research.
Long procedures in reviewing failures (Participant 27).	Delays lessons to be shared.	Allow for early identification of failure by creating a blameless culture; Phased reports.
Contractual Provisions (Participant 28, 27).	Focuses on finding who to blame and fine or correct the failure; Learning is left for the erroring/blamed party; time bound relationships.	Contractual provisions to encourage equal sharing of risks; problem solving instead of witch hunt.
Procurement and Project Models (Participant 20).	Joint ventures make it difficult to replicate processes from previous ones.	Establish guidelines and governance tailored to allow continuity in learning and relationships e.g frameworks.
Legal Procedures (Participant 28; 24; 6).	Failures may lead to disputes with court proceedings which injure relationships among actors with no one allowed to share any data.	Improve dispute resolutions and consideration of alternative dispute resolution methods.

Additionally, contrasting the small to medium sized firms (1- 49 and 50 to 249 employees) and large firms (250+ employees) reveals reluctance to engage in Lf-PRF from smaller firms with the process being unstructured or informal as echoed by Participant 7: *"Being on a very small staff, it's just conversation. And if somebody wanted to go and do something, they always get to go if there is a bursary or it's free. If we need to have to pay, then actually it has to fit what we are doing or CPD needs*"[41]. This was echoed by Participant 33 who referred to their organisation not having enough personnel to be

[41] From this, it can be argued that if Lf-PRF is to be encouraged, the normative (mostly professional bodies should be involved) since regardless of company size individual professionals subscribe to professional bodies. In contrast, Participant 7 observed that the bigger the company, the less willing they are to share failure lessons which could be directly associated with the competitive nature of the industry.

assigned the task of analysing failure. The institutional factors influencing PBOs' practices for Lf-PRF (and also leading to some dualities and dilemmas) can also be related with reasons discussed earlier by Oliver (1991) namely: 'cause', 'constituents', 'content', 'control' and 'context' shown in Table 6-11 below.

Table 6-11 Institutional Factors Influencing Practices for Learning from Failure (Adapted from Oliver, 1991)

Institutional Factor	Research Question	Predictive Dimensions	Impact on PBOs Lf-PRF and Mitigation
Cause	Why is the organization being pressured to conform to institutional rules or expectations?	Legitimacy or social fitness; Efficiency or economic fitness.	Hiding failures to attain 'social fitness'; focus on economic fitness (profitability), continuous work (productivity), focused on training - **Need to view failure as an opportunity for learning.**
Constituents	Who is exerting institutional pressures on the organization?	Multiplicity of constituent demands; Dependence on institutional constituents.	Leads to hiding failures to show social worthiness (reputation) to the interconnected parties. - **Demonstrate how Lf-PRF improves and benefits the wider supply chain.**
Content	To what norms or requirements is the organization being pressured to conform?	Consistency with organizational goals; Discretionary constraints imposed on the organization.	Focus on profitability, productivity, and competitiveness – Demonstrate how Lf-PRF mitigates failures leading to efficiency and profitability in future projects.
Control	How or by what means are the institutional pressures being exerted?	Legal coercion or enforcement Voluntary diffusion of norms.	Lf-PRF remains a voluntary response, except for H & S related accidents – Legitimize Lf-PRF **Need to have external motivation such as contract clauses.**
Context	What is the environmental context within which institutional pressures are being exerted?	Environmental uncertainty Environmental interconnectedness.	Failure despised/mitigated to achieve certainty; Leads to hiding failures to show social worthiness to the interconnected parties – **Demonstrate benefits of Lf-PRF to the wider supply chain.**

6.7.4 Summary and Implications

Instead of the portrayal of Lf-PRF 'as business as usual' via meetings and lessons learnt session, the study identifies institutional dichotomies, dilemmas and dualities which also act as barriers to effective learning. In some instances, learning is accompanied by disputes especially if deaths or huge financial loses are involved (Le May and Le May, 2016). However, instead of viewing these dichotomies as barriers, these present opportunities for sources of lessons or knowledge and solutions[42]. This is line with other scholars who encourage viewing the supposedly fragmented parties as sources of knowledge (Swan *et al.*, 2002; Scarbrough *et al.*, 2004; Newell *et al.*, 2006). This entails levelling the learning ground as advised by Emmitt (2010) by reducing power structures and distance between learners.

To assist with reducing such barriers, it is worth considering Sage *et al.* (2010) who encourage using 'boundary objects', that is documents that are robust enough to be used across C*m*P to reduce issues of fragmentation. In addition, PBOs should leverage on 'boundary spanner' type of organisations which interact with several other organisations within the sector such as professional bodies and the HSE (Eggleton, 2021)[43]. However, this depends on the willingness of the actors to share their information on failures. Thus, the need to create an environment for actors to discuss failures freely remains cardinal in the endeavour of Lf-PRF. However, in an event that actors are not free to share failures, 'intellectual contortions of failure' may be the common response as highlighted in Text Box 6.2 below.

[42] The present-future dichotomy may present an opportunity of how learning from present and past failures can secure their future with improvement performance. Lessons learnt could equally make them competitive as echoed by Participant 27 that it puts them on the front foot.

[43] Therefore, from an institutional perspective, the Normative and Regulatory pillars related organisations may serve as 'boundary spanners' and produce 'boundary objects' in form of guidelines or regulations that may be used by PBOs and the sector at large.

Text Box 6.2 Intellectual Contortions – Reframing Failures.

Besides the observable physical institutional factors such as organisational structuring, 'intellectual contortions' by professionals or individuals also influence learning from failures. Syed (2015, p. 95) reasons that through 'intellectual contortions', failure is mostly reframed to suit one's convenience: *"Most failures can be given a makeover. You can latch on to any number of justifications: It was a one-off; it was a unique case; we did everything we could; you can selectively cite statistics to justify your case, while ignoring the statistics that don't. You can find new justification that did not even occur to you at the time, and which you would probably have dismissed until they – thankfully, conveniently – came to your rescue".* Such practices are similar within the construction industry e.g., referring to project complexity and size in the case of the delayed Crossrail project; having used best 'practices'; having engaged a competent and trained team etc. Thus, intellectual contortions serve as a professional way of not accepting failures or underplaying their impact by comparing with other failures which are 'huge' compared to ours which is small or one off. Consequently, to avoid biasness, Syed encourages involving external parties when analysing failures

With such an approach of self-justification, Syed contends that learning from failure is not possible since such tendencies remove the 'sting' from the mistake or failures. Thus, the need to accept failure cannot be over emphasized as echoed by Syed (2015, p. 94) *"…progress in most human activities depends, in large part, on our willingness to learn from failure. If we edit out failure, if we reframe our mistakes, we are effectively destroying one of the most precious learning opportunity that exists".*

6.8 DECOUPLING TENDANCIES IN RESPONSE TO INSTITUTIONAL FORCES.

Though participants indicated engaging in Lf-PRF via past project reviews, much of these activities are done as a form of conforming to project or industry practices without primarily focusing on picking lessons. From a Neo-Institutional theory perspective, this is considered as 'decoupling[44]'. This can be observed from Participant 18 who indicated that: *"…we have reviews more less like monthly reviews, we have to go through them ticking boxes saying how are the financials of the project going on? And there is quarterly ones essentially… at least there is the monthly ones that you have to login and type the review and put a couple of notes saying how the project is going".* This highlights how such learning practices merely serve as means of identifying failures, mostly in form of finances, quality and health and safety checks to show conformity in the eyes of the HSE, instead of learning from failures. Evidently, Participant 3 observes that: *"…there is a system that is variously called Safety Observation Reporting, Safety Incident Reporting across the industry…. Most construction organisations record safety-related incidents whether it's a near miss or whether it's an accident, they record that. But… I don't know if they have made that connection yet of learning from them. So, they have got deliberate intentions perhaps to encourage learning from failure but possibly not actualised yet".* Participant 2 also echoed that projects do not reflect a true picture of what really was experienced in order to create a marketing intention.

Therefore, it may be argued that failure rarely influences learning within PBOs, instead, systems for Lf-PRF are setup to show 'conformity to good practice' or collect failure information, mostly related to health and safety. This demonstrates how PBOs engage in tendencies of 'decoupling' in order to show conformity due to the influence of Coercive and Normative isomorphic forces via the strict system of inspection and enforcement by the HSE (Boxenbaum and Jonsson, 2008)[45]. In addition, faced with the need to show 'conformity' and the dilemmas of 'profitability vs learning' and 'threat vs

[44] According to Tolbert and Zucker (2012) decoupling is when structures and activities in an organisation are done for presentation purposes without serving the intended purpose. Such activities do not have normative and regulative support. Organisations that exhibit decoupling in most instances avoid scrutiny or control the scrutiny process (Boxenbaum and Jonsson, 2008.).

[45] Evidently, Participant 25 adds that: *"So yes they do subscribe and what they have done with the professional bodies is like they encourage and they pay for one's membership, an employee say who belongs to the associate of project managers or the RICS, etcetera and there is a big drive for all employees in the delivery division, well the construction division to make sure they attain chartership of these organisations".*

opportunity/competitiveness', PBOs may rather spend time and resources on training their staff in industry mandated training to show conformity instead of engaging in Lf-PRF. In such circumstances failures may be hidden in order not to expose 'non-conformity'.

6.8.1 Summary and Implications

Reviewing participants' responses from a DA's perspective shows how it is 'business-as-usual' after a failure has occurred via lessons learnt meetings accompanied with decoupling tendencies. This is by responding to external institutional needs and pressures such as reputation (social worthiness) and commercial viability. Networking or interactions with other PBOs are for purposes of prospecting future works instead of Lf-PRF[46].

To better understand decoupling tendencies, the study agrees with Oliver's (1991) observation that organisational behaviour is influenced by the external context and internal organisational motives as shown in Table 6-12 below.

[46] Participant 33 further reasons that: *"the networks are what I would term as, networking events. I suppose it's more for marketing".* This further highlights decoupling via the focus on future work opportunities instead of on learning from failure.

Table 6-12 Institutional Factors' Influence on PBO's Behaviour Towards Learning from Failure (Adapted from Oliver, 1991).

Explanatory Factor	Convergent Assumptions	Institutional Perspective	Implication on Learning from Failure.
Context of Organisational Behavior	Organizational choice is constrained by multiple external pressures. Organizational environments are collective and interconnected. Organizational survival depends on responsiveness to external demands and expectations Organizations Organizations seek stability and predictability.	Institutional environment Nonchoice behavior. Conforming to collective norms and beliefs. Invisible pressures. Isomorphism, Adherence to rules and norms. Organizational persistence. Habit and convention.	Learning focused on good practice. Decoupling schemes towards learning (Participant 6) Hide failures to show conformity. Hide failures to show conformity (Participant 3). Failure is unwelcome, focused on project management tools (planning, risk management) and less on learning from failure (Participant 1).
Motives of Organizational Behavior	Organizations seek legitimacy. Organizations are interest driven.	Social worthiness. Conformity to external criteria Interests institutionally defined; Compliance self-serving.	Hide failures; No tolerance of failures; decoupling mechanism (Participant 6; . Non acceptance of failure; facing serving measures; focusing on income generating activities/profitability (Participant 9; 10 and 18).

Thus, PBOs surrounded by factors in Table 6-12 above develop strategic responses to failure which can be associated with Oliver's (1991) findings as follows:

a) Acquiescence – Includes tactics such as 'habits', 'imitate' and 'comply' exhibited through the mimic of professional membership for employees, and establishing systems for capturing failures. Mostly, the focus is on health and safety accidents reporting, with less consideration for Lf-PRF.

b) Avoidance – Exhibited through tactics such as 'buffer' and 'concealment'. These could be observed from the concealment or disguising of non-conformity[47] by participants not willing to share failures and focusing on failure mitigation instead of Lf-PRF.

Such responses are influenced by the understanding that failure threatens their legitimacy or social worthiness by affecting their competitiveness. In addition, stopping works on a project to analyse failure or learn from it equally threatens their organisational interests of productivity and profitability. In trying to balance the two pressures, PBOs succumb to decoupling tendencies by appearing to adopt mechanisms for Lf-PRF which are not implemented for that very purpose[48]. This is illustrated in Figure 6:2 below.

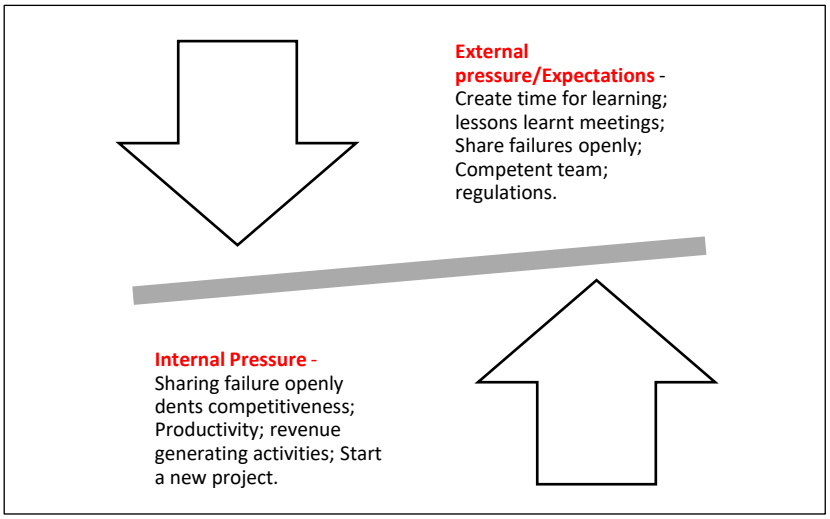

Figure 6:2 External and Internal Pressures on PBOs leading to Decoupling

[47] Oliver (1991) notes that disguising non-conformity involves 'window dressing' and ceremonial pretences, which can also be associated to decoupling, without having tangible influence on Lf-PRF.

[48] Participant 28 indicated that "*…outside the organisation, we are guided by the… subcontract documents… these are third party documents, we are guided by those terms and conditions on how best to deal with it [failure]… regarding who owns that failure at a time… that's the reason contracts come in.. if it's, the subcontractor owns that risk, for example, obviously there is a procedure within the contract documents on how to sort it. If it's a client risk, it's a client's failure… we are guided by that contract".*

Accordingly, if Lf-PRF is to be encouraged, attention should be given to PBOs' internal motives and how they are impacted negatively by failure. This further requires demonstrating how Lf-PRF may enable a PBO achieve its internal 'organisational interests' and 'legitimacy' or 'social worthiness'.

6.9 ENHANCING LEARNING FROM PROJECT-RELATED FAILURES

In order to contribute to the growing need of Lf-PRF, the following question was asked: ***"Do you have any suggestions that may improve the process of learning from project-related failures?"***

In response, Participant 3 indicated that *"they have to get their own cultures and behaviours in place first… getting the correct attitude to ownership and acceptance of failure".* Participant 5 reasons that: *"it's very much about value and understanding that… a job can go well if it is stopped".* Participants also encouraged creating a transparent, open, and blameless system (Participant 6, 7, 8). Accordingly, Participant 18 reasons that a blameless culture is important to allow team members to feel safe and free to share their failures[49]. Therefore, Participant 30 and 31 both indicated that they discourage the word 'blame' and instead use the word 'accountable'. Collaboration, being proactive and learning from other sectors such as manufacturing were also suggested (Participant 6, 14). Similarly, Baum and Oliver (1991) earlier advised firms to develop institutional linkages to reduce organisational death (failure).

However, responses encouraging actors 'not to hold back failure information' highlight the existence of fear of talking about failures at individual and organisational levels. For instance, Participants (6, 17, 18 and 31) encouraged junior team members to talk openly (raise their hand) before a project fails instead of holding back. Correspondingly, senior managers are encouraged to be approachable and give timely feedback (Participant 20). At organisational level, Participants 6 and 31 equally encourage contractors to be open

[49] An example of openness is Participant 1 who indicated that: *"it's quite nice to kind of just talk to each other and ensure that when we don't, nobody in the organisation wears headphones, so everybody is listening to conversations on the telephone and if you talk to other colleagues everybody is listening".*

when they notice signs of failing. PBOs should therefore endeavour to create a conducive environment for sharing of failures and associated lessons through the psychological safety facet as echoed by Participant 33[50]: *"Having open dialogue with people and saying… things don't go according to plan sometimes but it's going to happen… There will be a rocky road sometimes, focus on where we need to be and then let's deal with those hurdles that come our way as a team".* Therefore, Participant 4 suggests a 'teams' or 'collective' responsibility approach to failure*: "…if you approach everything as a team, and if there is a failure you say we have to learn as a team. You will find everyone comes on board and there is so much contribution and things go smoothly".* Participants 1 and 20 encourage formalized processes of Lf-PRF since in informal learning approaches, it is difficulty to structure the learning process and content. Similarly, other scholars contend that it is difficult to keep track of what has been learnt in informal approaches (Lukic *et al.,* 2012; Savelsbergh *et al.,* 2016) [51]. This also highlights the need to have Normative-related institutions such as professional bodies to structure the content and give legitimacy to the process of Lf-PRF (DiMaggio and Powell, 1983).

In contrast, Participant 33 suggests using informal processes since they are quicker and avoid making employees feeling bad. This highlights two issues regarding formal processes of handling failure. Firstly, the long process of investigation, and sometimes accompanied by disputes which PBOs may want to avoid by discussing failure informally. The assumption is also that big PBOs have sufficient resources to commit to resolving failures compared to small PBOs. Secondly, formal approaches seem to focus on identifying who to blame instead of resolving the problem. Therefore, Participant 33 suggests self-reflection or an individual perspective. Though the informal approach may be faster and cheaper, it remains limited realising the multifaceted and complex nature of failure and the process of Lf-PRF. A summary of themes arising from responses on how to enhance Lf-PRF are given in Table 6-13 below.

[50] To assist with that, Participant 33 further suggested not to use the term 'failure: *"… again not calling them failures calling them something else, calling them learning process*".

[51] Based on that, this study is focused on the formal approach. However, it is important to appreciate benefits of the informal processes by being faster. Hence, informal principles such as self-evaluation by individuals as suggested by Participant 33 should be included in the formal process and avoid the negative practices in the formal process such as finger pointing or blaming by focusing on the problem and not the individual.

Table 6-13 Enhancing Learning from Failure - Summary of Factors to Consider

Theme	Participants' Responses
Human Resource Practices.	*"…because they [team members] were recruited in a rush, the level of quality of information that is produced is not always great"* Participant 2.
Technological Tools.	*"by using BIMx you can actually identify an issue that is on site, ping it to the office immediately..., it's a way that you are cutting out the time lose…. they [failures] can be highlighted, it can be discussed, it can be shared and everybody is very much aware where the issue is"* Participant 34.
Defining and Measuring Failure.	*"Define what you want to measure for starters… it's very hard if not measuring against something real, you are never comparing apples with apples" Participant 32.*
Involve Multi-Professionals and Institutions.	*"it's really dangerous to concentrate just on your expertise, I think you have to open that up to everybody within your team"* Participant 1.
Reviewing the Clients' Role and Influence on Lf-PRF.	*"…clients get what they want, and if they want an industry that's going to be very inefficient and fighting each other, they don't understand that, that they are composing that"* Participant 5.
Management and Leadership Involvement.	*"…the leaders of the project, the leaders of the office as a whole in terms of leading out… It needs to go to the top… and then top to down"* Participant 19.
Effective Communication.	"…. *if you don't have effective communication, within the organisation then definitely, there is no proper flow of information"* Participant 31.
Learning from both 'Failure' and 'Success'.	*"when you take the good and the bad you come up with good processes"* Participant 22.
Cross-organisational Learning and Collaboration.	*"needs to be more about how collaboration is managed and how knowledge is shared, and the culture on a project, moving away from, we produce deliverables towards we produce a landscape of information that everyone uses"* Participant 2.
External Influence and Contractual Motivation.	*"In terms of a contractor who is constructing a building... he is given the role of how to identify and how to correct defects or failures, how to escalate them to the project manager so that they are aware and there is a process of resolving it"* Participant 25.

Considering the recommendation to engage 'external organisations' in Table 6-13 above, from a Neo-Institutional theory perspective, this highlights the influence of isomorphic forces (coercive and normative) and the key role that a client (and PBOs' external environment) may play in Lf-PRF. Clients should offer contractors a safety net or tolerance for Lf-PRF and making 'intelligent failures' as advised by Cannon and Edmondson (2005).

Though several factors for consideration are given in Table 6-13 above, the foundation of learning, which was also repeatedly cited by participants (from both the first and second round interviews), is 'communication'. As echoed by scholars, learning is a social process since individuals learn by interacting with others (Lave and Wenger, 1991; Duffield and Whitty, 2015). Accordingly, Participant 28 suggests improved record keeping, which also becomes handy in solving disputes. Worth emphasizing is that the identified themes are not exhaustive[52]. For instance, other modes of learning such as apprenticeships are encouraged by Participant 19 which aligns with Situated Learning were learners join a community and are mentored (Lave and Wenger, 1991). Hence, in line with social constructionism, it is evident that PBOs (may) employ several mechanisms for Lf-PRF. This may also depend on the size and nature of the organisation, project, and failure.

6.9.1 Outlier Themes – The 10Cs Approach

From a conceptual framework point of view, the study proposes establishing facets and learning mechanisms (tools) as discussed earlier. However, after analysing the responses the findings highlight outlier themes, 'the 10Cs', which are equally important in the process of Lf-PRF shown in Table 6-14 below.

[52] The identified themes are not exhaustive, for instance equal risks sharing remains cardinal in encourage Lf-PRF as observed by Participant 8: *"The client will do everything to shove the risk down to the contractual chain, and main contractor will take it and shove it down the contractual chain, and they will shove it on the designers, and you know…. the distribution of risks is a very important factor".*

Table 6-14 Outlier Themes based on the Findings - The 10Cs For Lf-PRF

Theme	Driving Factors	PBOs' Action
Communication (Participant 8, 9 15)	Learning is a social process; interaction with others (individuals and PBOs); involves exchange of data.	Clarity in documenting failures; encourage feedback between superiors and juniors.
Change management (Participant 8)	Project delivery involves change; Equally failures initiate change.	Leadership support and assurance through resources and emotional support.
Commitment (Participant 13, 19, 30)	From leaders in form of allocating resources.	Support in form of budget allocation.
Continuous Process	It's not an event but a process.	Think of learning and unlearning.
Common sense (Participant 9)	Lf-PRF definition cannot be standardized.	Be tolerant to new ideas; allow teams to make intelligent failures.
Commercial viability (Participant 11; 15)	PBOs are profit oriented; competition.	Show how learning from failure reduces future failures.
Cost	Learning from failure requires resources, e.g. time, venue/space.	Budgeting and resources allocation for learning from failure; contractual agreements.
Conflicts (Participant 5, 18)	Failures in some cases are accompanied by conflicts.	Consider alternative dispute that are fast and less hostile.
Competition (Participant 2, 15)	Limited jobs and resources (people and time to engage).	Illustrate how learning from failure benefits the wider supply chain.
Complexity (Participant 8, 19, 30)	Nature of failure and learning; projects and PBOs increasing in size and complexity.	Failure identification: Use of technology to process, store and share information on failure.

The outlier themes in Table 6-14 above also highlight the complexity of Lf-PRF which requires consideration of a number of factors. Thus, Love *et al.* (2011) note that organisations are always in a struggle of reconciling competing goals such as profitability and complete documentation. In addition, responses indicate that failure may also be

accompanied by chaos and disputes/conflicts[53] (Participant 21). Accordingly, other non-construction related institutions such as courts, insurance firms must be incorporated (Participants 21, 24 and 27). Therefore, besides establishing the identified facets within an organisation, PBOs should ensure that they address factors identified under the 10Cs such as effective communication, change-and conflict- management systems. Conversely, the identified themes and facets should also serve as a way of managing the outlier themes. For instance, considering the technological facet, Participants 21 and 27 suggested the use of a central data system for collecting information on failure on public projects in form of multimedia and online format for easily accessing and searching the content. Artificial intelligence and machine learning were also cited as technological tools to assist with Lf-PRF (Participant 2, 20, 32). This aligns with other scholars who encourage the use of artificial intelligence and deep learning when learning from health and safety accidents (Baker *et al.*, 2019b, 2019a).

