A Scoping Review on Project-Based Organization's (PBOs) Knowledge Transfer Using the Systemic Lessons Learned Knowledge (Syllk) Model as an Interpretative Structural Model (ISM)

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Abstract: Aim: A scoping review was conducted in order to systematically map the research featuring Project Based Organizations (PBOs) in relation to knowledge transfer. This scoping review considered over 50 years of research to ascertain how PBOs transfer knowledge by using an interpretative structural model (ISM) to illustrate the outcomes of the investigation via the Systemic Lessons Learned Knowledge (Syllk) Model, created by Duffield and Whitty (2015). We wanted to illustrate what knowledge transfer elements from the authors' original model outlining six key themes were sustained and prevalent in literature as representative of this knowledge transfer process. The six elements are: learning, culture, social, technology, process and infrastructure. Employing an ISM also helped identify gaps in existing knowledge. The following research questions formed the basis of our study: **Research Question 1:** How does the Syllk model help interpret and categorize knowledge transfer dynamics in PBO contexts? **Research Question 2:** What adaptations are required, if any, to the Syllk Model (Duffield & Whitty, 2015) to better facilitate knowledge transfer within PBOs? **Research Question 3:** What are the key barriers to knowledge transfer in PBOs? **Findings:** Extant literature indicated that knowledge sharing depends on the willingness of individuals to participate, without which lessons cannot be learned. The results of this scoping review illustrated how some of the elements within the original Syllk Model by Duffield and Whitty (2015) are not fully exploited by organizations. Moreover, several terms possess hazy definitions which further disadvantaged outcomes as it makes some reserch outputs open to question because concensus on the ideology for each element considered as a key theme is subject to interpretation. We propose the Aspirational Syllk (ASyllk) Model as a reconceptualized ISM that enables PBOs to systematically capture and assess experiential learning outcomes. **Methodology:** A scoping review was undertaken looking at 202 peer reviewed journal papers: Scoping reviews differ from a systematic review in that the former maps a broad body of literature on relevant topic areas and provides tabular outputs, as well as identifying gaps. Whereas the latter considers a far narrower range of research material as it possesses a dedicated synthesis. We subscribed to the scoping review protocol advocated by Bragge et al. (2011) in that we delineated our area of exploration, thereafter we conducted an extensive literature review and then we reported upon these sources to accurately assess the barriers to organizational learning and, thus, identify the gaps in literature. We also considered the antecedents that go into knowledge transfer in PBOs. **Significance:** Despite a half century of research on knowledge transfer, our findings indicated that knowledge transfer is not intrinsic to PBOs, thus illustrating the need for robust project termination processes to garner key lessons learned for subsequent organizational learning capacity. Through our extensive examination of existing literature, covering over 200 sources, we illustrated a detailed understanding of the barriers to knowledge transfer within PBOs. This scoping review serves as a powerful resource for researchers and practitioners by offering insights into an ammended model to test in future research.

Keywords: Systemic lessons learned knowledge (Syllk) model, Aspirational systemic lessons learned knowledge (ASyllk) model, Interpretative structural model (ISM), Organizational learning, Knowledge transfer, Project-Based organizations (PBOs), Scoping review

1. Introduction

1.1 Organizational Learning Model

Duffield and Whitty (2015) attempted to address the practical failures in delivering organizational learning and knowledge transfer from projects. The authors created their theoretical Systemic Lessons Learned Knowledge