6.9.2 Section Summary and Implications

Means of enhancing the process of Lf-PRF remain varied and unstandardised. This is influenced by many factors such as the nature and impact of the failure, company size and type of leadership. The findings also demonstrate that the process of Lf-PRF involves several participants, ranging from individual actors to institutions such as PBOs, professional bodies, regulatory bodies, and client-related organisations. Correspondingly if PBOs within the sector are to improve the process of Lf-PRF, it is inevitable that efforts are applied evenly at each level (individual level, project level, organisational level, and the sector level). Primarily, this is hinged on allocating specific time for Lf-PRF and having a blameless culture as observed by Participant 29. The need to define 'failure' for purposes of learning from it cannot be over emphasized. Apart from failure being ambiguous, several terms used in construction project management are subjective and need to be clarified (Zwikael and Meredith, 2018). For instance, Participant 19 suggests understanding the 'end of a contract': *"…if you define the end of contract... as when it's handed back, you will have very different perception of what would be success or failure".*

[53] It suffices to say that learning from failure is accompanied with disputes, therefore, there is a need for project leaders and those involved to manage such disputes for the benefit of collecting lessons from such occurrences to avoid them being repeated.

Importantly, PBOs need to identify actors and outline formal processes and guidelines of identifying failures and learning from them[54]. For instance, Participant 2 indicated that: *"we have got the project DNA which consists of roles and responsibilities… the brief, employers information requirements, the programme, the cost plan… that sets out the ground rules of a project… we have processes and standards we keep central to the business. When we encounter an issue [failure], we try to mitigate that next time".* Realising the different approaches suggested and in agreement with Participant 2, the 'DNA' for Lf-PRF for PBOs has been narrowed down to the identified 8 facets[55] which should also be supported by the institutional pillars or Neo-institutional theory's isomorphic forces. This is illustrated in Figure 6:3 below which is based on the three stages of coding: open coding, axial coding and selective coding as discussed by Yates (2004). The two levels (sectoral and project levels) identified in Figure 6:3 below are discussed further in Chapter 7, the model development chapter.

[54] Participant 22 advises that *: "This should be made… as a formal part of your normal project management in projects because it's not everything that's going to go as per plan…. maybe you can even align it to the RIBA plan of work… at each stage, did we do everything that we planned to do?*

[55] The five facets for learning are based on Lipshitz *et al.* (2002) who identified the structural facet, cultural facet, psychological facet, policy facet and contextual facet as key factors for learning. For this study and based on the data collected three facets, technological, governance 'the Nth Facet' have been added.

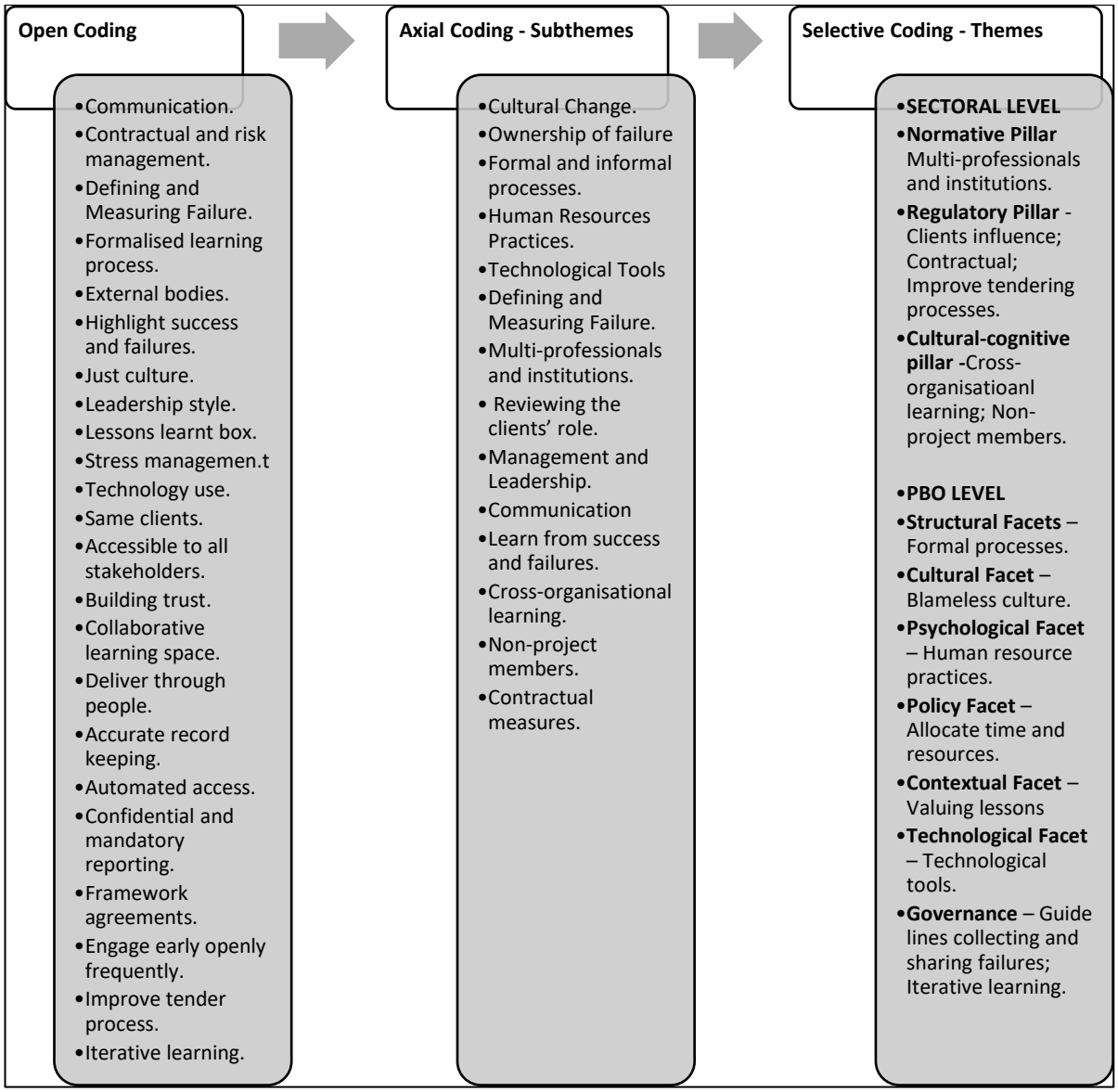

Figure 6:3 Themes Towards Developing a Model and Framework

6.10 TRIANGULATION IN VIEW OF ISOMORPHIC FORCES – INTERVIEWS AND DOCUMENTS ANALYSIS FINDINGS.

According to Denscombe (2010) data triangulation assists in the validation process and drawing of conclusions. Therefore, a comparison was made between the findings from the interviews and the documents used in the document analysis. See Chapter 3 and Appendix 7 for the criteria used to select the 36 reports used in document analysis and details respectively. The comparison of the two (interviews and document analysis)

primarily focused on Neo-institutional theory's isomorphic forces. This is because the study's conceptual framework and overall findings echo the need to pay attention to the wider sector and the external environment's influence on actors' behaviour towards Lf-PRF. Secondly, the study adopted sociological Neo-institutional Theory which supports isomorphism.

The findings from both (interviews and document analysis) support the influence of institutional pillars (through isomorphic forces) on OL and Lf-PRF[56] as shown in Table 6-15 below. Thus, it is argued that due to isomorphism, single PBOs do not share or learn from failures since other PBOs do not do so based on the following reasons or perceptions held by participants regarding Lf-PRF. Firstly, Lf-PRF is perceived as a non-revenue generating activity. Secondly, sharing failure-related information openly impacts any PBO's competitiveness negatively. Essentially, PBOs mimic each other's lack of Lf-PRF (and sharing failures) based on the perceived negative impact of failure on their competitiveness. From the study's philosophical positioning (interpretivism), findings from both the interviews and the documents confirm that there is no one agreed definition of failure and learning amongst PBOs. Similarly mechanisms for Lf-PRF vary among PBOs and range from individual learning to collective learning which mostly involve internal teams (or organisational members) while cross organisational learning is rarely practiced. In addition, both findings from the reports highlight a lack of Lf-PRF[57] and decoupling tendencies.

[56] PBOs aligning learning with good practice (and institutional pillars) instead of considering lessons from past failure was echoed by Participant 19: "And the main way of sort trying to prevent project failure is through training, trying to encourage everyone to get a qualification from the association of project management etcetera to share best practice on developing and delivering projects".

[57] The RICS (2019, p. 3) equally wondered on the number of projects that are completed without taking note of what went wrong and went right; *"how many projects are completed without taking stock of what worked and what did not? How many risk registers are 'seeded' with reference to lessons learned from previous projects?".*

Table 6-15 Isomorphic Forces and Learning from Failure Findings Triangulation.

Isomorphic Force	Examples	Archival Documents (Reports)	Participants' Response	Implication on learning from failure	Suggested Perception
Coercive[58]	Regulations, standards, contractual conditions.	*"Regulatory compliance conforming to a rule, such as a specification, policy, regulation, standard, or law. Contractual compliance"* (CIOB, 2019, p. 17).	Influence of the HSE on H&S conformance (Participants 20 and 25).	Failure is despised and associated with being incompetent or non-conformance.	Focus on the problem and not the individuals involved – Appreciate that there are other reasons why a project may fail.
Normative	Using tested methods and tools; good practice; PM methodologies.	*"Good practice project management tools, methods and techniques are applied"* (APM, 2014, p. 5).	*"it will be hidden in the whether we follow the bodies advice on their bodies guidelines and an accreditation for other processes"* (Participant 20).	Creates an environment which does not allow for testing new ideas; focused on good practice and despises failure.	Consider failure as an opportunity to develop and test other (new) tools and standards.
Mimic	Lack of sharing failure lessons and adopting good practice.	Quality and continuous improvement activities and community of practice (CIOB 2019).	*"in the construction industry, learning from failure tends to come under the guise of continuous improvement"* (Participant 20).	Failures are hidden, the sector is denied opportunities of learning from others.	Sharing failures improves the wider supply chain.

[58] According to the CIOB (2019, p. 17) *"Health and safety in UK construction has benefited greatly from the regulatory/compliance nature of the Construction Design and Management (CDM) Regulations, with a legal requirement subject to punishment by fine / penalty".*

Though Table 6-15 demonstrates some form of congruency or agreement from the interview and document findings, it is also worth highlighting some contradictions between the two sources of data. For instance, comparing findings from the document analysis, the APM (2014) report encourages using 'tested methods' while the CIOB's (2019, p. 11) report encourages PBOs to *"Innovate and delight customers by exceeding their expectations".* Yet again, within the CIOB's (2019) code of quality management report, standards are provided which PBOs should adhere to. This leads contractors to fear failure and engage less in new innovative ways of project delivery by opting for known methods or provided standards. Essentially, professional bodies such as APM, as echoed by other scholars (Cicmil et al., 2006, 2009; Hodgson and Cicmil, 2006) are focused on using standardised methods, whilst construction teams through organisations such as the CIOB (2019) are being encouraged to be innovative.

Overall, Table 6-15 above demonstrates the influence of the external environment[59], via the isomorphic forces, in limiting innovation and Lf-PRF since PBOs follow stipulated guidelines, standard practice(s) or tested methods. Therefore, instead of waiting for regulations to be revisited after experiencing failure which may lead to loss of life and damage to property, PBOs should be encouraged to Lf-PRF. Additionally, reasonable tolerance of 'intelligent failures' should be given for PBOs to try out new practices instead of being bound with 'tested methods' or 'good practice'.

6.11 DISCUSSION AND DATA ANALYSIS CHAPTER SUMMARY

From a historical point of view, Lf-PRF within the sector has been gaining attention. However, PBOs and the sector at large still face several challenges in their attempt to Lf-PRF with the lack of 'failure ownership' being one of the major barriers (Cannon and Edmondson, 2001, 2005; Baker *et al.*, 2018). Such findings give an indication of a lack of psychological safety amongst actors, who feel they are not 'free' to share failures or accept them due to the fear of losing one's job or damaging their PBO's competitiveness. These barriers may further be associated with the individual, project, PBO and sectoral

[59] The need to take a sector wide approach to learning and mitigating failures can be appreciated from the CIOB's (2021, p.) argument: *"The cost of failure can be high if a construction project goes wrong and it can have serious consequences with business interruption. Loss of reputation helps nobody".*

levels. Accordingly, it can be argued that mechanisms for overcoming the identified barriers should cover the very levels; sectoral, organisational, project (organisational culture and collaboration), and; the individual level such as managing emotions during failure (Shepherd *et al.*, 2014; Stefano *et al.*, 2014; Desai *et al.,* 2018; Madsen and Desai, 2018). This is unlike the customary practice of using lessons learnt meetings which are inadequate to surmount most of the barriers[60]. Essentially, a multilevel approach is encouraged based on participants' recommendation of engaging several actors. This is because using multiple levels and lenses/actors improves failure identification, problem analysis and offers multiple sources of lessons and solutions (Madsen and Desai, 2018; Kortantamer *et al.*, 2021).

However, instead of engaging 'everyone' as per the respondents' recommendation, the findings show a tendency of 'employeeification' of failure within the sector by PBOs. This is evidenced by blaming employees for the failures and the common reference to 'employee training' as the common response to failure. Such responses do not align with Argyris' (1976; 1977) view of learning which should instead result in system-wide changes. Besides the organisational challenges, there exists 'sectoral challenges' such as competition and low-profit margins. Hence, taking a reductionist approach to managing failures via training of team members does not sufficiently address all the barriers to Lf-PRF. Therefore, worth considering are scholars such as Dekker (2011) who advocate for an 'organisational wide view' of the causes and perception of failure instead of 'proximal' causes since P*r*F may be caused by several factors. These may include inadequate leadership, complacency, poor communication, and cognitive limitations among humans.

To achieve an organizational view/wide or approach to Lf-PRF, the study builds upon Lipshitz *et al.* (2002) multifaceted approach (five facets) instead of focusing on the common structural mechanisms (guidelines, lessons learnt reports and post action reviews) and cultural mechanisms. Lipshitz *et al.* (2002) original facets include the Structural-; Cultural-; Contextual-, Psychological-; and Policy-facets. As discussed

[60] See Cannon and Edmondson (2005) who identify several barriers to learning but summed up into technological and social-economic related.

previously, based on the present findings, this study contributes three additional facets, these being ‘Technological facet’, ‘Governance facet’ and ‘Nth facet’.

Findings further indicate that PBOs do not exist as islands nor operate in a vacuum which aligns with earlier observations made by Engwall (2003). This is exhibited through isomorphic forces, that is; Coercive force through government guidelines, specifications, and regulations; the Normative force through professional bodies’ guidelines and good practice, and; the Mimic force through peer PBOs copying each other (or in this case, the trend is not sharing information) (Meyer and Rowan, 1977; Scott, 2008; Sydow and Söderlund, 2022). Therefore, it is important to leverage on other institutions within the sector such as Professional Bodies and Government agencies/departments in structuring and sharing failure-related information, as these findings have shown how such organisations influence the behaviour of PBOs towards Lf-PRF. Accordingly, for the sector to improve the process of Lf-PRF, the study advocates for measures to be put in place at all levels (individual, project, PBO and sector). Essentially, collaboration and networking remain key factors for consideration by PBOs perceiving each other as sources of lessons, instead of being competitors.

Evidence from both interviews and reports also highlight decoupling tendencies and a limited use of lessons from past failures when initiating or implementing new projects amongst PBOs. Accordingly, PBOs must consider having a robust system for capturing and sharing lessons from failure throughout the life cycle of a project. In other terms, learning should be regarded as a process instead of being an event. This is echoed by the IPA (2020, p. 13) report which encourages to *“Capture lessons throughout the life of the project, and share them as feedback, stories and case studies to improve project delivery”.* Findings further reveal that failure is accompanied by disputes which does not create a conducive environment for learning (Arcadis, 2021). Hence, dispute management and mitigation measures should be in place to assist with Lf-PRF.

Overall, with learning being a social process, since it involves several actors and institutions, amongst the key factors to consider is communication as recommended by participants. Importantly, Bateson (1972) earlier referred to learning as a

‘communicational phenomenon’. In that endeavour, Participant 20 advises feedforward and feedbacking between junior and senior employees, structuring, processing the lessons (for easy access) and incentivising recording and sharing failure-related information. Thus, for effective Lf-PRF, it remains important for PBOs to ensure that the lessons learnt from failure are well documented, organised and accessible to all team members.

Chapter 7 A Multilevel Model for Learning from Project-related Failures

7.1 INTRODUCTION

To encourage Lf-PRF among PBOs, the production of a model is essential since according to Raftery (1998) and McCrickerd (2000) models facilitate problem solving and learning. Accordingly, the model presented herein highlights challenges associated with Lf-PRF, and ways of enhancing the process within a PBO. Raftery (1998, p. 296) defines a model as *"an idealized representation of that which is being studied".* Similarly, McCrickerd (2000) refers to a model *"as a means of more systematically and comprehensively drawing associations".* This is done in order to analyse and clarify the key elements of the system or what is being studied (Bryman, 2012; Easterby-Smith *et al.*, 2021). Usually, the level of detail varies depending on the subject matter and these may take the form of equations (in a positivist model), a framework or interpretivist model supported by qualitative data (Raftery, 1998; Bryman, 2012; Easterby-Smith *et al.*, 2021). Raftery (1998) refers to the 'disaggregation' of a model for the following details:

- Present facts relating to what is being studied.
- Share ideas about the subject matter.
- Generate new ideas for operating and design.
- Predict the behavior of the subject matter, or system in different circumstances.
- Provide insights on the outcome, or on what has been observed.

Accordingly, the present model endeavours to generate (new) ideas and facts around Lf-PRF associated with actors (participants in Lf-PRF), mechanisms, factors and the environment that may enhance PBOs' engagement with 'failure' and 'learning'. To be useful, a model must be contextually relevant because without this, its application is limited (Runeson and Skitmore, 2008). Hence, the following sections outline the development of the model with respect to Lf-PRF by PBOs within the UKCI.

7.2 MODEL DEVELOPMENT

Both literature and the collected and analysed data support the understanding that learning is a social process (Lave and Wenger, 1991; Inkpen and Tsang, 2005; Carmeli, 2007). Thus, the process of developing a model essentially responds to questions of who should be involved in the learning process, and how they can Lf-PRF (while highlighting mechanisms for doing this or other factors to be considered by PBOs). This aligns with Friedman *et al.* (2005, p. 23) who reason that for OL to occur, *"there must be roles, functions, and procedures that enable organizational members to systematically collect, analyze, store, disseminate, and use information".* In addition, interview responses demonstrate that Lf-PRF is influenced by external institutions within the sector such as professional bodies, the client and regulatory bodies who should be considered since they interact with PBOs and influence their activities such as learning. This reinforces prior findings (e.g. by Engwall, 2003, and Madsen and Desai, 2018) which contend that learning does not occur in a 'vacuum' and support the notion that a PBO does not exist as an 'island'. Accordingly, Madsen and Desai (2018) favour focusing on the population level for Lf-PRF, as these organisations (population-actors) shape the learning environment by providing information on failures and create and enforce rules/norms.

Therefore, the constructed model has multiple levels. From a Neo-Institutional theory perspective, the constructed model represents an institutional field[1] of Lf-PRF as shown in Figure 7.1 below.

[1] An 'institutional field' of learning from failure as opposed to C*m*P is being encouraged. This is because unlike a C*m*P where actors from different firms are purported to be operating in harmony, project team members hold different perspectives and values. For instance, clients may focus on savings while contractors' focus is profit maximisation. Additionally, contractor's in the sector compete instead of collaborating. Hence, to have a common ground or purpose of Lf-PRF, it is important for the sector to show the benefits that accrue to the actors/institutions within the institutional field by learning from failures instead of hiding them.

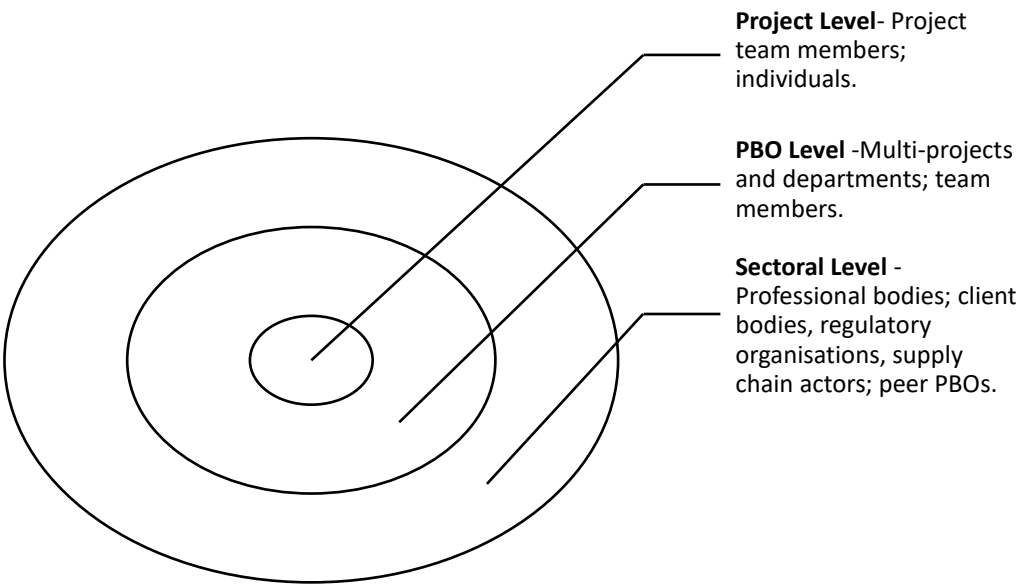

Figure 7.1 Institutional Field of Learning from Project-related Failure

Considering Figure 7.1 above, PBOs exist within an institutional field, where Lf-PRF is based on the realisation that PBOs interact with other institutions. Because projects are complex, with many inter-dependencies, such interaction helps with the identification of failures and may serve as source of lessons (Bresnen, 2016; Biesenthal *et al.,* 2018). Consequently, in order to identify and understand failure better (and effectively capture lessons from it), PBOs ought to rely on other organisations within the construction sector. Figure 7.1 above also shows that sub-institutions within PBOs exist, created by organisational structuring and multiple projects being executed within a single PBO. Hence cross-project Lf-PRF should be encouraged within PBOs[2].

Having appreciated the importance of the interaction of sector actors and institutions, the model also focuses on creating a conducive environment for Lf-PRF and providing mechanisms for capturing and sharing lessons from failure(s). Past research focuses on technological and/or social/cultural mechanisms (Cannon and Edmondson, 2001, 2005). However, the present findings indicate that Lf-PRF requires more than these social and

[2] Respective project managers of these multiple projects in most instances have divided loyalty between their respective project(s) and the parent organisation. Thus, they (project managers) may want to protect their image by not sharing their failures with project leaders on other projects

technological-related mechanisms since a focus on a single facet or mechanism for purposes of learning is insufficient. For instance, the technological means of Lf-PRF alone may not yield sufficient results as echoed by Newell (2004, p. 13) that *"the empirical research on cross-project learning, albeit limited, has tended to conclude that the ICT-based approach to the sharing of project learning is not effective, even though it is extremely common practice"*[3]. To address that, the study has built upon the five facets for OL identified by Lipshitz *et al.* (2002) namely: Structural, Cultural, Psychological, Policy and Context. Three more facets, namely ('Technological', 'Governance' and the 'Nth Facet') have been added. The Nth facet acknowledges the fact that there are other ways of enhancing Lf-PRF based on the interpretivism philosophical stance.

To actualise the collection and sharing of P*r*F information, the model also incorporates learning at the project, organisational and sectoral levels via mechanisms. Accordingly, a multilevel approach is encouraged in order to embrace collective learning (and acceptance of failures) instead of individual based learning. The multilevel approach also presents PBOs with an opportunity of multiple lenses which will assist with the identification of failures and serve as a source of lessons (Madsen and Desai, 2018; Kortantamer *et al.*, 2021). This aligns with other scholars who recommend a multilevel approach to learning (Beck and Plowman, 2009; Hovden *et al.*, 2011; Roussin *et al.*, 2016; Zappa and Robins, 2016; Wiewiora *et al.*, 2019). The levels considered in this study and their relevance are shown in Table 7.1 below.

[3] In that regard, Newell (2004) recommended social networking and community-based approaches as being effective for purposes of learning, especially from tacit knowledge. However, ICT tools still offer opportunities in learning such as capturing, storing and sharing lessons effectively which cannot be achieve through social networking approaches. Similarly, the study encourages not only focusing on one facet by taking a multifaceted approach in order tap benefits from each facet.

Table 7.1 Multilevel Approach to Learning

	Key Actors	Purpose/Relevance	Reference
Sector Level	Peer PBOs; supply chain actors, professional bodies; regulatory bodies; end-users.	Alternative source of lessons; structuring and legitimizing learning from failure.	Engwall (2003); Miterev *et al.* (2017); Madsen and Desai, (2018); Von Jacobi (2018).
PBO Level	Directors; Department heads; Employees (non-project and project team members)	Coordinate inter-project and cross-organisational learning; create conducive environment and culture.	Newell (2004); Serrat (2017).
Project Level	Managers and project leads; Team members	Opportunity for interaction with multiple team members; teams as source of lessons	Swan *et al.* (2002); Scarbrough *et al.*, 2004; Duffield and Whitty, 2016)
Individual level	Individual(s)	Self-reflection, acceptance of failure; manage personal emotions	Stefano *et al.* (2014); RICS (2016)

Accordingly, the first level of the developed model is the 'sectoral' which takes a push-based approach (or external motivation) via Neo-institutional Theory's isomorphic forces. The second level is the 'organisational' level which also considers the project, and individual levels of Lf-PRF as shown in Figure 7.2 below.

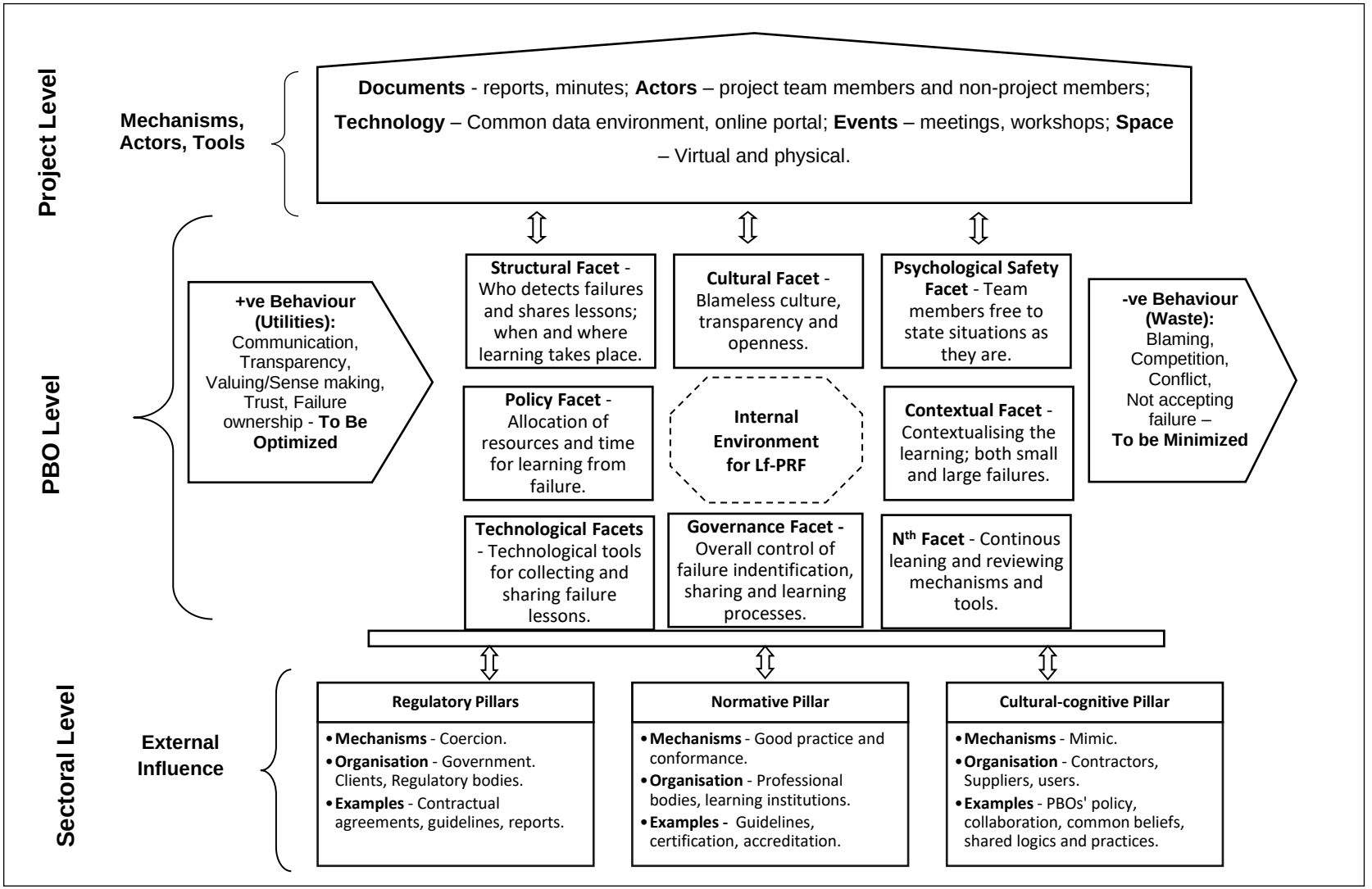

Figure 7.2 The House Model for Learning from Project-related Failures

The model in Figure 7.2 above is based on a 'HOUSE' metaphor since according to McCrickerd (2000), metaphors assist in explaining connected concepts or structures. Therefore, the underlying 'Institutional' theory provides the 'foundational bedrock' for Lf-PRF. Here, it is depicted by the sectoral level represented by the institutional pillars (via Neo-institutional theory's isomorphic forces). The 'facets' represent the walls with the learning tools and mechanisms and actors being represented by the roof. The 'waste' represents negative behaviour arising from the interaction of project actors that may hinder the process of Lf-PRF such as competition, conflicts and the blame game. Realising the need for openness/transparency, valuing and trust, these are represented by the 'Utilities'. Collectively, the facets, actors, artefacts (or tools) and utilities represent the internal learning measures to be put in place for effective Lf-PRF. Overall, the model was developed in response to participants' responses which highlighted an emphasis on the following; the use of technological tools; discouraged individual learning in favour of cross-departmental and cross-organisational learning; creating a conducive environment without blaming; offering support to team members (by both peers and leaders) in an event of a failure. These measures could be summarised into two categories: Internal mechanisms (creating a conducive environment) and external mechanisms (cross-organisational learning at the sectoral level). This lead to the argument for a multilevel approach to learning (project, organisational and sectoral levels) and internal mechanisms (based on the 8 facets) and the mechanisms for capturing data via the DATES framework. The levels of the model are further elaborated in the following sections.

7.2.1 Sectoral level

The sectoral or institutional level is being associated with the 'foundation' offering external support and influence (motivation/push) as they serve as the basis of most norms and rules that influence the behaviour of PBOs (Oliver, 1991; Santos and Pache, 2010; Biesenthal *et al.*, 2018). This aligns with Participant 13 who submitted that there must be some form of external motivation to influence PBOs to Lf-PRF. Therefore, from a Neo-Institutional theory point of view, the external influence can be observed via the three pillars:

- **Regulatory Pillar -** One example of how this is evident, is from the health and safety systems that are well established in most PBOs due to the HSE's robust

enforcement system compared to other types of P*r*F. In addition, the behavior of parties on a project is guided and influenced by contractual clauses (CIOB, 2019). Therefore, motivation for Lf-PRF at this level could be by providing incentives, contractual provisions, guidelines and highlighting benefits of Lf-PRF that may accrue to all contractual parties.

- **Normative Pillar -** Professional bodies such as the CIOB, APM and RICS give legitimacy and structure the knowledge and practices related to project management within the sector (DiMaggio and Powell, 1983). Therefore, guidance and structuring of the process of Lf-PRF may be provided by professional bodies. Motivation for engaging in Lf-PRF by professional bodies should stem from the realization that lessons from failures will improve professional members' performance.

- **Cultural Cognitive Pillar -** PBOs are influenced by competitors within the sector since sharing failure-related information affects their competitiveness. Therefore, PBOs mimic each other by not sharing failure-related information openly. However, scholars encourage vicarious learning and contend that competitors, suppliers and other specialists equally act as knowledge repositories which could save other PBOs from experiencing similar failures (Min, 2018; Scholten, Pamela and Fynes, 2019). Thus, the motivation for Lf-PRF at the cultural-cognitive pillar are supply chain wide benefits accruing from Lf-PRF.

This study contends that rather than viewing the institutional pillars as barriers or limitations to Lf-PRF, via the lens of Neo-institutional Theory, the organisations within each of the pillars may serve as valuable sources of lessons. Thus based on the 'institutional field of Lf-PRF' such influence of the institutions on PBOs' Lf-PRF are summarised in Table 7.2 below.

Table 7.2 Institutions within the Model -Institutional Field of Lf-PRF

Institutional Pillar	Purpose	Mechanism - Isomorphic Force	Influence on Lf-PRF.	Legitimacy of Lf-PRF	Participants' Responses	References
Regulatory Pillar.	Provides guidelines and external motivation.	Coercive – Government guidelines and procedures from regulatory bodies; contractual provision.	Fear, guilt vs innocence.	Sanctioned through legal framework.	*"….[when] a construction project has a fatality, they are forced to try and learn from that because of the legal proceedings brought against them and procedures and regulations that govern that.."* Participant 3.	Scott (2001); Baker *et al.* (2018); CIOB (2019, 2021); Jaber and Oftedal (2020).
Normative Pillar.	Bridge between private and government sectors); structure and legitimacy.	Normative – Good practice via professional bodies and learning institutions.	Shame or honor.	Part of Professional values, duties, societal expectations, certification, accreditation.	*"that code [CIOB's Code of Quality] is pretty much a bible on everything to do with quality in terms of setting up your systems so that you don't fail so… I have issued that to all site managers"* Participant 25.	Scott (2001); Hodgson and Cicmil (2006); Morris *et al.*, 2006; Beck and Plowman (2009); CIOB (2019, 2021); Jaber and Oftedal (2020).
Cultural-cognitive Pillar.	Offers vicarious and experiential sources of lessons.	Mimic - Alternative sources of lessons from other PBOs' with first-hand experience.	Certainty or uncertainty/confusion; social worthiness.	Shared beliefs culturally supported; social worthy; comprehensible and recognizable.	*"…you would get advice and experiences from other companies in reports. You learn from them"* Participant 2.	Scott (2001); Engwall, 2003; Miterev et al. (2017); Madsen and Desai (2018); Jaber and Oftedal (2020).

Essentially, the sectoral level of the model prompts arguments for interactive, collective and vicarious learning from other PBOs' failure(s), rather than individual based learning, or learning contained within a single PBO. This is to allow for wider sources of lessons and may enable other PBOs to without having to experience them (Dyke, 2009; Min, 2018; Scholten *et al.,* 2019; Kortantamer *et al.*, 2021).

7.2.2 Organisational Level – 8 Learning Facets

As much as the sectoral level is important, the organisational (or PBO) level remains central for effective Lf-PRF. This is due to three reasons: firstly, PBOs have primary information from first-hand experience of the failures; secondly, they host the majority of people/actors involved in a particular failure; and thirdly, as shown in Figure 7.3 below, PBOs are in closer contact or interact with other parties involved in the project delivery process. In addition, findings from the interviews show subtle power and influence contained by PBOs on learning, especially when it comes to contractor-supplier and main contractor-subcontractor relationships. Hence, the learning mechanisms or efforts at the organisational level will have far reaching effects onto the wider supply chain.

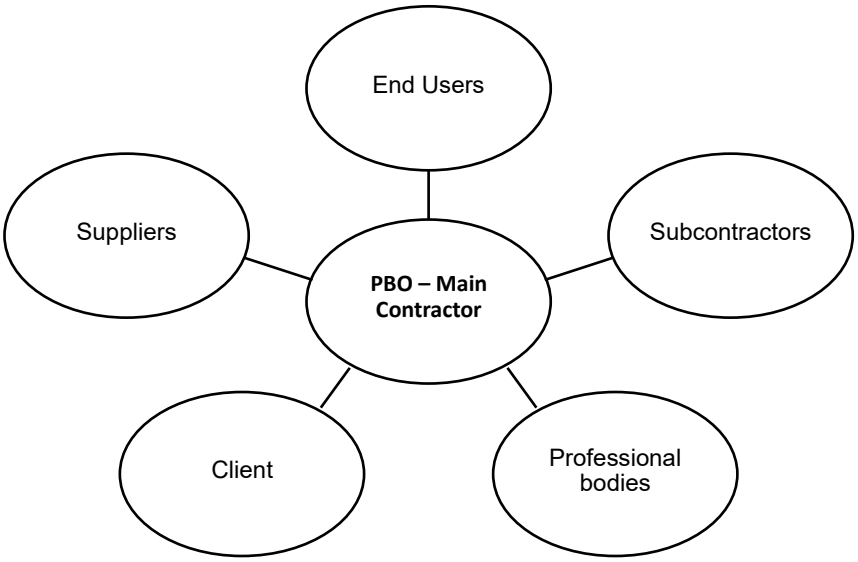

Figure 7.3 Focal Position of PBOs in the Process of Learning from Failure.

Accordingly, for a PBO to effectively leverage its strategic position in Lf-PRF, PBOs should rely on the identified 8 learning facets outlined in Table 7.3 below.

Table 7.3 Facets for Learning from Project-Related Failures

Facet	Participants Response	Purpose/example
Structural Facet	"*There needs to be more structural element.. I was like don't really think we have a lot of official forms you do at each stage saying like or at the end saying these are the aspects which failed, this is where it succeeded and why*" Participant 18.	Formal processes and activities for collecting, storing and sharing lessons from failure.
Cultural Facet	*"…we in our organisation allow people to speak freely and to discuss them and not to be a bad thing. And to be a thing [failure] you discuss [openly] allows you to move on collectively".* Participant 16.	Address the blame culture, share information openly and freely.
Psychological Safety Facet	*"Failure is very limiting to a person. If you get dragged down by your failures you are not going to do anything, you are not going to take risks, you are not going to expand on your life, whether it's in work, whether it's outside work*" (Participant 33).	Allow employees to freely try new ideas, support from peers and seniors.
Policy Facet	*"…if there is no policy or organisational learning system which is accommodated from top management, you are likely to have a challenge because it's one process which requires executive support and executive review"* (Participant 4).	Allocating resources and time to support the process.
Contextual Facet	*"if you have had a hard time [failures] on it [project], it can affect you in lot of negative ways. And bringing it up again and talking just brings you back to that position in life where you were not happy. It depends how big the problem was"* (Participant 16).	Understanding the context and valuing the lessons from failure.
Technological Facet.	*"…you could start using a bit of machine learning, a bit of dashboard, monitoring and tracking themes that could be openly published so you could, you know"* [Participant 2].	To allow for faster identification of failure(s) and collection, storage and sharing of lessons.
Governance Facet	*"good project governance, would identify project failings and force learning from them…, good project governance should intervene as the project is failing and correct the failure"* (Participant 8).	Overall control and oversight of the process of Lf-PRF within and outside the organisation.
N^{th} Facet	Any other conditions or mechanisms to enhance learning; continuous learning.	With constant reviews, PBOs may find other insights and mechanisms for Lf-PRF

From a social constructionism standpoint, the model and framework presented here are not absolute. Equally, the facets needed by PBOs for purposes of effective Lf-PRF are not conclusive. Instead, they offer building blocks that can be considered by PBOs in tailoring

or structuring their process of Lf-PRF. From a researchers' perspective, the facets also present areas or opportunities for exploring and understanding the process of Lf-PRF within PBOs. Additionally, realising the dynamic nature of Lf-PRF and in a bid to encourage constant development and reviewing of PBOs' mechanisms for Lf-PRF, the study introduces the concept of the 'Nth Facet'. The 'Nth Facet' prompts the following question to the sector's practitioners and researchers: what else can be done to improve the process of Lf-PRF?. Furthermore, having a conducive environment for Lf-PRF is not enough when there are no mechanisms for capturing and sharing lessons from failures. Therefore, the next section discusses tools and mechanisms that can be relied upon by PBOs in the process of Lf-PRF.

7.2.3 Project Level

Though Kululanga *et al.* (1999) earlier discussed learning mechanisms as tools used by contractors for learning purposes within the UKCI, this focused on learning networks without addressing other practices or aspects such as lessons learnt meetings and institutional factors. Other studies mostly discuss one aspect such as Sage *et al.* (2010) who focused on the 'project file'. In most instances the focus is on learning tools/objects such as technological tools or documents (lessons learnt reports). Thus, this study takes a holistic approach by identifying both actors (learners), and learning objects or artefacts[4] used for purposes of Lf-PRF. These are presented as a 'DATES' ('**D**ocuments' '**A**ctors', '**T**echnological tools' '**E**vents' and '**S**pace) framework shown in Figure 7.4 below.

[4] The study identifies both actors (people involved in the learning process) and artifacts. Artefacts in this study are objects that are used for the purposes of collecting, storing or sharing failure-related information. This aligns with Macpherson and Clark (2009) who regard artefacts as abstract objects that also symbolize the state of how to do things.

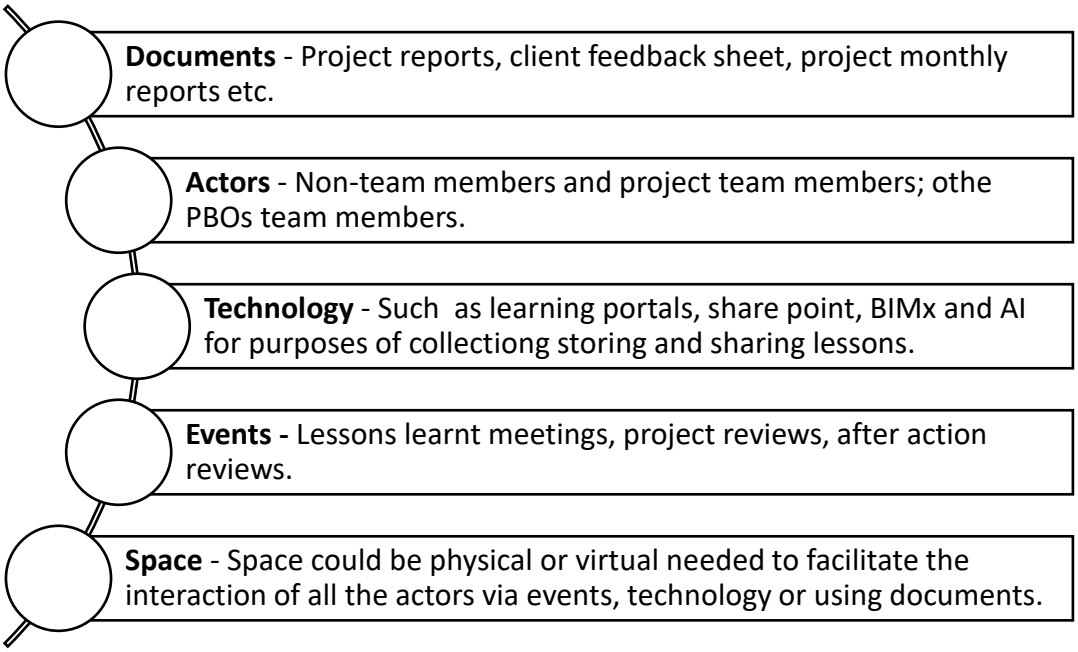

Figure 7.4 The 'DATES' - (Documents, Actors, Technology, Events and Space) Framework of Artefacts for Learning from Failure.

The rationale behind the '**DATES'** approach is that for Lf-PRF to take place, the information from failure can be made available via '**D**ocuments'. These may include hard or soft copy-based outputs such as audio recordings, images, short video clips and reports. Secondly, the documents will need to be prepared by someone for others to use them, which requires the interaction of '**A**ctors'. Thirdly, the actors will need to use appropriate '**T**echnology' in the process of preparing or using failure-related information. Technological support is important since project complexity and the chaos that often surrounds failures can create 'cognitive overload' and subsequent difficulties in learning (Sakhrani, 2016). Fourth, learning being a social process, the actors will need to interact and access the documents via '**E**vents' which could be formal (lessons learnt meetings, project review meeting) or informal events such as lunch time chats. 'Events' also refers to failure-related events that act as the trigger for learning and a source of lessons. Lastly, for the above to be actualised, there is need for '**S**pace' for interaction which could be physical (site office, head office, hired or rented venue) or virtual (Microsoft Teams, cloud data base). It is worth noting that the artefacts can be associated with all the levels

(project, organisational and sector). However, for purposes of project scoping, artefacts are discussed at the project and PBO or organisational levels.

Per the 'HOUSE' model, the study identifies 'utilities (+ve)' in the form of 'positive behaviours' and 'waste (-ve)' or negative behaviours that may influence Lf-PRF positively or negatively respectively. This is shown in Figure 7.5 below. For effective Lf-PRF (within and across PBOs) positive 'behaviour' must be optimized whilst the negative 'behaviours' (waste) must be minimized.

Figure 7.5 'Utilities' (+ve Behaviour) and Waste (-ve Behaviour)

Overall, the model development process was guided by relying the adopted lenses, Neo-institutional Theory and Situated Learning and the Five Facets by Lipshitz *et al.* (2002). Thus, through inductive analysis, themes were identified around Lf-PRF. However, as a way of guiding the inductive process, Neo-institutional theory acted as a guide in identifying the key parties via the institutional pillars and isomorphism (forces). Thus, the identified levels in Figure 7.2 above, respective parties and actors were associated with the institutional pillars. The internal level and factors were identified via the Lipshitz *et al* (2002) learning facets. As a way of identifying mechanisms for learning within the model, themes arising from the inductive analysis were summarised in a 'DATES' framework – Documents; Technology; Events; and Space.

7.3 PBOS' FRAMEWORK FOR LEARNING FROM PROJECT-RELATED FAILURES

The process of Lf-PRF faces barriers that may be associated with the project, organisational and sectoral levels. Consequently, if PBOs are to Lf-PRF, it is inevitable that measures are put in place at both the sectoral and PBO levels. Therefore, via isomorphic forces, regulatory bodies and professional bodies could legitimize and structure the process of Lf-PRF. Equally peer PBOs would serve as valuable sources of knowledge by sharing their failures. Overall, two aspects of the framework support the model for Lf-PRF. Firstly, creating a conducive environment for Lf-PRF and secondly, providing relevant mechanisms for collecting and sharing lessons from failure by embedding the identified facets and artefacts, as outlined in Table 7.4 below.

Table 7.4 Multilevel Framework for PBOs to Learn from Project-related Failures

STAGE ONE - CREATING A CONDUCIVE ENVIRONMENT FOR LEARNING FROM FAILURE						
FACETS	**Relevance**	**Individual Level**	**Project Level**	**PBO Level**	**Comments**	**References**
Structural Facet.	Outline who is involved and tools and mechanisms for learning.	Engage in self-directed learning; refer to reports; personal journal/reflection.	Within and across projects; lessons learnt meetings; after action reviews; client's feedback.	Cross-project learning; reports from other projects; meetings with teams from other projects; refer to sectoral reports.	Network based, flexible, within and outside the organization (Participant 1; 2; 18).	Burnes et al. (2003) (Burnes, Cooper and West, 2003; Carmeli, 2007; Danneels and Vestal, 2020).
Cultural Facet.	Creating an environment for failure identification and sharing lessons from failure.	Personal ownership of failure.	Blameless culture; Open culture.	Blameless culture; Open culture.	Leadership and management commitment (Participant 2; 8; 9 and 20).	Cannon and Edmondson, 2001, 2005; Bunch, 2007; Danneels and Vestal, 2020).
Psychological Facet.	Free to share and discuss information with superiors and peers; free to present opposing views.	Free to state situations as they are.	Team members Free to share failures with each other.	Team members Free to share failures with each other.	Blame and failure tolerance; focusing on the problem instead of individuals; allow constructive conflicts (Participant 13; 14 15 and 32).	(Edmondson, 1999; Edmondson and Lei, 2014; Friel, 2017; Danneels and Vestal, 2020).
Policy Facet.	Provide adequate time and resources needed for learning to show organisational commitment.	Encourage individuals to create personal time for reflection.	Allocate time for reflection on projects.	Allocate resources for learning; identity individuals and teams to coordinate collection and sharing failure.	Leadership and management commitment (Participant 2; 8; 9 and 20).	(Lipshitz, Popper and Friedman, 2002; Danneels and Vestal, 2020).