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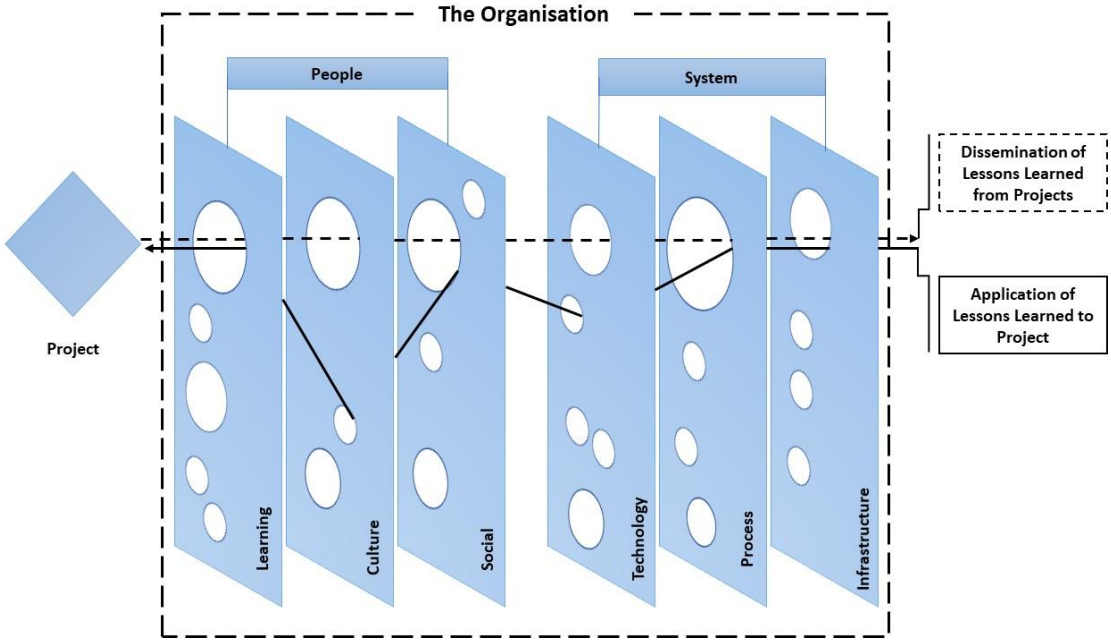
(Syllk) Model (Figure 1) through modifying the Swiss Cheese Model incepted by Reason (1997), which has been successfully applied within other research methodologies (e.g. Malik & Annabi, 2022; Wiegmann et al., 2022).

In the Syllk Model, the cheese slices, or plates, depict six elements: Learning, Culture, Social, Technology, Process, and Infrastructure. Each cheese slice is representative of the potential barriers to lessons learned for each segment, and the open holes in the Swiss cheese slices constitute the facilitators. For lessons to be learned from each project, it is necessary for that knowledge to be recorded and meaningfully transferred from the project back to the parent organization and likewise, the apertures in each cheese slice needs to permit knowledge to flow through them to have maximum impact (Duffield & Whitty, 2015).



Source: Duffield and Whitty's (2015) Syllk Model (permission to reproduce figure kindly received from the authors)

Figure 1: Systemic Lessons Learned Knowledge (Syllk) Model

The pathways through the apertures are illustrated by a dashed line and this shows the lessons learned route for projects through the facilitators, overcoming the barriers, then on towards the organization. The solid line in the opposite direction depicts the path of lessons learned from the organization to the project team. The paths are not necessarily direct, and the multifarious range of facilitators which are implicit in each slice of cheese are not used in a determined chronological pathway, hence the zigzagging characteristics of the solid line. Paver and Duffield (2019) applied the Syllk Model in their study of government entities, their adaptation of the model dealt primarily with externalities whereas our research is focused on internal processes that may collectively, or separately, impact upon knowledge transfer.

Project-based organizations (PBOs) merit a special treatment because they are often advocated as being best suited for environments where flexibility, adaptability, and collaboration are key to success (Pemsel & Müller, 2012) yet despite this there is a paucity of literature which means that this scoping review augments data by considering the wealth of literature on organizational knowledge transfer. This is consistent with approaches taken by other scholars (see Tshuma, Steyn & van Waveren, 2022). PBOs cannot be attributed a standard format, nor are they prevalent in any specific sector. Pemsel and Wiewiora (2013) considered previous research and discovered that PBOs could be referred to as 'firms', 'organizations or 'companies'. The first two terms have been exemplified in further research since that date (see Tarziján and Brahm (2014) on Project-based firms, and Miterev, Mancini and Turner (2017) relating to PBOs, although references to Project-based companies become less common thereafter. For all typologies, a PBO is considered an organization able to tackle several projects whether as a standalone institution or part of a larger organization. Arbabi, Salehi-Taleshi and Ghods (2020) highlighted the role PBOs should play in being a 'knowledge broker' between projects and the wider project organization.