Contextual Facet.	Contextualize the learning; Define concepts, meanings and beliefs and values.	Valuing lessons from failure.	Valuing lessons from failure; paying attention to all failures regardless of size.	Value lessons from failure; paying attention to all failures regardless of size.	Leadership and management commitment; getting the correct lessons from failures (Participant 2; 8; 9; 13 and 20).	(Lipshitz, Popper and Friedman, 2002; Danneels and Vestal, 2020).
Technological Facet.	Collection, storage and sharing failures lessons; failure detection and identification.	Personal devices; organisational online collaborative tools; the web.	Portal or cloud storage of lessons.	Organisational self-guided learning; virtual learning environment.	IT support and tools eg BIM, artificial intelligence (Participant 1; 14; 33 and 34).	(Newell *et al.*, 2006; Baker, Hallowell and Tixier, 2019).
Governance Facet.	Protocols or guidance on the process of learning from failure; avoid reinverting the team.	Personal commitment and acceptance of failure; openness and willingness to share failures.	Provide guidelines for team members on who to see, what document to use.	Identify specific events and procedure to be followed.	Contractual agreements; Organisational policy (Participant 2; 8; 30; 31 and 32).	(Pemsel *et al.*, 2014; Pemsel, Müller and Söderlund, 2016).
STAGE TWO – MECHANISMS AND TOOLS FOR COLLECTING AND SHARING LESSONS FROM FAILURE						
'DATES' Approach	**Relevance**	**Individual Level**	**Project Level**	**PBO Level**	**Comments**	**Related Literature**
Documents.	Collection, storage and sharing lessons from failure.	Past project report; personal diary.	Past project reports: lessons learnt reports; After action reviews.	Past project reports; Sectoral reports.	Easy access: Incorporate existing documents to avoid administration overload (Participant 4, 22 and 32).	(Newell *et al.*, 2006; Sage, Dainty and Brookes, 2010).
Actors.	Generation and sharing of lessons; failure identification.	Peers; Superiors; Juniors; Non-project team members.	Project team members.	Project and non-project team members; cross project and organisational members.	Engage key personnel; consider third parties who are not biased (Participant 4, 6 and 13).	(Sense, 2007b, 2007a; Hecker, 2012).

Technology.	Failure identification, documentation and sharing.	Personal gadgets and institutional intranet and portals	BIMx; AI; Deep learning.	BIMx; AI; Deep learning; Learning portal.	Easily adaptable technology; Encourage self-directed learning (Participant 24, 25 and 32).	(Newell *et al.*, 2006; Lu *et al.*, 2013; Baker, Hallowell and Tixier, 2019).
Events.	Encourage interaction amongst actors for exchange for lessons.	Personal chats; Engage in organisational and external events e.g., professional bodies, CPD.	Monthly meetings; Lessons learnt.	Seminars; workshops; CPD.	Select the right, people, time and place (Participant 20 and 32)	(Gameson, Suresh and Chinyio, 2008; Mueller, 2015; Crowe *et al.*, 2017).
Space.	A place for interaction of actors, conducting events and sharing documents.	Personal workspace; Cloud or online.	Project environment; virtual space.	Project environment; PBO premises; virtual space.	Allocate adequate time; right content (failure information) and people (Participant 1, 20, 25, 26 and 32).	(Al-Ghassani *et al.*, 2004; Lu *et al.*, 2013; Gutierrez-Bucheli *et al.*, 2016).

Although the individual level has not been discussed in detail, it is important to recognise the role individuals play since measures highlighted in the model are in effect implemented through individuals. This is echoed by Stefano *et al.* (2014) who note that though individual learning is not the sum of organisational learning, learning is unimaginable without it. Thus, it is important that deliberate measures are put in place to support individual learning. This may include ensuring psychological safety for members to express themselves freely regardless of the outcome, either good or bad. Therefore, a Toolkit for PBOs to Lf-PRF with four Action Area points shown in Figure 7.6 below has been developed as a guide. See Appendix T1, the PBOs Toolkit for Lf-PRF, for detailed explanation of the framework and organisational related practices for PBO to Lf-PRF.

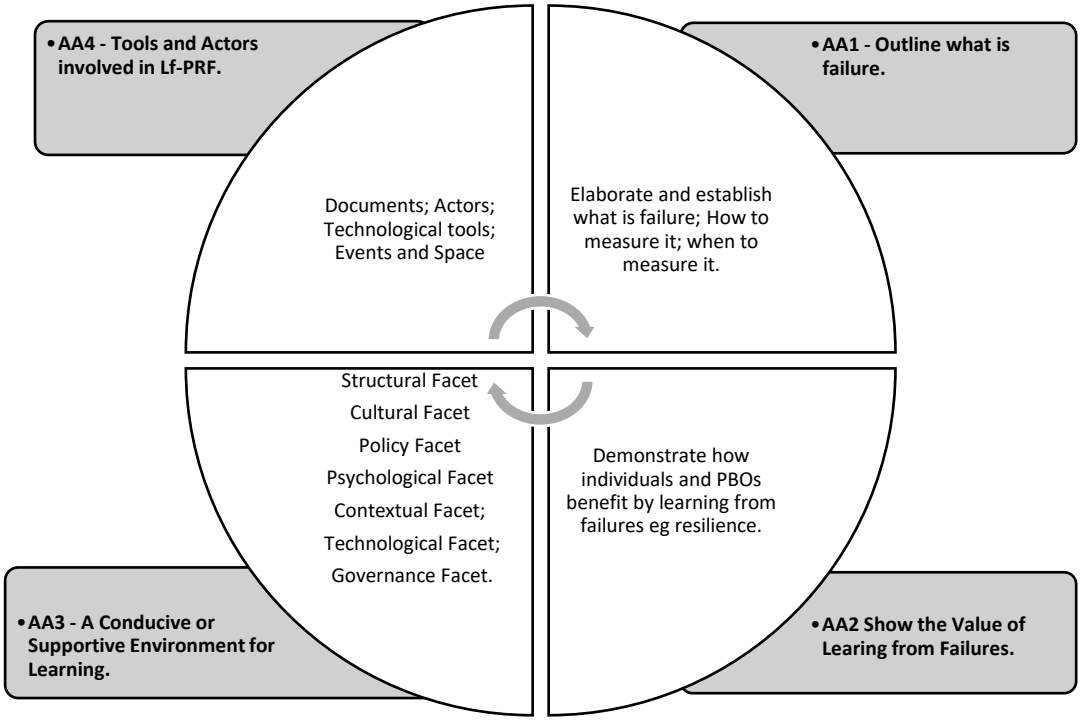

Figure 7.6 Toolkit – Four Action Areas for PBOs to Enhance Lf-PRF

7.4 MODEL EVALUATION

As good practice and part of achieving credibility in qualitative studies, a model needs to be evaluated. Bryman (2012) notes that this assists with improving the model and minimizing contradictions between it and the 'social world'. In qualitative studies, this is

regarded as model evaluation. Thus, three interviews, (participants shown in Table 7.5 below), were conducted (individually, to avoid biasness) for feedback on the developed model. See appendix 8 for the list of questions asked during the model evaluation.

Table 7.5 List of Model Evaluation Participants

Participants	Years of Experience	Profession	Management Level
Participant 1MV	25+ Years	Project Manager	Director
Participant 2MV	25+ Years	Environmental Engineer	Director
Participant 3MV	10 – 19 Years	Civil Engineer	Middle Management

7.4.1 Representation of Reality and Areas for Improving the Model

Overall, participants agreed that the model reflects reality within the sector with respect to Lf-PRF and that it can assist with improving learning. Participant 1MV indicates that "*I can see a lot of situations within the model in construction. Resource is an issue and culture can be both at site and organisational level when it comes to a no-blame environment, rarely will this be the case".* Participant 3MV equally indicated that the model covers most of the aspects that would be present in the industry with respect to Lf-PRF. See Table 7.6 below which gives a summary of participants responses on the model.

Table 7.6 Summary of Participants Responses from the Model Evaluation Interview

Questions	Participant 1MV	Participant 2MV	Participant 3MV
Q1 -Reflection of reality.	Yes.	Yes.	Yes.
Q2 – Ability to enhance Lf-PRF.	Yes.	Yes *"fairly clear model, it gives you a broad landscape picture of the assets in the construction industry".*	*"It is a very useful articulation, putting everything in a single model putting all the facets".*
Q3 – Other parties to be involved.	Non-project professionals; stakeholder mapping; clients and end users.	Include whoever is paying for it (the project) – The client in other words.	*"International aspect of it is particularly difficult especially when you come to mega projects… it's very difficult to compare across different contexts and a few government departments".*
Q4 – Other practices to consider.	Include key failure factors and key success factors as prerequisite to starting work on sites.	Project Wrap up conference; Using digital tools to monitor utilities and end-user's platform for submitting feedback; should be legislative imposed to enable collective learning.	
Q5 – Influence of the levels on Lf-PRF.	It's difficult… small failures could affect you at any level; *"Bring all the parties together"*	They are not of equal influence, but each level does not make sense without the presence of the other.	PBO level.
Q6 – Easy to implement the model.	Challenges with resources; difficult people on projects; work overload; understanding.	*"This should be easy, if you cannot understand what is on the paper (model), then you are not supposed to be on the job".*	*"Cultural, psychological safety and governance are probably the ones I would say have issues with negative behavior".*
Q7 – Ways of improving the model and implications.	Online digital risk register.	*"An umbrella organisation to take on the responsibility of collecting and disseminating information on failure".*	*The [negative] behaviors are all across the levels and not just at the PBO level. Identifying the interaction between the project and the PBO levels, different PBOs on certain projects.*

In terms of improving the model, participants echoed the need to include key stakeholders (such as statutory bodies) and non-project team members (such as the client) and establishing which of these have influence (Participant 3MV)[5]. Participant 1MV indicated that the need to: *"Identify the most common project issues such as communication and lack of trust/collaboration from the client and deal with them during the project charter. Know who your stakeholders are e.g. not just directly associated with the project, they could be councils, media, local pressure groups etc."* Similar to the findings of Velikova *et al.* (2018), Participant 3MV also suggested having 'laws' in place to encourage sharing lessons as evidenced by the advancements achieved in sharing H&S related lessons due to enforcement by the HSE. Accordingly, changes to the model in Figure 7.2 above were made to include such organisations under the institutional pillars and mechanisms via isomorphism. The inclusion of such a broad spectrum of stakeholders aligns with other studies that have associated the occurrence of P*r*F with the influence of pressure groups, the media and other key stakeholders (Damoah and Kumi, 2018; Damoah *et al.*, 2021). Consequently, collaboration, trust, and communication, also identified in the model shown in Figure 7.2 above, remain key parameters not only for Lf-PRF, but also for effective project management. This was supported by Participant 3MV who suggested cross-sectoral and cross-country learning especially with mega infrastructure projects.

In addition, instead of learning after completion of a project, Participant 1MV indicated that *"Learning only seems to be taken at the end of a project. Failures can be many and compound a situation if not addressed. Perhaps a before, during and then after lessons-learned culture should be adopted with all parties collaborating to bring their knowledge for the benefit of the whole project".* Therefore, taking note of areas for improving the model indicted in Table 7.6 above, this justifies the inclusion of the Nth Facet which also demonstrates that there are many ways or factors that should be considered in the process of Lf-PRF. Additionally, there was a recommendation for non-project participants and consideration of other countries beyond the UKCI to align with the multilevel approach depicted in the model. In summary, the participants in the model evaluation interviews helped to improve the model as follows. Participants firstly confirmed and agreed that the

[5] With the inclusion of several actors, the need of having a collective approach to Lf-PRF cannot be overemphasized as echoed by Participant 3MV *"Its important to set the norms; how do you make someone to put the interests of the collective first rather than their personal interest"*

findings (actors at each level) are what is prevailing in the industry; secondly, the participant suggested that several actors should be considered such as the client. Thus, realising that several mechanisms were recommended by model evaluation participants, (for instance introduction of KPI cannot be standardized due to the uniqueness of projects), this lead to the introduction of the Nth Facet. Thirdly, suggestion on who should pay for the process were made leading to the inclusion of contractual clauses under the regulatory pillar as a way of assigning responsibilities. This further reinforced the role of the external environment and is highlighted via the isomorphic forces (coercive, normative and mimic forces) of the house model.

7.5 CHAPTER SUMMARY

Overall, the developed model is based on findings from 32 interviews which involved participants with varying experience and professional background. Furthermore, for purposes of credibility, data was collected from participants with not less than 10 years of experience and holding senior positions. The developed model was further evaluated via 3 interviews with professionals of over 10 years of experience. This assisted in developing a a multilevel model that reflects current practice(s) amongst project actors when learning from failure. Realising the subjective nature of failure and learning, the study relied upon Neo-Institutional Theory and Situated Learning Theory when analysing the data and developing the model.

Therefore, based on the developed model, external factors/measures (via institutional pillars and isomorphism), organisational mechanism (eight learning facets) and project level mechanisms (DATES - Documents, Actors, Technology, Even and Space) are identified as key components for Lf-PRF among PBOs within the UKCI. Additionally, the model for Lf-PRF by PBOs is based on a ‘HOUSE’ metaphor in order to illustrate how the sections identified in the multilevel model interact. These initials further represent specific actions to be done and specific artefacts and facets to be used discussed as follows:

- **H – Holistic** – This relates to four main aspects: Involving everyone in the learning process (regardless of position); learning from both small and large failures; taking

a continuous approach/process of learning, from project initiation through to project completion and use, and; learning from both successful and failure-related events.

- **O - Opportunity** - To encourage actors to Lf-PRF, it is worth highlighting how Lf-PRF benefits them. Such benefits include resilience among team members and improved management of emotions during a failure.

- **U – Usability** – The nature of the documents or information on failure lessons must be accessible or readily available for others. They should be made versatile to be used across boundaries (Macpherson and Clark, 2009; Sage *et al.*, 2010). This also includes enabling access to learning events and actors.

- **S- Sensitivity** – As much as Lf-PRF is being encouraged, it is worth stating that not all lessons from failures will add value. It is therefore expected that PBOs and individual learners should assess relevance and verify the lessons.

- **E – Emotions** – Failure affects team members differently and, in some cases, this may cause grief in the case of losing one's job or when a company winds up (Bell and Taylor, 2011). Thus, it is important that team members' negative emotions are managed appropriately while keeping the team motivated in the face of failure and beyond (Shepherd *et al.*, 2011).

See Table 7.7 below which gives a summary of the 'HOUSE' framework and related facets and artefacts to be implemented by PBOs in order to enhance Lf-PRF.

Table 7.7 Translation of the 'HOUSE' Model for Learning from Project Related Failure Among PBOs

THEME	Explanation	Applicable Facets	Applicable Artefacts	References
H – Holistic	Include junior and senior employees; learn from both success and failure; Small and large failures; within and external sources; Continuous process from project inception to completion/use; Engage users and clients (Participant 1, 2, 4 13, 19 and 32).	Structural Facet; Governance Facet.	Actors; Events; Space.	(Ellis *et al.*, 1999, 2014; Cannon and Edmondson, 2005).
O - Opportunity	Demonstrate how Lf-PRF gives an opportunity for learning and growth. Opportunities at individual and PBO levels (Participant 30, 31 and 33).	Policy facet; and Governance facet.	Actors.	(Cannon and Edmondson, 2005; Ellis *et al.*, 2014; Dahlin, Chuang and Roulet, 2018).
U - Usability	Ensure that the lessons (documents, space and events) from failure are accessible and shareable; Ease of use; Clarity in documenting (Participant 1, 2, 4 and 32).	Structural Facet; Governance Facet; Technological Facet.	Documents; Actors, Technological Tools; Events	(Macpherson and Clark, 2009; Sage, Dainty and Brookes, 2010).
S – Sensitivity	Make sense of the lessons, not all lessons from failures are good; Assess relevance and approach to learn; Lessons verification (Participant 4, 6 and 24).	Contextual facet; Governance Facet.	Documents; Actors; Events.	(Ellis *et al.*, 1999, 2014; Lipshitz, Popper and Friedman, 2002).
E – Emotions	Motivate/uplift emotions during failure; assure before failure; sustain during success/failure (Participant 13, 24 and 33).	Cultural facet; Psychological Facet.	Actors.	(Shepherd and Cardon, 2009; Shepherd, Haynie and Patzelt, 2013; Shepherd *et al.*, 2014).

Chapter 8 Conclusion and Recommendations

8.1 INTRODUCTION AND RESEARCH RECAP

Across several sectors, including the construction sector, organisations are being encouraged to learn from their past failures since such occurrences offer valuable lessons. Accordingly, the aim of this research was ***"to examine whether and how failure can (or does) inform organisational learning, within construction PBOs".*** To achieve the overall aim, the following objectives were developed:

i. Uncover how organisational learning occurs, within PBO's.
ii. Review what project failure is in the construction sector.
iii. Review the common, underlying, root causes of project failure.
iv. Explore the nature of current practice, in the use of past project failures.
v. Assess whether failure may inform organizational learning in PBO's.
vi. Construct a model and evaluate whether it facilitates organisational learning from PrF(s) among PBOs.

In order to get insights on the subject matter, a qualitative approach to the study was adopted. This was by conducting semi-structured interviews with industry professionals and academics coupled with archival documents on project-related failures within the UKCI. Therefore, this chapter presents conclusions based on the key findings from the collected data which are discussed under each objective. Besides the conclusions, this chapter also discusses the following: research limitations; research recommendations, and; areas for future research.

8.2 RESEARCH CONCLUSIONS

8.2.1 Objective One - Uncover how organisational learning occurs, within PBO's.

Findings reveal that, unlike in the past, when organisations rarely engaged in learning, PBOs within the UKCI are presently keen on organisational learning. From those who practice OL, the following conclusions were drawn:

- Intra-organisational learning is practiced more, compared to cross-organisational learning.
- Learning is tailored around the industry's good practice and regulations.
- Learning takes an 'event' approach by being structured after project completion.
- Learning is biased towards past project evaluation and lessons learnt meetings.

Thus, instead of imbedding learning practices within a PBO's daily activities, learning is structured around, or is response to, the industry's regulations such as health and safety and good practice as requested by professional bodies (risk management, project planning etc). In addition, PBOs engage more in in-house learning and less of cross-organisational learning due to the competitive nature of the industry. Accordingly, common practices in learning include skills passports and CPDs organised by professional bodies. From a Neo-institutional theory perspective, it can be concluded that OL practices are mostly influenced by coercive and normative isomorphic forces by means of set standards for construction training (including regulations) and professional bodies' codes of good practice respectively. Evidently, in trying to improve the quality and performance of those in the sector, the CIOB (2019, 2021) produced the 'Code of Quality' as a guide for PBOs and further recommended CPDs and training.

Findings from interviews further reveal that human aspects (soft skills and working conditions) receive less attention when compared against other factors such as IT and processes[1]. Similarly, the BIS (2010) report on guidelines on managing programs also categorically lists soft skills in managing projects as one of the areas not covered in the report. Equally, as means of improving quality in construction, the CIOB (2019) suggests improving tools, regulations and processes. Thus, for Lf-PRF to be achieved, both human and process (including technological tools) related factors should be considered. Additionally, lessons should be imbedded in the daily activities of an organisation and throughout the project's life cycle.

[1] For instance, though there is attention given to human resource training, the report from Crossrail Ltd by Dumbleton and Pascutto (2016) reveals that 54% is focused on IT, 33% on personal effectiveness, 9% on health and safety, 2% on management and leadership and another 2% on quality.

8.2.2 Objective Two - Review the understanding of project failure within the construction sector.

The findings indicate that there is no agreed definition of project failure amongst PBOs and across the sector similar with earlier studies (Pinto and Mantel, 1990; Atkinson, 1999; Jugdev and Muller, 2005; Müller and Jugdev, 2012). Though scholars encourage measuring failure and success beyond the iron triangle, findings show a reliance on the 'cost', 'time', 'quality' and 'contractors' profitability'[2]. However, it is worth appreciating that while there is still a reliance on the iron triangle when measuring P*r*F, 'functionality', 'client/project objectives', 'profitability' and 'project performance' were highlighted as key factors to be considered. Yet, even such benefits or other measurement elements in terms of outputs and outcomes are still reduced to costs especially on government projects. For instance, the Green Book (2020) encourages considering both quantifiable/monetized or unquantifiable/unmonetizable benefits. The observed focus on profitability (and outputs) by PBOs when measuring project success or failure gives an insight of the vying needs or dilemmas within PBOs. This further reflects the nature and pressures of the construction sector in which PBOs operate. Thus, if Lf-PRF is to be achieved, it is worth addressing such needs or at least demonstrate how PBOs would benefit from Lf-PRF.

Overall, in line with recent findings by Pollack *et al.* (2018), it can be concluded that though there is an increased call for the sector to focus more on 'impact' and 'outcome' based criteria when measuring and defining failure or success, there is still a reliance on the iron triangle or 'project outputs'. Additionally, PBOs rarely measure failure (in any of the outputs) explicitly. Instead, failure is measured by inferring from success which is commonly measured against CSF. Therefore, specific efforts and steps should be taken by PBOs for purposes of identifying and measuring failure. It must be emphasized that the study does not propose a standard definition and criteria of measuring failure or success. Instead, project-specific approaches should be considered since the understanding of failure varies and is dependent on the stakeholders and the nature of projects (Jugdev and Muller, 2005; Müller and Jugdev, 2012). Thus, instead of a 'universal approach' to measuring failure, the study aligns with scholars who recommend having a benchmark. These include the IPA (2020, p.11) who encourage taking a system-wide view and contextual measurement criteria by *"including operating context, boundaries with partners*

[2] Similarly, sectoral reports focus more on cost, time and quality (CIOB 2019; 2021; RIBA, 2019). This is evident in the measurement of public funded projects as observed by the Department for Transport (2019, p. 7) *"Major projects are often asked to deliver against aggressive timescales set early in their* lifecycle*. They are expected to deliver to schedule and budget and, as they employ public money, to be right first time".*

and operational change" when measuring failure. More specific, the IPA (2020, 2021) recommends the following; using project/programme outcome profile for developing a stronger business case; outlining how success/failure will be measured, and; specific metrics to be used in assessing project outcomes (social value). This also echoes the need for setting up a correct measuring criteria[3].

8.2.3 Objective Three – Review the common underlying root causes of project failure within the construction sector.

Participants in the study highlighted several wide-ranging causes of project failure such as poor planning, clients' financial challenges, poor communication, optimism biasness, competition and inadequacies in business case preparation. Correspondingly, the Green Book (2020) refers to project initiation inadequacies as one of the factors leading to project failure. The complex nature of construction projects and PBOs' (internal) conflicting needs such as profitability and productivity were also cited as causes of failure. This aligns with Dekker (2013, p. 245) who notes that failure occurs *"While pursuing success in a dynamic, complex environment with limited resources and multiple goal conflicts, a succession of small, everyday decisions eventually produced breakdowns on a massive scale"*[4]. In conclusion, the study associates the causes of P*r*F to the following levels or factors shown in Table 8.1 below:

[3] The BIS (2020) encourages SMART (Specific, Measurable, Achievable, Realistic and Time-limited) objectives to guide with monitoring and evaluation of projects.

[4] Dekker and Pruchnicki (2014, p. 6) also note that *"Adverse events are not the result of an initiating event or a root cause that triggers a linear series of events. Instead, they emerge from (normal) interactions between many system components".*

Table 8.1 Classification of Causes of Project-related Failures

Level	Examples	Associated References
Individual	Optimism biasness; poor communication; inexperience; beliefs.	Pidgeon and O'Leary (2000); Cannon and Edmondson (2005).
Project	Project complexity, size and location; uniqueness; multiple parties, temporal teams; technology.	Flyvbjerg (2014); Chen (2015); Damoah et al. (2021).
Organisational	Organisational culture; financial challenges; profit orientation; leadership and management.	Atkinson (1999); Pidgeon and O'Leary (2000); Flyvbjerg (2014).
Sectoral	Competition; economic factors; regulatory and institutional frameworks; culture.	Flyvbjerg (2014); Levitt and Scott (2016); Damoah et al. (2021).

By taking a multilevel approach to the causes of P*r*F shown in Table 8.1 above, the study concludes by arguing in favour of a contextualist approach of assessing failure (Morris and Geraldi, 2011; Sage *et al.*, 2014; Stingl and Geraldi, 2017). This is unlike the reductionist approach which mostly associates P*r*F with technical factors and limitations in project management competencies**.** This aligns with Dekker (2011) who discourages a 'proximal' approach to understanding the causes of failure by taking a multilevel approach that includes factors related to both the organisation (including individual and project levels) and the sector.

8.2.4 Objective four – Explore the extent and nature of current practices, in the Use of past project failures.

Similar to the wider practice of OL, the findings reveal an 'event' approach to Lf-PRF, evidenced by structuring learning at or after project completion. This is done mostly via 'lessons learnt' meetings and project review reports, as observed by the RICS (2016). The practices used in Lf-PRF are summarised in the 'DATES' framework as follows:

- **Documents** – Reports, lessons learnt reports, meetings' minutes.
- **Actors** – Involve mostly project team members (internal members).
- **Technology** – Mostly rely on internal learning portals and emails.
- **Events** – Lessons learnt meetings, project reviews, CPD.
- **Space** – Both physical (main offices and site offices) and online (Microsoft teams).