2. Literature Review

2.1 Research Background

Knowledge-based economies require organizations to be innovative, creative, and incorporate learning opportunities faster and more effectively than their competitors (Serinkan et al., 2014; Crupi et al., 2021). The importance of knowledge is comensurate with a range of factors, including globalization, technological innovation happening apace, and best practice exchange requirements (Akhavan et al., 2018). The need for transparent internal knowledge sharing and open communication was illustrated during Covid 19 (Lee et al., 2021). Kirchner, Ipsen and Hansen (2021) emphasized how effective communication channels strengthened the sharing of learning outcomes during the pandemic. Transparent internal knowledge needs organizations to foster strategic learning capabilities by linking organizational learning and knowledge management (Dimitriades, 2005). This supports continuous organizational development opportunities that can be proactive during change and the need to operate in disruptive market conditions (Senge, 1990; Luhn 2016; Lee et al., 2021).

Over the decades, many studies have tackled organizational learning, knowledge management and learning organizations (e.g. Easterby-Smith, 1997; Senge, 1997; Bapuji & Crossan, 2004; Fai Pun & Nathai-Balkissoon, 2011; Argote & Hora, 2017; Odor, 2018). These disciplines have been linked with improving organizational performance and innovativeness (Du Plessis, 2007; Casprini et al., 2017) and are perceived as providing organizations with sustainable performance and competitive advantage (Almeida & Soares, 2014). For organizations to achieve these, they should target procedures aligned to capturing knowledge and creating the resultant knowledge management processes. This demands an organizational culture that can support and facilitate learning as well as the structure, infrastructures and systematic adaptability to flourish in times of dynamic change (Pemberton & Stonehouse, 2000; Balle et al., 2019).

Previous studies looked at knowledge management and organizational learning from a projectized perspective (Sense, 2011; Duffield & Whitty, 2015), focusing on knowledge management barriers (Lotti Oliva, 2014), human resource development and chaotic systems (Raidén & Dainty, 2006), leadership (Donate & de Pablo, 2015) alongside a consideration of multiple approaches (Powell & Ambrosini, 2012).

Thiry (2008) explained that PBOs conduct their primary activities as projects. However, PBOs can adopt many different forms: they can be structured as departments, matrix organizations, functional organizations alongside other less defined structural typologies.

Tshuma, Steyn and van Waveren (2022) claimed that whilst Project Management Offices (PMOs) could be used as a tool to sustain knowledge transfer between projects, this theme was not seen elsewhere in literature. Nonetheless, their study only looked at PBOs with overseeing PMOs offering moderation and mediation and concluded that hypothetically PMOs could provide both mediating and moderating roles to facilitate the transfer of knowledge between projects, without actually attesting that they did so in reality.

2.2 Distinguishing Between Individual Learning and Organizational Learning

Understanding the differences between individual learning and how organizations learn is paramount. Formative research initially linked individual learning to the parent organization's learning processes, in such a way as to indicate that there was no distinction between the two (Argyris & Schon, 1978; Shrivastava, 1983). This approach adhered to the principle that organization's learned via a humanistic cognitive-like process, thus personifying the organization and directly attributing it with learning traits similar to that of individuals: denoting both as able to acquire, analyze, store and disseminate knowledge (Lipshitz, Popper & Friedman, 2002). This view was not universal. Kim (1993) opined that although 'learning' was largely similar in both typologies, that the organizational learning itself differed in that the tasks needed to motivate individuals but it still took individuals to produce the behaviour that leads to learning (see also Mumford, 1992; Argyris, 1999; Franco & Hasse, 2009).

Essentially, for organizations to benefit from an individual's learning, organizations as an entity need to 'learn how to learn' (Schein, 1996), and to provide an effective supportive learning environment (Mumford, 2016). Individual learning is not a guaranteed pre-cursor to organizational learning (Cook & Yanow, 2011) and nor is it merely the aggregate of each group-member's learning capacity (Fiol & Lyles, 1985). Individual learning influences an idiocratic range of insights and the learning outcomes have the ability to produce changes in an individual's habits, skills, and action. This is at odds with organizational learning because that is designed to craft "changes in norms, doctrines, standard operating procedures, structures and cultures" (Naot, Lipshitz & Popper,

2004, p.93). In summary, organizational learning is essentially people orientated but it relies on an environment which is conducive to motivating and supporting individual learning. Yet, the organization needs to be able to exploit that individual learning to facilitate knowledge transfer between individuals and the organization.