Considering the OL facets outlined by Lipshitz *et al.* (2002), OL it can be concluded that PBOs rely mostly on the structural facet when Lf-PRF by utilising learning mechanisms such as lessons learnt meetings. In addition, the findings reveal that Lf-PRF is biased towards major projects-related failures[5] and health and safety-related failures. For instance, the Department for Transport (2019) and NAO (2014; 2021) reports discuss lessons from major rail projects such as Crossrail and the collapse of Carillion Plc, and more recent, the Grenfell Tower fire disaster.

In addition, silos exist within PBOs that may be presented as dualities. These are created by the professions or departments, age or someone's position within the organisation. For instance, participants referred to 'Young Engineers' Forum' and 'Resident Services Engineers' as teams where failures are discussed. Reference was made to coaching and mentoring for senior team members whilst operatives engage more in skills and regulated/trades training. Simply put *"the people in suits don't talk enough to the people in boots!"* (CIOB 2019, p. 10). Thus, the CIOB (2019) advises engaging everyone to learn from mistakes without blaming[6]. Cross-organisational learning is also rarely practiced at the sectoral level. This is attributed mostly to the negative impact of failure on PBOs' competitiveness. Lack of cross-organisational learning highlights a focus on internal learning or experiential and less of exploitative learning (March, 1991; Levinthal and March, 1993). Therefore, this study argues for the adoption of both experiential and exploitative (vicarious) Lf-PRF. This is because vicarious learning enables PBOs to avoid experiencing negative consequences of a failure if it occurred in the actual sense.

8.2.5 Objective Five - Assess whether failure may inform organizational learning in PBO's.

The findings of this study reveal that failure rarely informs OL due to a number of reasons. Firstly, the industry does not feel safe to share the failures with lessons mostly being structured at the end of a project. Secondly, in trying to protect their reputation by not sharing failures and the need to move onto new projects, PBOs tend to focus more on

[5] The emphasis on big project highlights the sectors' selective approach to Lf-PRF based on size and impact. See also NAO (2014) report which discusses lessons from other major projects such as High Speed 1 (HS1) and High Speed 2 (HS2), West Coast Mainline Modernisation and Thameslink besides Crossrail.

[6] With such silos, there is emphasis on what senior team members should do in addressing challenges or failures such as quality control without engaging their subordinates. For instance, the BIS (2010) provides guidance on how the small challenges or issues/deviations are left for junior managers to handle while larger ones involve the senior responsible officers and the project manager.

their ‘future’ activities instead of learning from past and present failures. Consequently, there is a focus on failure detection or identification instead of learning from such failures. In most cases, this does not lead to changes within the system and is evidenced by an emphasis on ‘risk and uncertainty’ by some of the sectoral reports (RICS, 2016; CIOB, 2021). In other terms, there is more ‘analysis of failure’ but less of how to learn or implement the lessons. Therefore, instead of OL being influenced by failures and creating time for learning from such past experiences, PBOs engage in different project management practices and tools in order to eliminate the risks; hide the failures, and; sometimes blame others in order to protect their reputation. For instance, the CIOB (2019, p. 19) notes that *“Identifying where, why, and how failure occurs is important…. The consequential economic and reputational loss caused by poor quality can be significant”.* On the contrary, this study argues that past failures should be incorporated in the organisation and project delivery system so as to inform the risk management process[7].

Thirdly, Lf-PRF is perceived as a non-revenue generating activity and tarnishes a PBO’s image. Similarly, it was observed from the RICS (2016, p. 10) report that: “L*earning from failure is a waste of time when there are other projects to work on… Meeting the client is more about impressing them than dwelling on problems and can be a great exercise in self-promotion…”.* Thus, to encourage Lf-PRF, it is important to highlight how PBOs and the wider construction sector can benefit from it. For instance, Cannon and Edmondson (2005) contend that lessons from failures do help improve performance.

8.2.6 Objective Six - Construct a model and evaluate whether it facilitates organisational learning from P*r*F(s) among PBOs.

Unlike the focus on a single facet or approach such as ‘structural‘, ‘technological’ or ‘cultural’ approach, the various causes of failure and barriers to Lf-PRF identified from the collected data emphasize the need to consider several mechanisms. These are summarized in the following facets; structural, cultural, policy, psychological safety, contextual, technological, governance, and Nth facet(s). This is also based on the realization that understanding and defining failure is subjective and complex (Pidgeon and

[7] It was observed that though construction reports provide lessons to PBOs, such reports cover ‘what should be learnt’ but rarely give guidelines on ‘how that should be learnt’. Reports also do not present how the lessons were learnt, instead they present lessons that were learnt.

O'Leary, 2000; Dekker, 2011). Hence, simply relying on technological approaches does not fully address socio-economic factors associated with failure such as scapegoating and lack of ownership. Accordingly, the 'technological' approach or facet, should be supported by other facets such as 'psychological safety' and 'policy' facets. Additionally, it is important to consider the influence of the external environment or context on Lf-PRF. This aligns with scholars such as Morris and Geraldi (2011) who recommend taking an institutional context level when managing projects. Figure 8.1 below gives a summary of the key elements of the multilevel model for Lf-PRF discussed in Chapter 7.

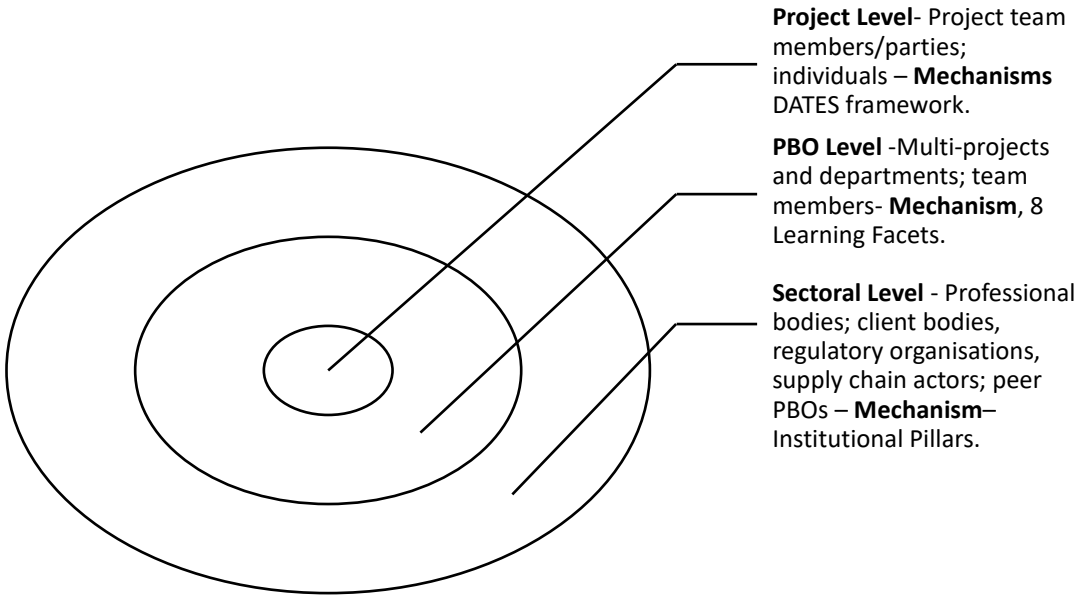

Figure 8.1 Institutional Field and a Multilevel Approach to Lf-PRF.

Evidently from Figure 8.1, Lf-PRF within PBOs is influenced by the external environment. Specific reference is made to the HSE's influence on mechanisms for capturing, documenting and sharing health and safety-related failures within the sector.

For purposes of credibility and further development, the developed model was evaluated through interviews. As discussed in Chapter 7, participants indicated that the model does represent the key elements and features of the process of Lf-PRF in construction. Participants further emphasized the need to engage 'everyone' in the process of Lf-PRF which reinforces the adopted multilevel approach. Table 8.2 below provides a summary of

the multilevel approach to Lf-PRF with an inclusion of the individual level to emphasis the importance of individual team members' influence on Lf-PRF.

Table 8.2 Multilevel Approach for PBOs to Learn from Failure

LEVEL	KEY FEATURES	ASSOCIATED REFERENCES
Individual	Failure ownership; openness.	Cannon and Edmondson (2001, 2005).
Project	Clarity in documenting failures; accessibility.	Sage *et al.* (2010); Goodman *et al.* (2014).
Organisational (PBO)	Blameless culture; transparency; leadership input.	Lipshitz *et al.* (2002); Edmondson (1999).
Sectoral	Collaboration; sectoral and professional body guidelines.	Madsen and Desai (2018).

As a summary, Table 8.3 below provides specific sections and chapters under which each objective has been addressed within the thesis.

Table 8.3 Summary of Key Findings Under each Objective

Objective	Key Findings	Method	Chapter
Objective One - Uncover how organisational learning occurs, within PBO's.	Rarely engage in cross-organisational learning; focuses on good practice and regulations; takes an events approach; influenced by normative and coercive isomorphic forces via codes of good practice, regulatory and compliance training.	Primary data (first round interview).	Chapter 5.
Objective Two – Review the understanding of project failure within the construction sector.	No agreed definition; measured against time, cost and quality; profitability; measured at project completion.	Primary data (first round interview).	Chapter 5 and 6.
Objective Three – Review the common underlying root causes of project failure in the construction sector.	Individual related (inexperience, beliefs, optimism biasness); Project related (size, complexity, uniqueness, multiple parties); Organisational related (leadership; profit orientation, organisational culture); Sectoral related (competition, economic factors, culture).	Primary data (first round interview).	Chapter 5.
Objective Four – Explore the nature of current practice in the use of past project failures.	Documents (lessons learnt reports); Actors (internal team members); Technology (emails and internal learning portals); Events (lessons learnt meetings, project reviews, CPD); Space (physical and online).	Primary data (first and second round interviews).	Chapter 5 and 6.
Objective Five – Assess whether failure may inform organizational learning in PBOs.	Focused on failure identification and mitigation; blame game; Perceive Lf-PRF as unproductive and non-revenue generating.	Primary data (first and second round interview).	Chapter 6.
Objective Six – Construct a model and evaluate whether it facilitates organisational learning from P*r*F(s) among PBOs.	Multilevel approach via: Sectoral level (cross-organisational learning, professional bodies, PBOs and regulatory bodies); PBO level (8 learning facets, cross department); Project level (team members, documents, technological tools, events, physical and online).	Primary data (first and second round interview).	Chapter 6 and 7.

8.3 CONTRIBUTION TO THEORY AND PRACTICE

The overall aim of the study was to enhance Lf-PRF among PBOs. Thus, in that endeavour, the following contributions have been made by the study.

8.3.1 Contribution to Theory and Literature

Failure remains subjective and under researched among construction professionals. Thus, this study has extended literature on the definition and understanding of failure. This is by discussing failure via the institutional perspective which argues for a multilevel and multisector involved. This was informed by Neo-institutional Theory's isomorphic forces. Secondly, with few studies being conducted on project-related failure and learning from it, the study has contributed to the literature on 'failure' by highlighting the causes of failure; the perception of failure and response to failure. This also includes highlighting the barriers associated with learning (from failure) among PBOs and practices that may encourage learning from failure. This is outlined in the model for Lf-PRF which highlights the 8 facets, institutional pillars and mechanisms for collection and sharing lessons. This is unlike the typical focus on lessons learnt meetings which are common among project actors. Overall, the study's theoretical contribution is associated with the following:

a) **Understanding of Failure – Socio-cultural Perspective** – Unlike the typical time quality and cost perspective, the study argues for a wider perspective which pays particular attention to the wider society's needs. This is unlike the focus of project outputs (via time, cost and quality) mostly measured against the delivery team's participants. Thus, based on Neo-institutional Theory, the wider society actors to be considered in a multistakeholder approach are associated with the three isomorphic forces: coercive force (regulatory bodies, government agencies, client related bodies); normative force (professional bodies such as APM, learning institutions) and mimic force (end-users, peer PBOs). This is an agreement with scholars who contend that that projects are not delivered in a vacuum since there

b) **Model for Lf-PRF** – Realizing the need for a population approach to learning as opposed to individual based, the study encourages learning at the following levels; project level, organisational level and sectoral level. See Chapter 7 for details. This is because each level offers opportunities for collecting and sharing lessons on failure. Additionally, the identification of the three levels for Lf-PRF highlights the influence of the external environment on learning from failure through professional

bodies, regulatory bodies, learning institutions (universities) and peer PBOs (mostly through competition). More specifically, the model has identified 8 facets for Lf-PRF by building on Lipshitz *et al.* (2002) 5 facets (structural, policy, cultural, psychological and contextual) by adding 3 more facets (technological, governance and N^{th} facets).

8.3.2 Contribution to Practice

The contribution to practice is associated with the perception of failure and learning. Instead of the typical practice of learning from good practice mostly through adoption of project management practices such as risk management the study argues for learning from failure-related experiences. This is line with the earlier definition and understanding of learning by Argyris (1977) as the 'correction of errors'. Consequently, this calls for the change in perception of failure from being a negative experience to an opportunity for leaning. Additionally, instead of the typical internal learning (within single projects or teams), PBOs are being encouraged to adopt cross-organisational learning. Thus, instead of competition, PBOs are being encouraged to collaborate for the benefit of all supply actors as echoed by Scholten *et al.* (2019).

Furthermore, in order to encourage PBOs to Lf-PRF, the study has developed a toolkit which highlights four Action Areas (AA); Action Area (AA1) emphasizes the importance of firstly outlining or providing the definition and measurement criteria of failure. This is based on the understanding that Lf-PRF can only be done once a failure has been identified. Secondly, AA2 calls for PBOs to demonstrate the benefits and opportunities of Lf-PRF to both the organization (and its individual employees) and other supply chain actors. Thirdly, AA3 calls for creating a conducive environment for Lf-PRF by embedding the identified 8 facets within their organization. Lastly, AA4 calls for the need to identifying 'who', 'where' and 'when' to Lf-PRF summarized in the 'DATES' framework (Documents, Actors, Technology, Events and Space). See Appendix T1 for details.

The study also calls for a context based approach to analysing failure and learning from it. Therefore, it remains incumbent upon each PBO to 'situate' their learning environment and mechanisms for effective Lf-PRF. Accordingly, the 'N^{th} Facet' in the model echoes the need for PBOs to engage in continuous learning and go beyond the identified facets.

8.4 RESEARCH LIMITATIONS

Similar with earlier studies' findings, the collected data did not provide a conclusive/standard definition and measurement criteria of 'project failure' (Pinto and Mantel, 1990; Müller and Jugdev, 2012). However, this study succinctly defines project failure as not meeting a project's goals or functionality. This may also include both small failures (such as defects) and large failures (such as low return on investments, collapse of a building or its components). It is worth noting that this does not serve as a universal definition/understanding of failure, but offers a building block for further research and understanding of failure. This is primarily due to the following reasons. Firstly, having drawn participants via non-probability sampling method of snowball sampling, the sample size is not representative. Secondly, for purposes of scoping, the study focused on construction project team members such as architects, engineers, planners and quantity surveyors without engaging clients. Furthermore, failure in its nature is subjective and viewed differently by different parties or stakeholders on a project (Jugdev and Muller, 2005; Müller and Jugdev, 2012).Thus, having advocated for a multi-discipline approach to measuring failure, a wider team which includes the client and other project stakeholders should be considered in future studies. In addition, failure in its nature is subjective and viewed differently by different parties or stakeholders on a project (Jugdev and Muller, 2005; Müller and Jugdev, 2012). Furthermore, Lf-PRF presently in construction remains unstructured and takes an ad-hoc approach mostly via lessons learnt meetings. Thus, as a guide the study identifies eight facets for Lf-PRF. However, the facets cannot be standardized across PBOs, instead they serve as building blocks for enhancing the process of Lf-PRF. This is due to the fact that 'learning' and 'failure' are influenced and perceived differently by parties or organisations depending on the context (Desai, 2015).

Nevertheless, even with the identified limitations, having put in place appropriate measures (such as data saturation, credibility and transparency) to guide the whole research process (outlined in Chapters 4 and 5), the study's findings contribute towards the understanding of 'failure' and thereof, learning from it. Importantly, realising the challenge of analysing qualitative studies, the study adopted Neo-institutional Theory and Situated Learning theories which both acted as guide in the formulation of interview questions and eventually analysis of the data through codes or themes identified deductively and inductively (outlined in Chapters 3 and 4).

8.5 RECOMMENDATIONS AND IMPLICATIONS FOR FUTURE PRACTICE

As observed by scholars, a social constructionist approach does not provide fixed or exhaustive conclusions, but instead offers insights and raises questions on the subject matter (Bahari, 2012). Therefore, based on the collected data, the following recommendations for practice have been drawn:

8.5.1 Failure Definition/Perception and Measurement

Paramount to the process of Lf-PRF is the identification, understanding and measurement of failures (Cannon and Edmondson, 2001, 2005; Edmondson, 2011; Desai, 2015). In view of that, the following recommendations have been made:

a) Realizing the subjective nature of failure, it is important that a multi-discipline (and multiple-organisational) approach is considered when defining failure. Additionally, failure is a social phenomenon which should be understood over time and in consideration of various 'people', 'groups' and 'organisations' (Dekker and Pruchnicki, 2015). Thus, from a Neo-institutional theory perspective, the multiple organisations and disciplines for consideration are summarized as follows: coercive-related parties (such as client bodies, government, regulatory bodies, financial institutions); normative-related parties (professional bodies, learning institutions), and; mimic-related or cultural-cognitive pillar related parties (peer PBOs, end-users, suppliers, and supply chain actors).

b) Instead of alienating failure and being viewed as having negative consequences, it should be regarded as part of the project delivery process and an opportunity to address weaknesses in the system. This aligns with Dekker (2013, p. 245) who encourages inclusion of failure in our everyday discussion: *"This does not mean that failure is inevitable, or that all risk is unmanageable. It does, however, require that managers think with a new vocabulary to complement the componential discussion that keeps dominating their work today"*[8].

[8] This is also against the background that failure still occurs even when competent team members are engaged as echoed by Core (2017, p. 21) that *"What is significant about the Edinburgh situation is that highly professional and competent teams of structural engineers were unable to identify, through detailed visual inspections, the existence of serious defects in the construction of the walls they examined".*

8.5.2 PBO and Project Level Learning Focused Recommendations

At both the project and PBO levels, a balanced and holistic approach towards Lf-PRF should be considered. This includes balancing between learning from 'success' and 'failures' and from 'small and large' failures. This is in order to show appreciation to team members while avoiding a 'witch hunt' or 'scapegoating'. Other measures that may aid taking a holistic approach include the following:

a) Instead of focusing on the use of 'technology' or 'virtual learning spaces', results reveal how where possible face-to-face learning should be facilitated. This (face-to-face) can be faster with problem solving and allows for more detailed sharing of information on a particular issue. Similarly, Sense (2007) observes that multiple face-to-face meetings allow for effective sharing of individuals' experience and tacit knowledge with other project team members. However, because projects (and team members) are often separated geographically, the use of virtual or cloud-based systems also offer opportunities to circumnavigate such learning barriers. Hence, PBOs should explore taking a balanced approach of using 'face-to-face' supported by virtual' based approaches when Lf-PRF.

b) Instead of relying on a single approach such as technological- or cultural-related approaches, the study recommends PBOs embedding the identified 8 facets as building blocks in the process of Lf-PRF. These should serve as aids in the key stages or process of learning, namely knowledge creation, coding and transfer (Grant, 1996; Scholten *et al.,* 2019).

In addition, the creation of a conducive environment for Lf-PRF within a project or a PBO, should be supported with the provision of tools/mechanism for collecting and sharing lessons[9]. Though a 'holistic' approach entails engaging 'everyone' in the learning process, a situational or context approach should be considered when selecting who should be involved in Lf-PRF. Therefore, small groups of learning in formal settings are encouraged even though bigger groups are good for stimulating collective enquiry (Sense, 2007). Accordingly, an appropriate size of learners should be selected depending on the size and nature of the failure instead of taking a generic approach.

[9] Based on the findings, these are summarised in the 'DATES' (Documents, Actors, Technology, Events and Space) framework. Key to actualising the use of these tools is ensuring accessibility by all key parties.

8.5.3 Sectoral Level Recommendations

Realising that 'failure' and 'learning' are both influenced by the context, it is worth ensuring that sectoral-specific measures are put in place. From an institutional perspective, since project actors' behaviour is guided by the contract, at the sectoral level, consideration should be given to contractual agreements. This is by reviewing contractual arrangements or provision of clauses covering learning within and across project parties. For instance, frameworks are regarded as best suited for Lf-PRF since they offer long term relationships for exchange and sharing lessons from failure. Additionally, the main contractor and the client should take a leading role in fostering non-adversarial relationships (between them and subcontractors) since they hold power over who participates in future works. This also aligns with Hackett's (2018) recommendations that in a bid to improve quality, the sector should: review the tendering process and contract terms; avoid adversarial relationship to encourage learning; allow retention and transfer of commercial and technical construction information, and; encourage international engagement, and learning from other sectors (such as the aviation and health industries). Other recommendations at the sectoral level include the following:

a) **Consider boundary spanning roles of regulatory and professional bodies** - There is need to engage regulatory and professional bodies in the process of Lf-PRF for legitimizing and organizing the process. This aligns with Hackitt (2017) who advises "*ensuring dialogue between the government, the regulator and industry beyond the consultation phase*". Since almost every participant and their respective organisations are affiliated to professional bodies such as APM and CIOB, these may serve as both sources of lessons and distributors by acting as 'boundary spanners'.

b) ***Government and clients' influence***[10] - In agreement with Holgeid and Thompson (2013) the government and its related departments can create a platform and incentives that enable other key stakeholders involved in the project delivery process to take intelligent failures/risks and accepting failure. This may include an online portal for anonymous submission of failure-related information on government projects and introducing 'failure amnesty'. In addition, clients such as the government should equally demand for lessons from failures.

[10] The government's influence on learning from failures especially realizing that it spends huge sums of money on construction-related projects cannot be over emphasized. However, except for the HM Government (2020) report which mandates the maintenance and submission of the building drawings to the local authority by the client, there remains little or no guidance on the role of the client in Lf-PRF.

c) ***Address contractors' commercial needs –*** The findings show a bias towards the physical or tangible side of failures within the sector such as quality and completion time without addressing contractors' profitability. This may range as low as 0.5 or 2% at times. Without considering their profitability, PBOs are forced to resort to cost cutting measures resulting in project failures[11]. Thus, instead of only considering project success via the lens of the 'clients' needs' or 'project objectives', contractors' profitability should be part of that criteria.

d) ***Appropriate risk allocation and sharing –*** It was observed that the client's tendency of shoving risks down the contractual chain to the main contractor who shoves them down to designers and further down the contractual chain humpers Lf-PRF. To avoid that and encourage Lf-PRF, risks and their resulting negative consequences should be apportioned or shared equally (Liu and Low, 2009).

e) ***Demonstrate the benefits of Lf-PRF*** - Findings indicate that Lf-PRF is seen as a non-revenue generating activity. Thus, if PBOs are to be encouraged to engage more in Lf-PRF, associated benefits of learning from failure should be outlined.

Overall, the study recommends that instead of Lf-PRF being centred on PBOs, for effective sharing of lessons, engaging other actors and organisations in the institutional field for leaning from failure remains paramount. Essentially, a context and collective approach to Lf-PRF is encouraged. Figure 8.2 below summarizes the key actors and institutions influencing Lf-PRF at the sectoral level.

[11] Therefore, instead of engaging in Lf-PRF, PBOs focus more on profitability and project completion or on cost reduction measures. Hence, Cole (2017) advises evaluating the negative impact of the desire for faster and lower construction so that that does not negatively impact on the safety and quality of the product.

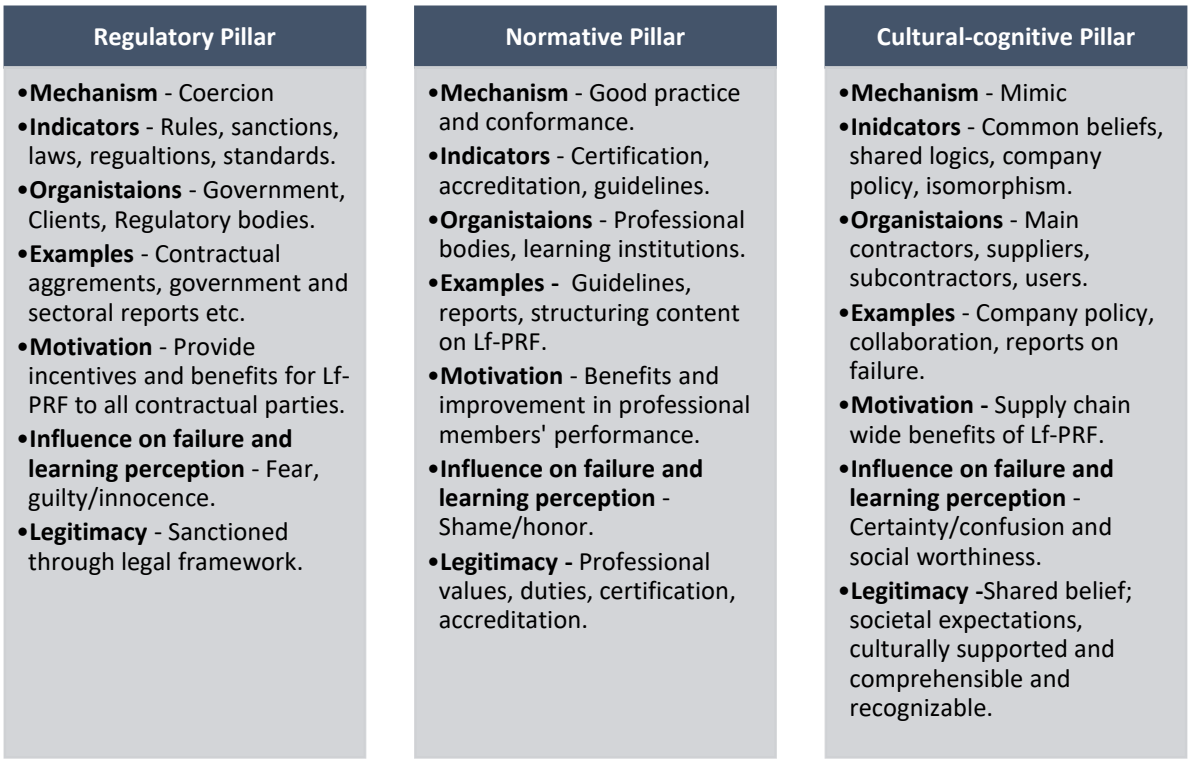

Figure 8.2 Influence of Institutions on Learning from Project-related Failure at the Sectoral Level Adapted from Scott (2001) and Jaber and Oftedal (2020).

8.6 AREAS FOR FUTURE RESEARCH

The study has identified 8 facets (structural, cultural, policy, psychological safety, context, technological governance and the N^{th} Facet) for purpose of Lf-PRF. These should generate specific areas of research to better understand how each would contribute to Lf-PRF. For instance, how governance influences Lf-PRF could be a starting point for future research. In addition, specific technological tools should be identified such as BIM, and how they may enhance Lf-PRF.

Furthermore, based on the understanding that ‘failure’ and ‘learning’ are social phenomena, instead of the usual technological focus, the study calls for understanding the power differentials of parties involved in learning and the influence of power on the process of Lf-PRF. In addition, much of the benefits of Lf-PRF remain anecdotal. To encourage Lf-PRF, it will be interesting to see research taking a more focused approach on actualising the benefits of Lf-PRF such as improved competitiveness and project delivery; or how such lessons can reduce the occurrence of failures such as time and cost overruns.

With respect to research methods, more ethnographic-centred research should be considered. This is in order to get more insights and first-hand experience and information on failure. This may be supported by case studies with data collected via interviews and direct observation. additionally, this study adopted a qualitative study which is limited in terms of the of numbers participants. Thus, further research could take a larger sample via surveys for a better understanding of failure. Other theories such as lean construction, specifically the Last Planner System (LPS), should be considered in encouraging Lf-PRF since this (LPS) encourages collaboration and cross-organisation learning amongst project leaders (referred to as last planners). Additionally, since failure is subjective, cross-sectoral research is encouraged and may include comparing learning practices within construction and that of other sectors such as health and aviation in order to improve Lf-PRF.

Schunk (2012) reasons that there is a difference between 'learning' and 'maturation'. Therefore, in this study, 'learning' is perceived as acquisition of new skills and change in behaviour while 'maturation' is understanding of the environment (and situations) and developing systems to support learning[12]. Consequently, future research may focus on 'maturation' in Lf-PRF by PBOs (ensuring that PBOs have a systematic approach, a conducive environment and tailored learning) instead of focusing on 'learning' alone which mostly is structured at the end of the project via 'lessons learnt' meetings. Furthermore, since leadership also influences individuals' activities within an organisation and realising that there are several approaches to leadership, it would be important to understand the appropriate leadership style and leaders' traits/skills that may support Lf-PRF.

Learning from failure, based on the findings, remains unstructured. Thus, research on structuring the content or inclusion Lf-PRF in the training curriculum for AEC students should be considered. Furthermore, at the sectoral level, research could be done on how professional bodies could structure and legitimize the process of Lf-PRF. This also calls for cross-professional body research since it has been observed that professional bodies conduct much of their learning in isolation via CPDs. With the realisation that individuals' and organisational behaviour is influenced by contractual conditions, it will be worthwhile

[12] Thus, it must be stated that the scope of this research was developing a framework and model for PBOs to apply in Lf-PRF. Hence, attaining maturity in Lf-PRF in PBOs is beyond this scope and is suggested for further research.

also to research and understand how the various types of contracts or clauses and procurement methods influence Lf-PRF.

8.7 CHAPTER SUMMARY

Though learning from failure incidents is being encouraged across several sectors, there are still challenges faced by PBOs in their attempt to Lf-PRF. Therefore, this study through the developed model provides building blocks for PBOs attempting to learn from failures and researchers conducting studies on failure (within and outside construction).

Overall, with several parties being involved in the process of Lf-PRF, the need for effective communication and collaboration by avoiding competitive tendencies cannot be overemphasized. This is primarily due to the fact that learning is a social process which involves interaction amongst learners. And as such, a multilevel approach is ultimately encouraged for effective Lf-PRF amongst PBOs. However, though the 8 facets for learning within PBOs have been identified for purposes of improving Lf-PRF, identification of failure remains a key factor in order to effectively learn from it. In view of that, three suggestions are made: Firstly, end users and other stakeholders should be engaged in the process of defining and measuring failure. This also aligns with other scholars such as Jugdev and Muller (2005), Müller and Jugdev (2012) and Desai (2015) who contend that ‘success’ and ‘failure’ vary amongst project team members such as contractors and end-users.

Secondly, failure should be measured at different intervals instead of immediately after completion. This may be five years later since some failures and benefits (project impact and outcomes) can only be observed after a certain period of time. Thirdly, instead of a standardized criterion, each project should employ different or unique criteria since projects have different stakeholders with varying needs and values. This further requires identifying unique measurement criteria for ‘projects’ and ‘programs’, since at times, these terms are loosely interchanged (Molloy and Stewart, 2013). Therefore, instead of taking a simplistic approach to Lf-PRF by relying mostly on technological tools, the study favours having multiple facets and actors. This also calls for concerted efforts from every stakeholder on a project and across the sector.

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APPENDICES

APPENDIX A – PhD RELATED PUBLICATIONS

JOURNAL PAPERS

Chiponde, D. B., Gledson, B. and Greenwood, D. (2022) 'Organisational learning from failure and the needs-based hierarchy of project- based organisations', *Frontiers in Engineering and Built Environment*, 2022(March 12), pp. 1–12.

Chiponde D, Gledson B, and Greenwood, D (2022) Contrasting Perceptions of Construction Managers and Project Managers around Failure in Light of Morris and Geraldi's Institutional Context – The Engineering Project Organisational Journal (EPOJ) – Special Issue on Appreciating the Contribution of Professor Peter W G Morris. 2022, pp 1-20.

CONFERENCE PAPERS

Chiponde, B D., Gledson, B. and Greenwood, D. (2020) 'An Integrated Approach to Learning from Project-Related Failures', *Proceedings of the 36th Annual ARCOM Conference*, (September), pp. 196–204.

Chiponde, B D., Barry, G. and Greenwood, D. (2019) 'Examining Construction and Project Management Perspectives of Project-Based Failure.*ARCOM 2019 - Productivity, Performance and Quality Conundrum, 2nd - 4th September 2019, Leeds, UK.* Leeds: Association of Researchers in Construction Management, pp. 649–657.

DOCTORAL WORKSHOP PAPERS

Chiponde, D. B., Gledson, B. and Greenwood, D. (2019) 'Exploring How Learning From Project- Related Failure Promotes Resilience In Project-Based Organisations', *Disaster Resilience in the Built Environment ARCOM Doctoral Workshop, 25th April, 2019, Northumbira University.*

Chiponde B D*,* Gledson B, and Greenwood D (2019): *Project-Related Failures and Problems of Quantitative-only Enquiry,* ARCOM Doctoral Workshop held on 26th February 2019, University College London, London.

Chiponde B D, Gledson B, and Greenwood D (2019) Paper title: *Learning from Project Failure by PBOs in the United Kingdom Construction Industry – A Mixed Methods Research Approach*. ARCOM Doctoral Research Methodology Workshop. Glasgow Caledonian University, Glasgow, UK, 1st November 2019.

Chiponde B D, Gledson B, and Greenwood D, (2018); *Failure and Learning in UK Project-Based Organisations: A Case for Productivity*. APM Doctoral Workshop held on 4th December 2018. Holiday Inn Manchester Piccadilly.

ORGANISATIONAL LEARNING FROM FAILURE AND THE NEEDS-BASED HIERARCHY OF PROJECT-BASED ORGANISATIONS.

Danstan Bwalya Chiponde, Barry Gledson and David Greenwood.

Abstract

Purpose: In his 1943 paper "A theory of Human Motivation" Maslow suggested a 'Hierarchy of Needs' as a classification system that described the stimuli for human behaviour. Hence, the purpose of this paper is to analyse project-based organisations (PBOs) reluctance in engaging in organisational learning from past projects failures by relying upon institutional theory Maslow's model.

Methodology: Interviews were held with construction professionals from the UK construction industry, and data was analysed using thematic analysis.

Findings: Besides the need to learn from failures, PBOs' main competing needs revolve around their 'competitiveness'; 'profitability and 'productivity'; (need for) 'repeat business', and; 'reputation and partnering'. Mirroring these needs against Maslow's hierarch of needs, 'competitiveness' and 'profitability' are analogous to foundational 'physiological' and 'safety' needs. The need for 'repeat business' and 'reputation' are approximated with Maslow's 'affiliation' and 'self-esteem' needs, and organisational learning is associated with 'self-actualization'. From an institutional theory's point of view, such response to failure is influenced by the need to show legitimacy and conformity imposed by institutional factors.

Originality: Unlike past studies, that present organisational learning within PBOs as though it is a straightforward process, this study highlights the need of understanding various competing needs within a PBO and the external pressure.

Practical Implications: Instead of solely relying on technological tools for purpose of organisational learning from failure, PBOs and the sector at large should appreciate the influence of institutional factors and the external environment on learning from failure.

Keywords: Failure, Needs, Organisational Learning, Project-Based Organisations.

Citation: Chiponde, D. B., Gledson, B. and Greenwood, D. (2022) 'Organisational learning from failure and the needs-based hierarchy of project- based organisations', *Frontiers in Engineering and Built Environment*, 2022(March 12), pp. 1–12.

Link: FEBE-10-2021-0051_proof 121..132 (emerald.com)

EXAMINING CONSTRUCTION AND PROJECT MANAGEMENT PERSPECTIVES OF PROJECT-BASED FAILURE.

Danstan Chiponde, Barry Gledson and David Greenwood.

Abstract

Projects are distinctive, time-constrained, undertakings meant to generate benefits for their stakeholders. They are delivered by Project-based organisations (PBOs) whose various actors separately consider achievement in relation to a project's outputs, outcomes, and impact. For example, contracting organisations typically consider projects that fail to meet their principal cost and time targets as having been unsuccessful, whereas the various sponsors, customers, collaborators, and end-users may instead base their evaluation upon the ultimate operational results of these same projects. The aim was to examine the knowledge base for contrasting perspectives around project-based failure in the construction sector. This required scrutiny and analysis of the extant literature, using a systematic-type literature review approach within and across construction management (CM) and project management (PM) literature. This revealed that in PM literature, considerations of failure are often more introspective and discussed in more general terms; with its main causes being associated with the PM function itself. Whereas the CM literature instead focuses on more specific and external failures; with causes more likely attributed to the wider supply chain and contextual factors. Results can help inform the design of dedicated research instruments to help better understand the impact of failure on PBOs.

Keywords: failure, organisational learning, performance, success**.**

Citation: Chiponde, B D., Barry, G. and Greenwood, D. (2019) 'Examining Construction and Project Management Perspectives of Project-Based Failure.*ARCOM 2019 - Productivity, Performance and Quality Conundrum, 2nd - 4th September 2019, Leeds, UK.* Leeds: Association of Researchers in Construction Management, pp. 649–657.

Link: http://nrl.northumbria.ac.uk/40515/

CONTRASTING PERCEPTIONS OF CONSTRUCTION MANAGERS AND PROJECT MANAGERS AROUND FAILURE IN LIGHT OF MORRIS AND GERALDI'S INSTITUTIONAL CONTEXT

Danstan Bwalya Chiponde, Barry Gledson and David Greenwood.

Abstract

In their 2011 paper titled "Managing the Institutional Context for Projects" Morris and Geraldi raised the importance of the institutional context in the management of projects. Building on that, this study proposes the conceptualisation and understanding of project-related failure and success through an institutional perspective. This is based on an understanding that projects are distinctive, time- constrained, undertakings meant to generate benefits for all associated stakeholders whose perception of failure varies. Yet, little attention has been given to explaining how such perception is influenced by underlying institutional contexts. Therefore, the aim of the study was to examine the knowledge base for contrasting perspectives of project managers and construction managers around project- related failure in light of the institutional perspectives. To do this, a systematic literature review (SLR) approach was adopted. The first finding of note from this SLR is the dominance of interest in and from the UK Construction Industry (UKCI). This may be attributed to the culture and structure of the UKCI driven by the autonomy and authority of organisations such as the National Audit Office (NAO). The findings further reveal that in the general Project Management (PM) literature, considerations of failure are more introspective and discussed more in terms of project outputs with the causes associated with project management limitations. Considering the three levels discussed by Morris and Geraldi (2011) the PM perspective of failure and success can be associated with the technical level of analysis of project outputs. In contrast, the Construction Management (CM) literature focuses predominantly on specific failures, and on external failures. Causes are more attributed to profitability and the wider supply chain and this can be associated with Morris's strategic level focus on effectiveness and value. The results from this study call for a systemic approach by heeding the call of Prof. Peter Morris to consider the institutional context level in the perception and analysis of failure instead of solely focusing on output or technical level parameters of time cost and quality.

Keywords: Project Failure, Project Manager, Construction, Perception, Institutional Theory.

Citation: Chiponde D, Gledson B, and Greenwood, D (2022) Contrasting Perceptions of Construction Managers and Project Managers around Failure in Light of Morris and Geraldi's Institutional Context – The Engineering Project Organisational Journal (EPOJ) – Special Issue on Appreciating the Contribution of Professor Peter W G Morris. 2022, pp 1-20.

Link: https://nrl.northumbria.ac.uk/id/eprint/49444/

AN INTEGRATED APPROACH TO LEARNING FROM PROJECT-RELATED FAILURES.

Danstan Bwalya Chiponde, Barry Gledson and David Greenwood.

Abstract

Project Based Organisations (PBOs) are established to optimise project delivery. Unfortunately, as failures still occur on projects, the anticipated performance enhancements of PBOs have not lived up to expectations to date. This has led to interest in how PBOs learn from project-related failures. Regrettably, despite considerable financial investment on projects, particularly infrastructure projects, there is limited research on learning from project failures. Hence, the aim of this study was to assess the practices and behaviours of project-based actors and organisations towards learning from project-related failures. To achieve that, semi- structured interviews were conducted with construction project management practitioners. Results reveal that systematic attempts to learn from project-related failures are rare. Barriers relate to the temporary and fragmented nature of projects, the negative perceptions around failure, and the fear of being blamed or punished for failure(s). Where such learning exists within PBOs, mechanisms such as project reports and project review meetings are typically used. The cause of project failures ranges from the actions of project actors themselves such as the project manager, designers, contractors and the client, to external events such as financing and technological challenges. The implication for project actors is that instead of relying on ad-hoc learning mechanisms, systemic and sector-wide approaches should be encouraged. This is by integrating the following six facets in the process of learning from failures: structure; culture; psychological; safety; policy; context, and; technology.

Keywords: project failure, PBOs, learning practices, organisational learning.

Citation: Chiponde, B D., Gledson, B. and Greenwood, D. (2020) 'An Integrated Approach to Learning from Project-Related Failures', *Proceedings of the 36th Annual ARCOM Conference*, (September), pp. 196–204.

Link: https://www.researchgate.net/profile/Danstan-Chiponde/publication/344166419_An_Integrated_Approach_to_Learning_from_Project-Related_Failures/links/603c1e164585158939d97edb/An-Integrated-Approach-to-Learning-from-Project-Related-Failures.pdf

APPENDIX B – ETHICS APPROVAL EMAIL

Research Ethics: Your submission has been approved

EthicsOnline@Northumbria <EthicsOnline@Northumbria>

Wed 23/10/2019 13:13

To: danstan.chiponde <danstan.chiponde@northumbria.ac.uk>

Cc: Barry Gledson <barry.gledson@northumbria.ac.uk>

Dear danstan.chiponde,

Submission Ref: 16377

Following independent peer review of the above proposal*, I am pleased to inform you that **APPROVAL** has been granted on the basis of this proposal and subject to continued compliance with the University policies on ethics, informed consent, and any other policies applicable to your individual research. You should also have current Disclosure & Barring Service (DBS) clearance if your research involves working with children and/or vulnerable adults.

* note: Staff Low Risk applications are auto-approved without independent peer review.

The University's Policies and Procedures are here

All researchers must also notify this office of the following:

- Any significant changes to the study design, by submitting an 'Ethics Amendment Form'
- Any incidents which have an adverse effect on participants, researchers or study outcomes, by submitting an 'Ethical incident Form'
- Any suspension or abandonment of the study.

Please check your approved proposal for any Approval Conditions upon which approval has been made.

Use this link to view the submission: View Submission

Research Ethics Home: Research Ethics Home

Please do not reply to this email. This is an unmonitored mailbox. If you are a student, queries should be discussed with your Module Tutor/Supervisor. If you are a member of staff please consult your Department Ethics Lead.

APPENDIX 1 - RESEARCH INSTRUMENT NO. 1 AND FIRST ROUND INTERVIEW QUESTIONS*:*

Table A.1 - Theoretical Underpinning of the of First Round Interviews

Item	Research Question	Associated Literature	Research Objectives
I	How does organisational learning occur, within PBO's?	(Crossan et al., 1999; Easterby-Smith et al., 2000; Koskinen, 2010, 2012)	Uncover how organisational learning occurs, within PBO's.
Ii	What are the common, underlying, root causes of project failure?	(Pinto and Mantel, 1990; Flyvbjerg, 2014; Agaiby et al., 2017; Liu et al., 2017; Gupta et al., 2019).	Analyse the common, underlying, root causes of project failure.
iii	What do you consider to be a failed project or failure?	(Pinto and Mantel, 1990; Atkinson, 1999; 2012; Liu et al., 2017; Gupta et al., 2019).	Examine what project failure is, in the construction sector.
iv	Are past project failures currently used, for organizational learning?	(Edmondson, 2004; Cannon and Edmondson, 2005; Shore, 2008).	Explore the extent and nature of current practice, in the use of past project failures.
V	How does (such) failure influence organizational learning in PBO's?	(Edmondson, 2004; Cannon and Edmondson, 2005; Shore, 2008; Shepherd et al., 2014).	Address whether and how, failure does inform organizational learning in PBO's.
	Additional Questions		Associated Objectives
Vi	Who should (should not) be involved in the process of learning from failure?	(Stehlik, 2014)	Uncover how organisational learning occurs, within PBO's.
vii	Does your organisation have any deliberate measures that encourage learning from failures? If so give examples.	(Edmondson, 2004; Cannon and Edmondson, 2005; Shore, 2008).	Explore the extent and nature of current practice, in the use of past project failures.
Viii	How willing are individuals and organisations to share lessons learned from failures?	(Shepherd, Patzelt and Wolfe, 2011)	Address whether and how, failure does inform organizational learning in PBO's.
Ix	How do you measure or determine a project is a success or failure?	(Pinto and Mantel, 1990; Atkinson, 1999; 2012; Liu et al., 2017; Gupta et al., 2019).	Examine what project failure is, in the construction sector.
X	What would be the barriers to learning from project failures?	(Edmondson, 2004; Cannon and Edmondson, 2005; Shore, 2008; Shepherd et al., 2014).	Address whether and how, failure does inform organizational learning in PBO's.

xi	Do you have any suggestions that may enhance the process of learning from failure in construction among PBOs.		

Second Round Semi-Structured Interview Questions

i) How is organisational learning conducted, within your organisation (PBO)?

……

ii) What are the main causes of project failure?

.....

iii) What do you consider to be a failed project or failure?

……

iv) Are past project failures currently used, for organizational learning?

.....

v) How does (such) failure influence organizational learning in your organisation?

.....

vi) Who should (should not) be involved in the process of learning from failure?

.....

vii) Does your organisation have any deliberate measures that encourage learning from failures? If so give examples.

.....

viii) How willing are individuals and organisations to share lessons learned from failures?

.....

ix) How do you measure or determine a successful or failed project?

.....

x) What could be the barriers to learning from project failures?

.....

xi) Do you have any suggestions that may enhance the process of learning from failure in construction among PBOs.

The End and Thank you for your time

:

APPENDIX 2 - RESEARCH INSTRUMENT NO. 2 AND SECOND ROUND INTERVIEW QUESTIONS*:*

Table A2- Theoretical Underpinning of the of First Round Interviews

Item	Research Question	Associated Theory	Associated Literature	Research Objectives
1	Does your organization use or refer to any sector reports or government guidelines or procedures on learning from failures? If so, give examples.	Institutional Theory	(O'Neil, 2009; Currie, 2012; Lukic et al., 2012; Milligan et al., 2014; Levitt and Scott, 2016; Littlejohn *et al.*, 2017).	I,IV, V
2	Does your organization use or refer to any sector reports or government guidelines or procedures on learning from failures? If so, give examples.	Institutional Theory	(O'Neil, 2009; Currie, 2012; Lukic et al., 2012; Milligan et al., 2014; Levitt and Scott, 2016; Littlejohn *et al.*, 2017).	I,IV, V
3	Does your organization have any networks in place within and outside your organization for learning from failure? If so, give examples.	Situated Learning	(Wiseman, 2007; O'Neil, 2009; Levitt and Scott, 2016)	I,IV, V
4	Are there any templates or documents within your organisation that are used for purposes of recording project-related failures within your organization? If so, give examples.	Structural Facet	(Sense, 2007; Sense and Badham, 2008; Littlejohn *et al.*, 2017)	I,IV, V
5	Are roles and functions clearly identified regarding learning from project-related failures within your organization? If so, give examples.	Structural Facet	(Sense, 2007; Sense and Badham, 2008; Littlejohn et al., 2017)	v
6	In an event of a failure or mistake being experienced on a project, how does your organization collect and share information within and outside your organization?	Cultural/Psychological Facet	(Lipshitz *et al.*, 2002; O'Neil, 2009; Shepherd et al., 2011; Grohnert et al., 2017)	IV, V
7	How are employees supported before and when a failure occurs or a mistake is made on a project?	Cultural and Psychological Facet	(Lipshitz *et al.*, 2002; O'Neil, 2009; Shepherd et al., 2011; Grohnert et al., 2017)	IV, V
8	Does the organization you work for allocate time for reflection and discussion on failures on projects? If so, kindly give examples.	Policy Facet	(Lipshitz *et al.*, 2002; O'Neil, 2009; Shepherd et al., 2011; Grohnert et al., 2017)	I,IV, V

9	Do you have any suggestions that may improve the process of learning from project-related failures?		(Lipshitz *et al.*, 2002; O'Neil, 2009; Shepherd et al., 2011; Grohnert et al., 2017)	VI

Second Round Semi-Structured Interview Questions

i) Does your organization use or refer to any sector reports or government guidelines or procedures on learning from failures? If so, give examples.

ii) Does your organization use any professional bodies' (such as CIOB, APM etc.) guidelines and publications on learning from failure? If so, give examples.

iii) Does your organization have any networks in place within and outside your organization for learning from failure? If so, give examples

iv) Are there any templates or documents within your organisation that are used for purposes of recording project-related failures within your organization? If so, give examples.

v) Are roles and functions clearly identified regarding learning from project-related failures within your organization? If so, give examples.

vi) In an event of a failure or mistake being experienced on a project, how does your organization collect and share information within and outside your organization?

vii) How are employees supported before and when a failure occurs or a mistake is made on a project?

viii) Does the organization you work for allocate time for reflection and discussion on failures on projects? If so, kindly give examples.

ix) Do you have any suggestions that may improve the process of learning from project-related failures?