2.3 Knowledge Management

Knowledge management as a business discipline began in the early 1990s and built on information management, data management, and document management. Fai Pun and Nathai-Balkissoon (2011) believed that knowledge is complex, has many dimensions and can be communicated several different ways, dependent upon the audience and technological aids available. Knowledge management can be found in an array of formats that include perceptions, routines and behaviour (Argote, 2011). The knowledge gets lodged in several different repositories within the organization. These encompass shared external memory systems and are exhibited within social networks (Argote & Ingram, 2000).

Ho et al. (2004) surmised that organizational knowledge systems depend upon constructive collaborative relationships to scaffold cooperation and a shared vision. This type of collegiality needs a platform strengthened by common consensus and trust. Social/sociable behaviour between team members is requisite for knowledge sharing. Organizations seek out and improve knowledge foundations by using training, education, research and development and communication. The knowledge management doctrine requires focusing effort in the right direction (Bhatti et al., 2021).

2.4 Knowledge Transfer and Preservation

Terzieva's (2014) research informs readers that organizational knowledge transfer and knowledge preservation approaches fall under the terminology of being either 'explicit knowledge' or 'tacit knowledge'. Her study centred on projectized learning and detailed explicit knowledge as software tools and shared project folders, reports and portfolios. Tacit knowledge was exhibited through internal social networks, specific project management training or coaching and mentoring programmes. Explicit knowledge can be easily shared across the organization, independent of the individual. In contrast, tacit knowledge mandates the individual's direct engagement with the process (Mitchell, Harvey & Wood, 2022). Knowledge management is a strategic approach that enables organizations to identify, capture, and leverage their collective knowledge to enhance productivity, innovation, and decision-making (O'Dell & Hubert, 2011). The core premise of knowledge management is that an organization's intellectual capital, which encompasses the skills, expertise, and experiences of its employees, is a critical driver of competitiveness (Rastogi, 2002; Santhose & Lawrence, 2023). Effective communication and the seamless sharing of knowledge among employees are essential components of successful knowledge management initiatives.

Knowledge management should facilitate lessons learned across an organization (Terzieva, 2014). By documenting and disseminating the insights and best practices gained from past projects, organizations empower their teams to learn from the successes and failures of their colleagues, allowing them to avoid repeating mistakes and streamline their processes (O'Dell & Hubert, 2011). The benefits of knowledge management are well-documented. By fostering a culture of collaboration and continuous learning, organizations can make use of the collective intelligence of their workforce, leading to improved problem-solving, enhanced innovation, and a competitive edge in the marketplace (Rastogi, 2002).

2.5 Knowledge Management Process

Gupta, Iyer & Aronson (2000, p.17) defined knowledge management as a "process that helps organizations find, select, organise, disseminate, and transfer important information and expertise necessary for activities such as problem-solving, dynamic learning, strategic planning, and decision making". The *process* element is echoed by Antunes and Pinheiro's (2020, p.146) view that knowledge management is the "processes of creation, storage, access and dissemination of the intellectual resources of an organization."

Barney (1991) created VRIO, which looked at resources from the perspectives of Valuable, Rare, Imitable and Organizational. The copious literature featuring the resource-based view (RBV) of a firm indicates that focus falls mostly on resources and performance. The RBV thesis is that resources which, simultaneously, are valuable, rare, imperfectly imitable and imperfectly substitutable become significant sources of competitive advantage (Barney, 1995). This explains inter-organizational performance differences (Hoopes, Madsen & Walker, 2003). The true value of VRIO is released when resources are valuable, rare, inimitable, and thereby become *irreplaceable* (Antunes & Pinheiro, 2020).

2.6 Practical Challenges to Knowledge Management

Whilst knowledge management appears as if it should be a straightforward construct, in fact there are practical challenges that incorporate a range of issues such as how accurate the knowledge is, how voluminous it may be, then how to motivate group-members to share their knowledge with others, as well as financing the IT/Technological support and ensuing maintainance that the data requires (Antunes & Pinheiro, 2020).