The End and Thank you for your time

Appendix 3 - Participant Debrief Sheet

Name of Researcher: Danstan Bwalya Chiponde

Name of Supervisor (if relevant): Dr. Barry Gledson, Senior Lecturer, Engineering and Environment.

Project Title: Learning from failure in UK Construction Project-Based Organisations: An Examination of Actor Approaches, Intentions, and Behaviours.

1. What was the purpose of the project?

The purpose of this research is to assess how project failures can be used or inform the learning process among Project Based Organisations (PBOs) organising operations in the UK. This is because projects have now become a main form of operation in many industries including the construction industry. Yet, 'failures' are still a common feature on projects even when training and tools for managing projects have been improved. Additionally, failure among project participants is viewed as negative experience, though in other sectors such as aero engineering, it is considered as a source of valuable lessons that have helped improve the aviation industry. In order to get meaningful results, perspectives of key construction project management persons such as the project manager are considered in order to obtain information on practices and behaviours towards learning from project-related failures. The results will help develop a model that can be used to enhance learning among PBOs in order to mitigate future failures from occurring. Consequently this will help save huge sums of money, in some cases lives, that may be lost due to project-related failures.

How will I find out about the results?

The project is scheduled to be completed in September 2021. Thereafter, if requested, participants can be provided with a general summary of the findings via email.

If I change my mind and wish to withdraw the information I have provided, how do I do this?

In case you wish to withdraw your participation and have your data removed then this can be done by emailing the investigator at danstan.chiponde@northumbria.ac.uk requesting this.

The data collected in this study may also be published in scientific journals or presented at conferences. Information and data gathered during this research study will only be available to the research team identified in the information sheet. Should the research be presented or published in any form, all data will be anonymous (i.e. your personal information or data will not be identifiable).

All information and data gathered during this research will be stored in line with the Data Protection Act and will be destroyed after 12 months following the conclusion of the study. If the research is published in a scientific journal it may be kept for longer before being destroyed. During that time the data may be used by members of the research team only for purposes appropriate to the research question, but at no point will your personal information or data be revealed. Insurance companies and employers will not be given any individual's personal information, nor any data provided by them, and nor will we allow access to the police, security services, social services, relatives or lawyers, unless forced to do so by the courts.

If you wish to receive feedback about the findings of this research study then please contact the researcher at danstan.chiponde@northumbria.ac.uk.

This study and its protocol have received full ethical approval from Faculty of Electrical and Environmental Engineering Research Ethics Committee. If you require confirmation of this, or if you have any concerns or worries concerning this research, or if you wish to register a complaint, please contact the Chair of this Committee stating the title of the research project and the name of the researcher which have been provided in this debrief sheet.

Appendix 4 - Participant Information Sheet

Study Title: Learning from failure in UK Construction Project-Based Organisations.

Principal investigator (Researcher): Danstan Bwalya Chiponde

Supervisors: Dr Barry Gledson, Senior Lecturer, and Professor David Greenwood of the Faculty of Engineering and Environment.

You are being invited to take part in this research study. Before you decide whether to do so, it is important for you to read this leaflet so you understand why the study is being carried out and what it will involve.

Reading this leaflet, discussing it with others or asking any questions you might have will help you decide whether or not you would like to take part.

What is the Purpose of the Study

The aim of this research is to enhance learning from project-related failures among Project-Based Organisations (PBOs) in the UK Construction Industry. Hence, I am conducting this research in order to collect data on the current practices and approaches towards learning from such failures among PBOs. Doing this will help develop a model that can be used to inform the organisational learning process from project related failures.

Why have I been invited?

Since you work in a project environment, your experience and knowledge is highly valued in informing the research. It is important that we survey as many people as possible with this experience and you have indicated that you are interested in taking part in this study, and that you are an adult aged over 18 years. Hence minors in this research and those without relevant experience in a project environment have been excluded from this research.

Do I have to take part?

No. It is up to you whether you would like to take part in the study. This information sheet will help you make that decision. If you do decide to take part, remember that you can stop being involved in the study whenever you choose, without telling me why. You are completely free to decide whether or not to take part, or to take part and then leave the study before completion.

What will happen if I take part?

You will be asked to undertake a short interview with me, for approx. 30-45 minutes. This interview will be informal and will be arranged for a day and time that suits you best, and it could be held at your work place for example, or it could be held at a suitable alternative location. Alternatively telephone or Skype-type interview could be held. My skype ID is danstan.chiponde. With your permission I would audio-record the interview, to aid the research process.

The major inconvenience you might face is time taken. Hence, questions are few in order not to take longer than the estimated time.

Be reassured of confidentiality, anonymity, and that if, as a respondent you feel uncomfortable, you can withdraw at any point.

By taking part in the study this will hopefully help you consider issues around project-related failures, and strategies for organisational learning, which you may be able to use within your organisation. Also by taking part and telling us your -views and experiences on learning and project failures in PBOs you will be helping with the development of a theoretical model that can inform project delivery to perhaps aid the wider UK economy.

Will my taking part in this study be kept confidential and anonymous?

Your name or identity details will not be written on any of the data we collect; the written information you provide will instead be assigned an anonymous participant identification (ID) number. Your name will not be written on the recorded interviews, or on the typed up versions of your discussions from the interview, nor will it appear in any reports or documents resulting from this study. The consent form you have signed will be stored separately from your other data. The data collected from you in this study will be entirely confidential.

How will my data be stored, and how long will it be stored for?

Data will always be anonymized. All paper data, including the questionnaires, the typed up transcripts from your interview and your consent forms will be kept in secure locked storage. All electronic data; including the recordings from your interview, will be stored on the University U drive, which is password protected. All data will be stored in accordance with University guidelines and the Data Protection Act (2018), and will be securely disposed of after the project is completed.

What categories of personal data will be collected and processed?

The study will only collect personal data relating to profession, experience and years of experience.

What is the legal basis for processing personal data?

GDPR requires researchers to be transparent about the legal basis for undertaking research which will collect and process personal data. According to the provisions under GDPR legal basis for university research projects will is based on Article 6(1) (e).... “processing is necessary for the performance of a task carried out in the public interest”. This is due to the fact that this research is being sponsored by Northumbria University.

Who are the recipients or categories of recipients of personal data, if any?

This information will only be received and used for analysis purpose by the named research team at Northumbria University. No personally identifiable data will be transferred to third parties for further processing.

What will happen to the results of the study and could personal data collected be used in future research?

The principal purpose is to aid the production of a PhD thesis. Additionally, general findings of the study may also be reported in a scientific journal or presented at a research conference. Again, the data collected for this will be anonymized, and you or the data you have provided will not be personally identifiable, unless we have asked for your specific consent for this beforehand. The general findings may also be shared with other organizations/institutions that have been involved or participated in the study. We can provide you with a summary of the findings from the study if you email the researcher at the address listed below.

Who is Organizing and Funding the Study?

Northumbria University.

Who has reviewed this study?

The Faculty of Engineering and Environment Research Ethics Committee at Northumbria University have reviewed the study in order to safeguard your interests, and have granted ethical approval to conduct this study.

What are my rights as a participant in this study?

The *individual's rights under GDPR* shall be maintained for all participants. Further, a right of access to a copy of the information comprised in their personal data (to do so individuals should submit a *Subject Access Request*); a right in certain circumstances to have inaccurate personal data rectified; and a right to object to decisions being taken by automated means. In case participants are dissatisfied with the University's processing of personal data, they have the right to complain to the Information Commissioner's Office. For more information see *the ICO website*.

Contact for further information:

Researcher email: danstan.chiponde@northumbria.ac.uk

Principal Supervisor email: barry.gledson@northumbria.ac.uk

Name another person who can provide independent information or advice about the project: Michael Lim, Progression Chair – michael.lim@northumbria.ac.uk

Name and contact details of the Data Protection Officer at Northumbria University:

Duncan James (dp.officer@northumbria.ac.uk).

APPENDIX 5 - RESEARCH PARTICIPANT CONSENT FORM

Participant name……..:

Organization of participant*:……...*

Principal investigator (Researcher): Danstan Bwalya Chiponde

Supervisor*:* Dr Barry Gledson, Senior Lecturer, Engineering and Environment.

Title/Brief description of research project:

Title: Learning from Failure in UK Construction Project-Based Organisations.

The purpose of this research is to assess how or if project-related failures can be used to inform organisational learning practices in UK based Project Based Organisations (PBOs). This is because, projects can experience small or large forms of 'failure', and although these can be viewed as negative experiences for those involved, they can be a valuable source of lessons learned for organisations.

To get meaningful results, key construction project management practitioners are being surveyed to obtain their insight towards organisational learning from project failures in the construction industry.

Please tick or initial where applicable:

- I have been briefed about this research project and its purpose. ☐
- I have discussed any requirement for anonymity or confidentiality with the researcher. ☐
- If appropriate, I agree to be audio taped / videotaped during the interview ☐
- I understand I am free to withdraw from the study at any time, without having to give a reason for withdrawing, and without prejudice ☐
- I agree to take part in this study ☐
- I also consent to the retention of this data under the condition that any subsequent use also be restricted to research projects that have gained ethical approval from Northumbria University. ☐

Signature of participant..... Date.....……..   (NAME IN BLOCK LETTERS).....…….
Signature of researcher..... Date.....……..   (NAME IN BLOCK LETTERS).....…….

Interview No.	Participants ID	Duration	Format	Years of Experience	Gender	Professional Qualification	Job Level	Date	Company Code and size
1	Participant 1	27:13	Face to Face	10 - 19 Years	M	Company Director.	Upper Management	18/11/2019	C1 - 1 - 49 Employees
2	Participant 2	38:09	Telephone	10 - 19 Years	M	Director.	Upper Management	21/11/2019	C2 - 250+ Employees
3	Participant 3	29:18	Face to Face	Over 30 Years	M	Academic/Civil Engineer.	Middle Management	18/12/2019	C3 - 250+ Employees
4	Participant 4	50:40	Telephone	10 - 19 Years	M	Electrical Engineer.	Middle Management	25/12/2019	C4 - 50 – 249 Employees
5	Participant 5	49:59	Face to Face	Over 30 Years	M	Project Planner.	Middle Management	12/01/2019	C5 - 250+ Employees
6	Participant 6	25:16	Face to Face	20 - 29 Years	M	Project Manager.	Upper Management	18/01/2019	C6 - 250+ Employees
7	Participant 7	24:29	Face to Face	Over 30 Years	M	Environmental Engineer.	Upper Management	14/02/2020	C7 - 1 - 49 Employees
8	Participant 8	21:32	Telephone	Over 30 Years	M	Director (Local Authority).	Upper Management	11/02/2020	C8 - 250+ Employees
9	Participant 9	38:24	Face to Face	10 - 19 Years	M	Director.	Upper Management	17/02/2020	C9 - 250+ Employees
	Participant 10		Face to Face	20 - 29 Years	M	Director.	Upper Management	17/02/2020	C9 - 250+ Employees

10	Participant 11	26:41	Face to Face	20 - 29 Years	M	Project Manager.	Middle Management	17/02/2020	C9 -250+ Employees
11	Participant 12	29:27	Telephone	Over 30 Years	M	Regional Manager.	Upper Management	16/03/2020	C10 - 250+ Employees
12	Participant 13	33:39	Virtually	10 - 19 Years	F	Social Value Manager	Lower Management	17/04/2020	C11 - 250+ Employees
13	Participant 14	37:39	Telephone	20 - 29 Years	M	Civil Engineer.	Lower Management	24/04/2020	C12 - 250+ Employees
14	Participant 15	34:39	Virtually	10 - 19 Years	M	Civil Engineer.	Lower Management	07/05/2020	C13 - 1 - 49 Employees
15	Participant 16	15:29	Virtually	20 - 29 Years	M	Regional commercial manager.	Upper Management	17/06/2020	C10 - 250+ Employees
16	Participant 17	35:33	Virtually	10 - 19 Years	M	Commercial Manager.	Middle Management	18/06/2020	C10 - 250+ Employees
17	Participant 18	23:10	Virtually	10 - 19 Years	M	Services Engineer.	Lower Management	17/08/2020	C11 - 250+ Employees
18	Participant 19	43:17	Telephone	20 - 29 Years	F	Project Manager.	Middle Management	02/20/2020	C12 - 250+ Employees
	2nd Round Interviews								
19	Participant 20	44:20	Virtually	10 - 19 Years	F	Research Impact Manager.	Lower Management	19/01/2021 .	C13 -250+ Employees
20	Participant 21	29:10	Virtually	10 - 19 Years	M	Director/Quantity Surveyor.	Upper Management	25/01/2021 .	C14 - 1 - 49 Employees

21	Participant 22	36:08	Virtually	20 - 29 Years	M	Procurement and Commercial Contracts Manager.	Middle Management	30/01/2021.	C15 - 250+ Employees
22	Participant 23	36:13	Virtually	Over 30 Years	M	Director.	Upper Management	04/02/2021.	C16 - 250+ Employees
13	Participant 24 (6)	28:21	Virtually	20 - 29 Years	M	Project Manager.	Upper Management	11/02/2021.	C6 - 250+ Employees
24	Participant 25	45:36	Virtually	20 - 29 Years	M	Procurement, Contract and Commercial Manager.	Middle Management	17/02/2021.	C17 - 250+ Employees
25	Participant 26 (5)	26:18	Virtually	Over 30 Years	M	Director.	Upper Management	22/02/2021.	C7 - 1 - 49 Employees
26	Participant 27 (15)	20:23	Virtually	10 - 19 Years	M	Civil Engineer.	Lower Management	16/04/2021.	C13 - 1 - 49 Employees
27	Participant 28	37:14	Virtually	10 - 19 Years	M	Quantity Surveyor.	Lower Management	18/04/2021.	C14 - 50 - 249 Employees
28	Participant 29 (18)	21:55	Virtually	10 - 19 Years	M	Services Engineer.	Lower Management	27/04/2021.	C11 - 250+ Employees
29	Participant 30 (9)	46:32	Virtually	10 - 19 Years	M	Director.	Upper Management	05/05/2021.	C9 - 250+ Employees
	Participant 31 (10)		Virtually	20 - 29 Years	M	Director.	Upper Management	05/05/2021.	C9 - 250+ Employees
30	Participant 32	27:31	Virtually	10 - 19 Years	M	Digital Engineering and Compliance Manager.	Lower Management	18/05/2021.	C18 - 250+ Employees

31	Participant 33	49.1	Virtually	Over 30 Years	M	Commercial Director.	Upper Management	21/07/2021	C19 - 50 - 249 Employees
32	Participant 34	32.31	Virtually	Over 30 Years	M	Director.	Upper Management	22/07/2021 .	C20 - 1 - 49 Employees

DOCUMENT ANALYSIS - REPORTS		
Item	Reports	Report Title
	GOVERNMENT REPORTS	
1	BIS Report	Guidelines for Managing Projects - How to organise plan and control projects - 2010
	Infrastructure and Projects Authority Related Reports	
2	HM Treasury (In association with IPA)	The Green Book - 2021
3	Ministry of Defence (In Association with IPA)	Lessons Learned Report - 2021
4	Department for Transport (In association with IPA)	Lessons from transport for the sponsorship of major projects
5	IPA - 2020	Principles for project success - 2020
6	IPA	Guide to completing the Project/Programme Outcome Profile - 2021
	National Infrastructure Commission Related Reports	
7	National Infrastructure Commission	Principles for effective Urban Infrastructure - Lessons Learnt from the Next Steps for Cities Programme - 2020
	National Audit Office (NAO) Related Reports	
8	NAO	Investigation: the Department for Transport's funding of the Garden Bridge
9	NAO	Framework to review programmes - 2017
10	NAO	Investigation into the government's handling of the collapse of Carillion Summary
11	NAO	Crossrail – a progress update - 2021
12	NAO	The Failure of Metronet - 2009
13	NAO	Investigation into the rescue of Carillion's PFI Hospital Contracts

Appendix 7 – List of Reports Used in Document Analysis

14	NAO - 2009	Helping Government Learn
	Edinburgh Schools Defects	
15	Cole 2017	Report of the Independent Inquiry into the Construction of Edinburgh Schools
	GRENFELL TOWER FIRE	
16	Home Office - 2020	Quarterly thematic update on progress against the Grenfell Tower Inquiry Phase 1 Recommendations
17	Moore-Bick - 2019	Grenfell Tower Inquiry: Phase 1 Report Overview – Report of the public inquiry into the fire at Grenfell Tower on 14 June 2017
18	Hackitt - 2018	Building a Safer Future Independent Review of Building Regulations and Fire Safety: Final Report.
	Association for Project Management Related Reports	
19	APM - 2012	APM Web Briefing - Lessons Learned - 2012
20	Anthony - 2017	How can we hand over projects better?
21	APM 2014	Conditions for Project Success
	RIBA Related Report	
22	RIBA	Building in Quality Initiative Summary Report and Next Steps
	CIOB Related Reports	
23	CIOB - 2021	Guide to Quality Management in Construction: Site production and assembly
24	CIOB - 2019	Code of Quality Management
	RICS Related Reports	
25	RICS - 2016	Lessons learned - RICS guidance note, Global.
	SECTORAL REPORTS AND FAILURES	
26	Arcadis - 2021	2021 Global Construction Disputes Report The road to early resolution

Appendix 7 – List of Reports Used in Document Analysis

	CROSSRAIL LEARNING LEGACY	
27	Laws and Wood - 2017	Programme Efficiency and Cost Reduction During the Delivery Phase.
28	Fennel - 2016	Crossrail Approach to Managing and Planning Design
29	Little - 2016	Approach to Managing Interfaces
30	Dumbleton and Pascutto - 2016	Learning and Development
31	Crossrail Ltd - 2007	Learning and Development Policy and Procedure.
32	Taylor - 2018	Crossrail Project: Application of BIM (Building Information Modelling) and Lessons Learned.
	Participants Documents	
33	Participant 18	Residential Team Live Lessons Learnt
34	Participant 18	Clients' Feedback
35	Participant 14	Project Management Tools
36	Participant 13	Company C12 Learns from Failure

Appendix 7 – List of Reports Used in Document Analysis

APPENDIX 8 – LIST OF QUESTIONS FOR MODEL EVALUATION INTERVIEW

Study Title: Learning from failure in UK Construction Project-Based Organizations.

Principal investigator (Researcher): Danstan Bwalya Chiponde

Supervisors*:* Associate Professor Barry Gledson and Professor David Greenwood of the Faculty of Engineering and Environment.

QUESTIONS

Q1. Does the model reflect the reality in the construction industry with respect to learning from failure? Kindly explain your answer.

Q2. Can this model help enhance learning from failure within PBOs? Kindly explain your answer.

Q3. Apart from the identified parties or organisations in the model, who else should be involved in the process of learning from project failure? Kindly explain your answer.

Q4. Apart from the identified practices and mechanism for learning, what other measures would you suggest for PBOs to consider in order for them to effectively learn from failure?

Q5. To what extent does each of the identified levels in the model influence learning from failures within a PBO? Kindly explain your answer.

Q6. How easy will it be to implement the proposed model (identified facets and mechanisms) by PBOs within their business? Kindly explain your answer.

Q7. Suggest ways of improving the model and give any probable implications on practice within the sector with respect to learning from failure:

Thank you for your time.

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5.1 - RESEARCH QUESTION RELATED CODES	Short Code	Ref/Number
OB1 - Uncover how organisational learning occurs, within PBO's.	OB-Org Learning	5.1.1
OB2 - Examine what project failure is, in the construction sector.	OB-What is Failure	5.1.2
OB3 - Analyse the common, underlying, root causes of project failure.	OB-Failure Cause	5.1.3
OB4 - Explore the extent and nature of current practice, in the use of past project failures.	OB-Practices Learning Past	5.1.4
OB5 - Address whether and how, failure does inform organisational learning in PBO's.	OB – Failure Use	5.1.5
OB6 - Examine actors' behaviour and intentions towards learning from failures.	OB – Behaviour and Intentions	5.1.6
OB7 - Construct and validate a model that makes use of project-related failure(s) to facilitate organisational learning	OB – Learn from Failure -Model	5.1.7
THEORETICAL/CONCEPTUAL RELATED CODES		
5.2.1 Institutional Theory Related Codes		
IT – Regulative Pillar	IT- Regulative	5.2.1
IT- Normative Pillar	IT – Normative	5.2.2
IT - Cultural Cognitive Pillar	IT- Cult-Cog	5.2.3
IT - Institutional Field	IT-Inst Field	5.2.4
IT – Isomorphic Forces	IT-Isom Force	5.2.5
IT-Normative Isom Force	IT-Normative Isom Force	5.2.5.1
IT-Conceive Isom Force .	IT-Conceive Isom Force	5.2.5.2
IT-Mimic Isom force.	IT-Mimic Isom force	5.2.5.3
5.3 Situated Learning.		
SL - Interorganisational learning.	SL – Interorg Learning	5.3.1
SL – Community of Practice	SL – Com Practice	5.3.2
SL – Power to say project has failed;	SL – Power to Say Failure	5.3.3
SL Capacity/capabilities to say this is a failure;	SL – Capacity to Identify Fail.	5.3.4
SL Power to Say let us Learn	SL – Power Learn from Fail	5.3.5
5.4 Facets/Variables for a Learning from Failures Lipshitz et al. (2002) Facets		

LV - Structural Facet **LV – Cultural Facet** **LV – Psychological Facet** **LV – Policy Facet** **LV - Contextual Facet** **LV – Technological Facet** **LF - Governance**	LV-Structural LV-Cultural LV-Psych LV-Policy LV-Context LV-Tech LV-Governance	5.4.1 5.4.2 5.4.3 5.4.4 5.4.5 5.4.6 5.4.7
5.5 Attribution of Failure		
AF – Internally Attributed **AF – Externally Attributed**	AF-Int Attrib. AF-Ext Attrib.	5.5.1 5.5.2
5.6 Learning Objects		
LO – Technology **LO -Events** **LO – Documents/Reports/Records/Story Telling** **LO – Actors (Individuals and organisations)** **LO – Evaluation/Feedback**	LO – Technology – 5.6.1 LO -Events – 5.6.2 LO– Documents – 5.6.3 LO – Actors – 5.6.4 LO – Evaluation - 5.6.5	

Appendix T1 - PBO's Toolkit for Learning from Failure Based on the 'HOUSE' Model

1.1 INTRODUCTION

In response to the research question *"To what extent is project-related failure accepted as a mechanism for learning in project-based organisations?",* the study establishes that there is willingness to engage and use lessons from failure. Yet, this process is hampered by challenges at the following levels:

- **Individual level** – These include people related factors such as lack of failure acceptance, fear of consequences of failure, 'I know it all' type of attitude.
- **Project Level** – Time and cost constraints, temporal teams, multi-actors.
- **PBO Level** – Leadership, structuring via departments; profit orientation.
- **Sectoral Level** – Competition and fragmentation.

Based on the above challenges, the toolkit is divided into two parts. Part 1 discusses factors to be considered at the sectoral level. The second part of the toolkit is focused on the PBO and project levels.

1.2 PART 1 – SECTORAL FACTORS

Though the focus is at the PBO level, it is worth analysing the sectoral level since it influences learning from project-related failures through factors such as competition and fragmentation. In the first instance, it is worth encouraging PBOs within the sector to appreciate the benefits of collaboration instead of 'competition' which mostly leads to hostile relations and cost cutting measures among them. Consequently, institutional[1] fragmentation should be reduced by encouraging collaboration (Fayazi *et al.*, 2017). To achieve that, the sector should rely on boundary spanners within the sector such as professional bodies and regulatory bodies since they interact with majority of PBOs within the sector. These should be supported by boundary documents that can may be shared across PBOs and extending the project time-horizons for further collaboration and sharing

[1] In this toolkit, institutions are defined as *"government or community constituents in the organization's task environment that possess either communitywide and uncontested social acceptance (e.g., public schools, churches) or legislative and administrative authority in the organization's domain (e.g., government agencies, regulatory commissions)"* (Baum and Oliver, 1991, p. 187).

knowledge beyond the project delivery period (Newell and Edelman, 2008; Sage, Dainty and Brookes, 2010; Stjerne *et al.*, 2019).