2.7 Culture, Structure and Infrastructure

The organizational structure teamed with the nature and expansive support/infrastructure (such as IT and communication systems) influence the effect and speed of an organization's learning (Pemberton & Stonehouse, 2000). The organizational culture determines the overall impact on an organization's capacity to learn (Bapuji & Crossan, 2004; Cook & Yanow, 2011; Lotti Oliva, 2014; Yao et al., 2020).

PBOs are defined as firms that structure their operations around temporary, client-specific projects rather than continuous, process-driven tasks (Hobday, 2000; Sydow, Lindkvist & DeFillippi, 2004). These organizations typically operate with decentralized, team-based structures and have high turnover across project teams and functions. This structural fluidity presents unique challenges for knowledge retention and transfer (Turner & Keegan, 2001; Bresnen et al., 2003). Unlike traditional hierarchical organizations, PBOs frequently "reset" their knowledge environments between projects, often leading to loss of learning, fragmented knowledge, and reduced organizational memory (Lindkvist, 2005). Knowledge transfer in PBOs is more episodic and informal, relying heavily on interpersonal relationships, embedded routines, and temporary networks (Sydow, Lindkvist & DeFillippi, 2004). As a result, standard models of organizational learning and transfer do not always apply effectively. Hassan and Annabi (2019, p.20) conducted research in the aircraft Manufacturing, Repair and Overhaul (MRO) Industry in which each repair and overhaul was project based and they reported that "there was evidence that assumptions, as opposed to knowledge, underpinned decisions".

2.8 What is a Learning Organization?

Wang and Ahmed (2003) believed that a learning organization should concentrate effort on continuously improving its performance via constructive learning channels. A learning organization also aims to direct appropriate knowledge to any requirement arising which needs an adapted response to changing market conditions (Luhn, 2016).

Literature detailed that PBOs have become increasingly common over the past 25 years (Miterev, Mancini & Turner, 2017). The International Organization for Standardization (ISO) stated that "More businesses are harnessing the power of projects to drive social and economic benefits" (ISO, June 2022). The Association for Project Management (APM) stated that projectized work had increased by 51% between 2019 and 2024 (APM, April 2024). Yet, despite the increase in project-based activities and implicit understanding that knowledge transfer is key to project success (van Waveren, Oerlemans & Pretorius, 2014; Todorović et al., 2015) an astonishing number of projects continue to fail, often in excess of half of them (Project Management Institute (PMI), 2023). Several scholars have highlighted that traditional knowledge management systems such as repositories and formal lessons-learned processes are often insufficient in PBOs unless complemented by mechanisms that support interpersonal, project-to-project and post-project learning (Bresnen et al., 2003; Ajmal & Koskinen, 2008). This creates a compelling need to examine knowledge transfer in PBOs through a tailored lens that reflects the socio-technical and temporal dynamics of project work.

In the context of PBOs, knowledge transfer is further complicated by the temporary and fragmented nature of project teams. Unlike traditional hierarchical firms, PBOs often lack formal structures for embedding learning between projects. As a result, mechanisms like *lessons learned reports* are frequently implemented in a procedural way, but without being meaningfully integrated into the organization's broader systems. The transient project environment makes it difficult for knowledge to move beyond the individual or project level, especially in the absence of sustained processes or cultural incentives for reuse. Nonetheless, it was consistently discovered that the lessons learned are rarely transferred or absorbed into organizational learning, or are even utilized beyond each project (Newell et al., 2006; Williams, 2008; Sense, 2011; Mothapo & Joseph, 2023). The optimum outcome is to transfer lessons learned by means of individuals sharing their knowledge whilst moving on to new projects or via relevant social networks (Swan, Scarbrough & Newell, 2010; Lin & Lo, 2015; Grant, 2016). If knowledge transfer is deficient for whatever reason, the result leads organizations to reinvent the knowledge and, moreover, risk repeating failures (Baloh, Uthicke & Moon, 2008; Almeida & Soares, 2014).