Furthermore, the sectoral level should serve as the foundation for Learning from project-related failures (Lf-PRF) through the institutional isomorphic forces or external pressure which should structure and legitimize the process of learning from failures. This is in agreement with DiMaggio and Powell (1983) who contend that organisations in principle seek legitimacy or compliance influenced by the isomorphic force. This is because the findings indicate that Lf-PRF is not formally outlined in most project contracts or POBs' activities. Thus, PBOs focus on 'good practice' and 'training' in order to gain conformance, legitimacy and also meet the contractual obligations of time, cost and quality. This is mostly influenced by generally relating failures with 'ill trained employees', 'non-conformance' or 'incompetence', which may lead to the very failures being hidden by PBOs[2]. However, instead of viewing the external environment as a barrier, the Isomorphic forces may serve as external motivation for Lf-PRF through the following mechanisms:

- **Coercive Force** – The Coercive force may offer guidelines and regulations that may encourage Lf-PRF such as contractual clauses. Regulatory bodies such as the HSE may act as 'boundary spanners' and at the same time produce reports/guideline on project-related failures (P*r*F) within the sector that may act as 'boundary objects' to be used by PBOs.
- **Normative Force** – PBOs rarely engage in Lf-PRF since it lacks legitimacy and unstructured contents. Thus, the Normative force through professional bodies such as APM, CIOB and RICS may structure and legitimizing Lf-PRF. These organisations may also serve as 'boundary spanners' since majority of individual professionals and PBOs are affiliated with them.
- **Mimic Force** - The Cultural-cognitive force offers opportunities for PBOs for learning by mimic other PBOs and learning from their failures. Such may reduce the cost of facing similar negative consequences of a failure by learning vicarious. However, with the sector being competitive, it is important to appreciate the value of sharing failures (and associated lessons) across the wider sector. These may

[2] Focus is mostly on mandatory training and understanding guidelines and regulations unlike learning from failures.

include improved supply chain actor's performance which makes and informed decision making.

Besides competition, the study identifies other factors for consideration by the sector summarised as '10 Cs' as shown in Table T1 below.

Table T1 . Factors Influencing Learning from Failure within the Sector – 10Cs

Theme	Driving Factors	PBOs' Action
Communication	Learning is a social process; interaction with others (individuals and PBOs); involves exchange of data.	Clarity in documenting failures; encourage feedback between superiors and juniors
Change management	Project delivery involves change; Equally failures initiate change.	Leadership support and assurance through resources and emotional support.
Commitment	From leaders in form of allocating resources.	Support in form of budget allocation.
Continuous Process	It's not an event but a process	Think of learning and unlearning.
Common sense	Lf-PRF and failure definition cannot be standardized.	Be tolerant to new ideas and allow teams to make intelligent failures.
Commercial viability	PBOs are profit oriented; competition.	Show how Lf-PRF reduces future failures.
Cost	Lf-PRF requires resources; eg time, venue/space.	Budgeting and resources allocation for Lf-PRF; contractual agreements.
Conflicts	Failures in some cases are accompanied by conflicts.	Consider alternative dispute that are fast and less hostile.
Competition	Limited jobs and resources (people and time to engage in learning).	Illustrate how learning from failure benefits the wider supply chain.
Complexity	Nature of failure and learning; projects and POBs increasing in size and complexity.	Failure identification: Use of technology to process, store and share information on failure.

1.3 PART 2 PBO LEVEL LEARNING

To assist with Lf-PRF at the PBO level, the Toolkit has been influenced by participants' response such as that of Participant 32 who indicated that on learning Lf-PRF: *"it's a case of, say what you want to measure, two, putting the process in [place] and then three making sure that people are comfortable with doing it and know how to do it".* Accordingly, the toolkit has four 'Action Areas' (AA) for PBOs to address in their endeavour to Lf-PRF:

- **Action Area 1 (AA1) –** Outlining clearly the criteria for 'defining-', 'measuring' and identifying- failure.
- **Action Area 2 (AA2)** - Demonstrate the benefits of failure to individuals and PBOs;
- **Action Area 3 (AA3)** – Creating a conducive environment for learning and;
- **Action Area 4 (AA4)** – Actors, mechanisms and tools for collecting and sharing failure-related information.

Action Area 1 - Definition and Identification of Failure

If organisations are to Lf-PRF, the need for having a well outlined measuring criteria cannot be over emphasized as echoed by Participant 32 that: *"Define what you want to measure for starters.. people don't know if they have failed if they don't know what success looks like… I was looking at using artificial intelligence to track photographs to see if a room is tidy or not. 'You can say failure in housekeeping but, what level of tidy or what level of mercy is acceptable' That's what basically the computer scientist said to me."*

Atkinson (1999) equally observes that projects may fail based on ill created measuring criteria. In addition, instead of solely focusing on time, cost and quality measuring criteria, project benefits or project functionality remain key (Jugdev and Muller, 2005; Müller and Jugdev, 2012). The measurement should also not be at completion but iteratively during project delivery and after completion[3]. In addition, there should be distinct measurement criteria for 'projects', 'programmes' and 'portfolios'. This is supported by the NAO (2017)

[3] For instance the Green Book (2020) provides that any benefits and costs should be calculated over the lifetime of the proposed project and suggests 60 year period for roads, railways and new builds being assessed at 30 years for refurbishment.

report which provides a framework for reviewing every stage of a programme and project(s) differently based on four themes: Purpose; Value; Programme set-up, and; Delivery and Variation management. See also Shenhar *et al.* (2001) who identify very short (project efficiency), short (impact on customer), long term (business success) and very long term (preparing for the future) as mechanism and dimensions of measuring project success and failure. Importantly, the measurement should not merely include the project technical team members, instead, key project stakeholders such as end-users and the client's team should be involved. For instance, the BIS (2010, p. 3) report recommends that when assessing what a successful project is "*take into account the needs of staff and other stakeholders who will be impacted by the changes brought about by the project".* thus, key factors under the definition and measurement criteria of failure are:

- **What to measure?** – Provide KPIs, project objectives, functionality and clients' needs.
- **Who to measure it?** – Engage key stakeholders/multisectoral.
- **When to measure it** – Measured iteratively instead of at completion.

Worth noting is that besides the term 'failure', other concepts such as 'quality' (CIOB, 2019; 2021) 'project completion' and 'project handover'[4] are equally subjective with no clear outline of the roles of the PBO. Such inconsistency in project terminologies and roles have also been observed by scholars such as Zwikael and Meredith (2018). Thus, as noted by Participant 19 the sector needs to clearly define the processes of project completion and handover[5] and how learning Lf-PRF can be incorporated, not only in this stage but throughout the project life cycle.

Action Area 2 – Demonstrate Value of (Learning from) Failure.

Unarguably, failure leads to a number of negative consequences such as loss in profits, physical damage to property and in some cases death. However, it is worth appreciating that such occurrences, provide opportunities for improvement by highlighting weaknesses

[4] Handover according to the APM's Body of Knowledge 6th edition (as cited in Anthony, 2017, p 6) is *"The point in the life cycle where deliverables are handed over to the sponsor and users."* However, beyond that, there is need to include exchange of information and lessons in order to encourage learning from failure.

[5] The CIOB (2019) report indicates that circa 2%-5% of the contract's sum is spent on correcting defects which is worrying for a sector which operates on minimal profit margins such as 1%-3%. Hence, it is inevitable that learning from failures is encouraged in order to avoid such.

in the system, latent conditions or factors that may lead to failure (Love *et al.*, 2011). For instance, Participant 32 advises that *"…not just viewing it as having negative learnings but like okay… if we are to do it again how would we, knowing what we know, how would we have done better you know, what did we fall down on?".* Thus, such occurrences assist in identifying weaknesses within the system and with learning mechanisms being put in place, this may result in improved performance and delivery of services. Similarly, earlier studies by Baumeister *et al.* (2001) and Bauer and Mulder (2013) and more recently by Schwarz *et al.* (2021) reveal that failures invoke more learning (lessons) unlike success which at times may lead to complacence within a system. The major key point to note under AA2 is encouraging team members to identify and share the failure earlier. To achieve that, it remains important for the sector, PBOs specifically, to change the perception of failure from:

- **Negative to Informative** – Failure gives more information on the state of 'resources' and 'capacity' when compared to successful events.
- **Negativity' to 'Opportunity'** – Failure is an opportunity to improve and not a sign of weakness.
- **Competition to Collaboration** – The overall benefits accrue to the wider supply chain.
- **Blame to Alert/Alarm** – Understand the cause and underlying issues' of the failure and not who to blame.

Action Area 3 – Creating an Environment Conducive for Learning.

To encourage learning from failure as referred to in 'AA2', what is crucial is to ensure that a conducive environment is created. To achieve that, some strategies have advocated for a focus on technological or social processes. However, realising the multifaceted nature of failure and the complexity of learning, the study contends that PBOs ought to leverage on a number of factors. This is by considering Lipshitz *et al.* (2002) five facets of learning (structural, cultural, policy, context and psychological). Based on our study, three more facets have been added, the 'technological', 'governance facets' and the 'Nth Facet' (emphasizing a continuous review of and approach to learning). Hence, the facets that PBOs should embed within their organisation to encourage learning from project-related failures include the following: the 'structural facet' – mechanisms and tools for collecting lessons; 'cultural facet' – leaders commitment to creating an open and transparent environment for learning from failure; 'psychological facet' – encouraging individuals to

state situations as they are; ‘policy facet’ – leadership’s commitment through allocation of time and resources for purposes of learning from failure; the ‘contextual facet’ – valuing lessons from failure and tailoring learning depending on a situation; the ‘technological facet’ – technological tools for capturing and sharing the lessons; the ‘governance facet’ – for structuring and guiding the process of learning from failure within a PBO and across projects and organisations, and; the Nth Facet which encourages PBOs to seek other mechanism for improving the process of learning from failure. Learning at the organisational level is also conceptualised to involve the individual, team and cross project learning. The implication is that learning should start from individual level and culminate into project level learning involve sharing lessons across projects. Action Area 3 is summarised in Table T2 below inform of a multilevel-framework for learning from failure involving individual-, project and organisational-levels.

Table T2 – Multilevel – Framework for Learning from Project-Related Failures

MULTILEVEL FRAMEWORK FOR LEARNING FROM FAILURE							
AA 1 - 3	Facet	Relevance To Learning from Failure	Level 1 - Individual	Level 2 - Project	Level 3 – PBO	Comments	References
Setting a Conducive Environment – Learning Facets	Structural Facet	Outline who is involved and tools and mechanisms for learning;	Engage in self-directed learning; refer to reports; personal journal/reflection	Withing and across, Across projects; lessons learnt meetings; after action reviews; clients feedback	Cross-project learning; reports from other projects; meetings with teams from other projects; refer to sectoral reports; and other PBOs	Network based, flexible, within and outside the organisation.	Burnes et al. (2003) (Burnes, Cooper and West, 2003; Carmeli, 2007; Danneels and Vestal, 2020)
	Cultural Facet	Creating an environment for failure identification and sharing lessons from failure.	Personal ownership of failure.	Blameless culture; Open culture;	Blameless culture; Open culture; collaborate with other PBOs	Leadership and management commitment	(Cannon and Edmondson, 2001, 2005; Bunch, 2007; Danneels and Vestal, 2020)
	Psychological Facet	Free to share and discuss information with superiors and peers; free to present opposing views.	Free to state situations as they are.	Team members Free to share failures with each other;	Team members Free to share failures with each other;	Blame and failure tolerance; focusing on the problem instead of individuals; allow constructive conflicts	(Edmondson, 1999; Edmondson and Lei, 2014; Friel, 2017; Danneels and Vestal, 2020)

	Policy Facet	Provide adequate time and resources need for learning to show organisational commitment.	Encourage individuals create personal time for reflection.	Allocate time for reflection on projects.	Allocate resources for learning; identity individuals and teams to coordinate collection and sharing lessons.	Leadership and management commitment.	(Lipshitz, Popper and Friedman, 2002; Danneels and Vestal, 2020)
	Contextual Facet	Contextualise the learning; Define concepts, meanings and beliefs and values.	Value lessons from failure;	Value lessons from failure; paying attention to all failures.	Value lessons from failure; paying attention to all failures regardless of size.	Leadership and management commitment; getting the correct lessons from failures.	(Lipshitz, Popper and Friedman, 2002; Danneels and Vestal, 2020)
	Technological Facet	Collection, storage and sharing lessons; failure detection and identification.	Personal devices; organisational online collaborative tools ; the web	Portal or cloud storage of lessons;	Organisational self-guided learning; virtual learning environment.	IT support and tools eg BIM artificial intelligence.	(Newell *et al.*, 2006; Baker, Hallowell and Tixier, 2019)
	Governance Facet	Protocols or guidance on the process of learning from failure; avoid reinverting the team;		Provide guidelines in for team members on who to see, what document to use.	Identify specific events and procedure to be followed; Mechanisms for cross-organisational learning	Contractual agreements; Organisational policy	(Pemsel *et al.*, 2014; Pemsel, Müller and Söderlund, 2016)

From the 8 facets, the governance facet may be regarded as an anchor and focal point for looking at the entire process of learning from failure. This also relates back to AA1 which may include failure definition and measurement criteria and reporting systems. The governance facet should also outline the link between a single project to the PBO and other projects within a single business for purposes of Lf-PRF. This is support by Participant 8 who reasons that:

> *"…in the world I work in… we have a very clear governance arrangement within the organisation how we review and agree projects how we prepare business cases for projects and approvals and how monitor delivery of projects how we take action if things go off the rail. Those processes are all in place, the organisational learning, most significantly is understanding how, the governance arrangement in the organisation in overseeing capital investment projects and making sure that that governance arrangement is tightened up".*

The identified facets also present research areas or opportunities for exploring and understanding the process of learning from project-related failures. Hence the N^{th} facets raises the following question before the sector's practitioners and researchers: what else can be done to improve the process of learning from failure?.

Action Area 4 – Actors, Mechanisms and Tools For Learning

For purposes of collecting, sharing and storing (sheltering) the lessons, the study identified actors and tools/objects that can be used by PBOs based on the 'DATES' framework; **D** – Documents for collecting and sharing failure related lessons; **A** – Actors to be engaged in the learning process and collection and documenting the lessons (managing the learning the process); **T** – Technological tools to be used actors in the collection, documentation and sharing of lessons; **E** – Events for purposes of engaging in learning and interaction between actors, and; **S** – Space both physical and virtual space for purposing actors to engaging 'events' or share 'documents' in order to learn from failure. The 'DATES' framework of artefacts is summarised in Table T3 below

Table T3 – Artefacts for Learning from Project-related Failures – The Dates Framework

MECHANISMS FOR COLLECTING AND SHARING LESSONS							
AA 4 - Tools and Mechanism - Learning Artefacts	Artefacts	Relevance to Learning	Individual Level	Project Level	PBO Level	Comments	Related Literature
	Documents	Collection, storage and sharing lessons from failure.	Past project report; personal diary;	Past project reports; lessons learnt reports; After action reviews	Past project reports; Sectoral reports; Lessons learnt from other PBOs	Easy access; Incorporate in existing documents to avoid administration overload; versatile softcopy such as audio; images etc.	(Newell *et al.*, 2006; Sage, Dainty and Brookes, 2010)
	Actors	Generations and sharing of lessons; failure identification.	Peers; Superiors; Juniors	Project team members	Project and non-project team members; cross project and organisational members	Engage key personnel; consider third parties who are not biased.	(Sense, 2007b, 2007a; Hecker, 2012)
	Technology	Failure identification, documentation and sharing.	Personal gadgets and institutional intranet and portals	BIMx; AI; Deep learning.	BIMx; AI; Deep learning; Learning portal.	Easily adaptable technology; Encourage self-directed learning.	(Newell *et al.*, 2006; Lu *et al.*, 2013; Baker, Hallowell and Tixier, 2019)

	Events	Encourage interaction amongst actors for exchange for lessons	Personal chats; Engage in organisational and external events e.g professional bodies, CPD	Monthly meetings; Lessons learnt;	Seminars; workshops; CPD; Cross-organisational collaboration/learning	Select the right, people, time and place	(Gameson, Suresh and Chinyio, 2008; Mueller, 2015; Crowe *et al.*, 2017)
	Space	Place for the interaction of actors, conducting events and sharing documents	Personal workspace; Cloud or online	Project environment; virtual space	Project environment; PBO premises; virtual space	Allocate adequate time; right content (failure information) and people	(Al-Ghassani *et al.*, 2004; Lu *et al.*, 2013; Gutierrez-Bucheli *et al.*, 2016)

Some of the specific documents and events that were observed from the study can be seen from Appendix F1 and Appendix F2 respectively[6].

Action Area 4.1 – Utilities for Learning

Besides the hard facets for learning from failure, the study identifies 'utilities' which influence the process of learning from failure referred to as positive behaviour[7]. Besides, that the study also identifies 'waste' or negative behaviours hindering the process of learning from failure (barriers). Examples of positive and negative behaviours are given in Figure T1 below. Accordingly, PBOs should ensure that positive behaviour is optimized or embedded in the system whilst the negative behaviour (waste) are eliminated or avoided.

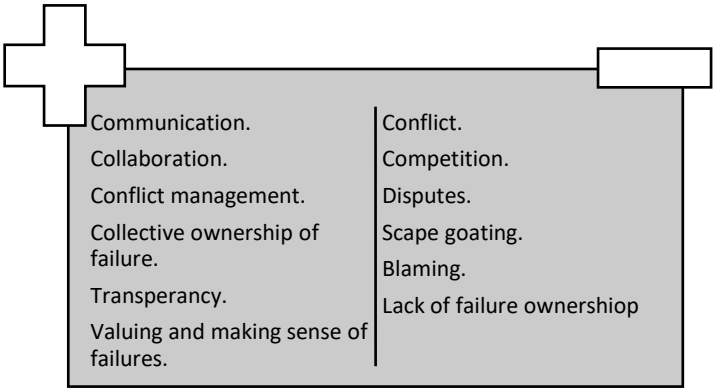

Figure T1 – Positive and Negative Behaviours Influencing Learning from Failure

1.4 TOOLKIT SUMMARY

In summary the areas of action or concern for PBOs can be summarised in Figure T2 below.

[6] Worth noting is that various documents and events are conducted during the project delivery and at completion stage. Instead of suggesting new documents of events, the study argues that PBOs should focus on encouraging learning from project failure so that 'failure' is included in these discussion. This is by relying on passive artefacts discussed in the following subsection.

7 Essentially, these are to keep the 'lights on and the data bundles' on for effecting learning.

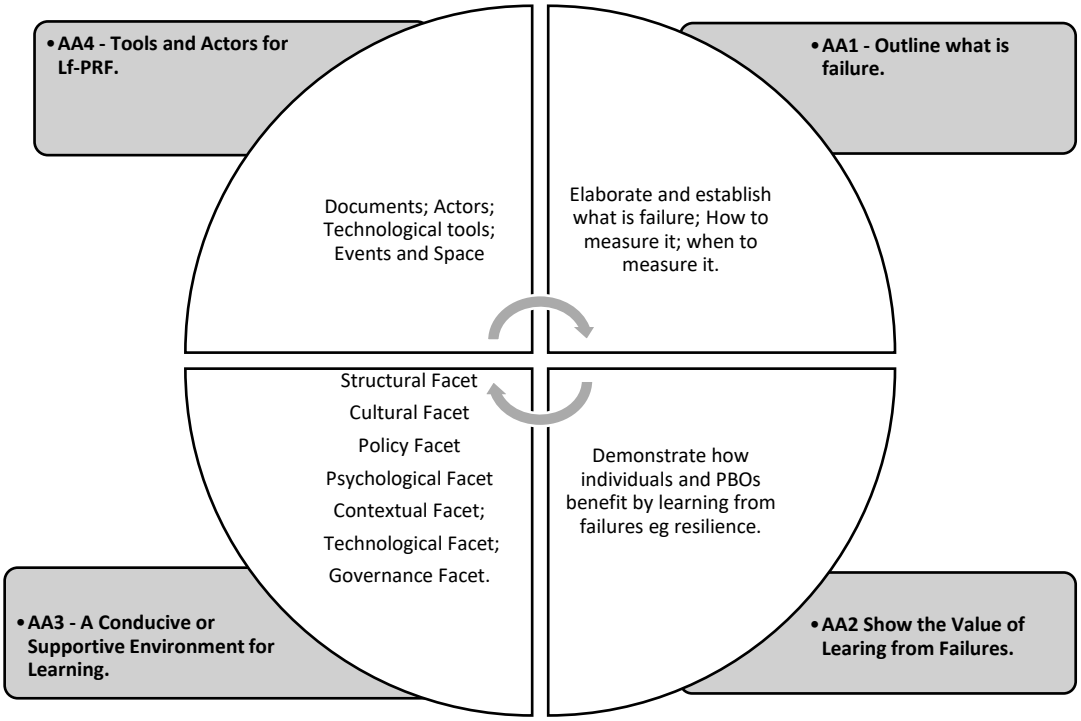

Figure T2 – Action Areas for PBOs to Enhance Learning from Failures.

To summaries the toolkit for PBOs to learn from failure, acronyms based on a 'HOUSE' metaphor, provide specific actions to be considered as follows:

- **H – Holistic** – This relates to four main aspects: Involving everyone in the learning process (internal and external environments); learning from both small and large failures; taking a continuous process by learning from project initiation through to project completion and use, and; learning from both successful and failure-related events.
- **O - Opportunity** - To encourage actors to learn from failures, it is worth highlighting how learning from failure benefits them. Such benefits include building resilience among team members and improved management emotions during a failure.
- **U – Usability** – The documents or information on failure lessons must be accessible or readily available for others. They should be made versatile to be used across boundaries (Macpherson and Clark, 2009; Sage *et al.*, 2010). This also includes access to learning events and actors.

- **S- Sensitivity** – As much as learning from project-related failures is being encouraged, it is worth stating that not all lessons from failures will add value or can be regarded as being ‘good lessons’. It is therefore expected that PBOs and individual learners should assess relevance and verify the lessons.
- **E – Emotions** – Failure affects team members differently and in some cases this may be caused by grief in the case of losing one’s job or when a company winds up (Bell and Taylor, 2011). Thus, it is important that team members’ negative emotions are managed appropriately and keeping the team motivated in the face of failure and beyond (Shepherd *et al.*, 2011).

See Table T4 below which gives a summary of the ‘HOUSE’ framework and related facets and tools from the Toolkit to be implemented by PBOs in order to enhance learning from project-related failures.

Table T4 – The House Model for Learning from Project-related Failures Among PBOs.

THEME	Explanation	Applicable Facets (AA3)	Applicable Tools and Actors (AA4)	References
H – Holistic	Include junior and seniors employees; learn from both success and failure; Small and large failures; within and external sources; Continuous; process from project inception to completion/use; Engage users and clients.	Structural Facet; Governance Facet.	Actors; Events; Space.	(Ellis *et al.*, 1999, 2014; Cannon and Edmondson, 2005).
O - Opportunity	Demonstrate how learning from failures gives an opportunity for learning and growth. Opportunities at individual and PBO levels.	Policy facet; and Governance facet.	Actors.	(Cannon and Edmondson, 2005; Ellis *et al.*, 2014; Dahlin, Chuang and Roulet, 2018).
U - Usability	Ensure that the lessons (documents, space and events) from failure are accessible and shareable; Ease of use; Clarity in documenting failures.	Structural Facet; Governance Facet; Technological Facet.	Documents; Actors, Technological Tools; Events.	(Macpherson and Clark, 2009; Sage, Dainty and Brookes, 2010).
S – Sensitivity	Make sense of the lessons, not all lessons from failures are good; Assess relevance and approach to learn; Lessons verification.	Contextual facet; Governance Facet.	Documents; Actors; Events.	(Ellis *et al.*, 1999, 2014; Lipshitz, Popper and Friedman, 2002).
E – Emotions	Motivate/uplift emotions during failure; assure before failure; sustain during success/failure.	Cultural facet; Psychological Facet.	Actors.	(Shepherd and Cardon, 2009; Shepherd, Haynie and Patzelt, 2013; Shepherd *et al.*, 2014).

APPENDICES

Appendix F1 - Documents Used for Recording and Sharing Failure Information By PBOs.

Level	Pretender	Project Delivery/ Construction	Completion	Use
Individual Level	Personal diary.			
Project Level	Risk register.	lessons learnt tracker; defects notice and quality alerts; safety observations, quality observations, environmental incidents.	meetings' minutes; project closure document; Defects and snag lists; post implementation reviews.	
PBO Level			Lessons learnt; project report.	
Sectoral Level	Sectoral Reports.			

Appendix F2 Associated Events for learning from Project Related Failures.

Project Stage	Pretender	Project Delivery	Project Completion	Use
Sector Level	Regulated training; Predesign meeting; CPD; Professional body reports.	Regulated training.	Client review/Feedback.	
PBO Level	Project Pitch; Knowledge hubs; Annual reviews; workshop/training; seminars; Past Project reports.			
Project Level	Method statement; Contingency program meetings; past project reviews.	Quality alert meetings.	Project reviews; lessons learnt meetings.	Customer care survey.
Individual Level	Personal reflection.	Informal chats; personal initiative.		