2.8.1 Lessons Learned

Success, failures, and near-misses all provide opportunities for effective lessons learned. The outputs from each of these three scenarios should be incorporated into the organizational operandi modus (McClory, Read, & Labib, 2017). These types of institutional 'memories' are the most effective learning tools and should prevent time wasted on making the same mistakes (Shokri-Ghasabeh & Chileshe, 2014).

The development of lessons learned tools and procedures, are exampled through the Project Management Institutes (PMI) guidelines: Project Management Body of Knowledge (PMI, PMBoK Guide, 2021 7th Edition). Indeed, it has been established by a range of empirical studies that the failure to record and transfer project learning has remained unchanged over the decades (Williams, 2008; Swan, Scarbrough & Newell, 2010; Duffield & Whitty, 2015; Argote, Lee & Park, 2021). The various iterations of the PMBoK have proferred many guidance pointers regarding lessons learned. These outputs have covered documented and variance attributes and touched upon many of the project management knowledge areas. For example in the 4th version of the PMBoK (2008) there were 54 lessons learned entries. By the 5th edition of the PMBoK (2013) 78 guidance points were included. The 6th edition PMBoK (2017) contained a section on *Manage Project Knowledge* as a component of the Project Integration Management knowledge area. The PMI (2017) advocated that this utilized existing knowledge and also created new knowledge to realize the project's targets and give rise to organizational learning. A more detailed breakdown of the nuanced differentiation is covered by Duffield (2017). The focus of PMBoK was changed for the 7th edition. Whereas all versions up to the 6th edition detailed both project phases and knowledge areas, the 7th edition moved towards a competency performance perspective in lieu of knowledge areas. In brief, the 6th edition concentrates on outputs whereas the 7th edition tries to inculcate an understanding of value-driven skills and resources to deliver outcomes.

There is a gap in organizational knowledge management and a need for more effective practices to capture and disseminate lessons learned. Researchers continue to chronicle this gap without providing the solution (Argote, Lee & Park, 2021; Zhou et al., 2022; Mothapo & Joseph, 2023). Duffield and Whitty (2015) used their Syllk Model to emphasize that lessons learned is crucial for organizational efficacy. They argued that documented and shared lessons can contribute to an organization's intellectual capital, fostering innovation and preventing mistake reptition. However, the authors also disclosed that many organizations struggle to operationalize lessons learned processes.

2.9 Further Dimensions to Project-Based Organizational Learning (PBOs)

Further dimensions significantly impact on an organization's ability to learn within PBOs. Sense (2011) was keen to emphasize the distinction between 'projects' and the every-day 'normal' work in organizations. He stated that projects were quite separate because they were temporary and task-focused with unique aims and objectives. This inpermanent project status can often culminate in knowledge leakage because at project termination the project team members are reallocated to different roles, which leads to the fragmentation of the project knowledge, unless it is collected, collated, placed in a repositary and disseminated within the organization (Lindner & Wald, 2011; Mothapo & Joseph, 2023). The transient nature of project teams poses challenges for organizational learning. As project-based work becomes more prevalent, organizations must grapple with how to effectively capture and transfer the lessons learned by these temporary, fragmented teams back to the broader organization. Traditional organizational learning processes may prove insufficient in this context (Wiewiora, Chang & Smidt, 2020). This lack of project uniformity and the fragmented end knowledge which is not captured within existing organizational structures, processes, practices, and technologies is a monumental challenge to effective PBO learning. There is a paramount need to find mechanisms to effectively share and integrate knowledge between projects and throughout the parent organization (Almeida & Soares, 2014; Zhou et al., 2022). Organizations must adapt their learning processes to become agile. This may involve implementing robust project debriefing procedures (lessons learned), designing knowledge repositories that transcend individual projects, and fostering a culture that prioritizes cross-project collaboration and learning.

Despite this, much of the literature still generalizes knowledge transfer across organizations without adequately accounting for the context of project-based structures. This review therefore contributes to the field by focusing specifically on how knowledge transfer processes are enacted, constrained, and facilitated within PBOs, highlighting a gap in how these PBOs build and sustain institutional learning. Failing to do so could result in lost lessons learned and the resultant missed knowledge transfer opportunity. Zhou et al. (2022) reported that the system dynamics model that they employed in their research illustrated that knowledge was not transferred from the PBO to the parent organization.

2.10 Linking Organizational Learning with Knowledge Management

Researching links between knowledge management and organizational learning both have interplay in the roles relating to the operation and/or creation of a learning organization (Raidén, Dainty & Neale, 2008). Additional aspects including culture, the environment, strategy and structure all influence organizational learning and contribute to efficacious knowledge management outcomes (Bapuji & Crossan, 2004; Putra et al*.,* 2020).

2.11 Reviewing Duffield and Whitty's (2015) Syllk Model

The Duffield and Whitty (2015) Syllk Model (see Figure 1) was developed from an earlier model (see Duffield & Whitty, 2012). The model offers examples of facilitators for each element but associated barriers are omitted. It is not apparent if the lack of one or more of the Swiss cheese elements would be a significant barrier to organizational learning, or just reduce optimum learning effectiveness (and if so, which of the six elements would be most impactful on the [lack of] success outcomes if they were absent?) It is unclear whether or not each element holds equal weighting with regard to the efficacy of the final lessons learned. For example, in other studies, a supportive organizational culture was said to be of higher relevance for facilitating organizational learning than either the organizational structure or infrastructure (Chen et al., 2003). Despite this, the development of supportive infrastructure significantly scaffolds organizational learning (Lotti Oliva, 2014; Yao et al., 2020).

Although the knowledge economy (KE) is not an intrinsic part of the Syllk Model, it is implicit that the dissemination and application of lessons learned when done effectively epitomize the KE principles. Roberts (2009) stated that the KE is the result of "the recognition that advanced economies derive a high proportion of their economic wealth from the creation, exploitation and distribution of knowledge and information" (p.285). Hadid (2017) synthesized several authors work and suggested that "the knowledge economy is developing continuously as a direct consequence of the increase of importance of knowledge in economic processes in all economic sectors" (p.204). She further mentions that KE is required for effective knowledge management. It is crucial to retain knowledge to feed into a successful KE (Mubarak et al., 2024).

2.12 People Matter

The Syllk Model has broad similarity to the organizational elements noted in Pemberton and Stonehouse's (2000) *Organizational Learning and Knowledge Management Environment Model*. However, there is one noteworthy addition in the inclusion of *Social* under the heading of *People*. Its addition clearly indicates research findings show that PBOs suffer from the lack of knowledge transfer (Lin & Lo, 2015; Grant, 2016; Balle et al*.,* 2019). This requires greater reliance on social network activities (interpersonal skills) to support project-based learning (Williams, 2008). Bartsch, Ebers and Maurer (2013) argued that project teams' social capital could remove the barriers to PBO learning. Social capital requires intra-organizational social networking between the project team with colleagues outside the project. Carayannis and Campbell (2018) interlink academic mechanisms for achieving knowledge with those of interaction mechanisms of inter and intra workings in and between society and organizations. The authors were of the opinion that to convert to a full knowledge society and achieve KE, "almost everyone acts also as a knowledge worker" (p.11) which emphasizes the point that people really do matter.

3. Methodology

Mays, Roberts and Popay (2001) defined scoping reviews as a means of synthesizing "key concepts underpinning a research area, especially where an area is complex" (p.194). Each of the areas that we looked at have been the foci of years of extensive research, yet there has not been an approach beforehand that analyzed an aggregate of relevant multiple themes for PBOs knowledge transfer. We considered 202 sources of literature spanning over fifty years. The findings have been reimagined under the lens of the Syllk Model (Duffield & Whitty, 2015), which in itself gave us the six elements to consider as a starting point. Peters et al. (2022) noted that scoping reviews have rapidly become an acceptable approach to synthesize evidence.

Bragge et al. (2011) created three recommendations for scoping reviews based upon the earlier writings of Katz et al. (2003), Mays, Roberts and Popay (2004), Arksey and O'Malley (2005) and Bates, Clapton and Coren (2007). They proposed that scoping reviews should have three main functions:

1. To delineate what is being explored, which in our case is the half century of extant literature on project-based knowledge transfer.
2. To conduct a search for appropriate literature, which we have done by using a plethora of rich sources, and

3. To report on those characteristics.

Munn et al. (2018) refined the context for scoping reviews and advocated that the primary purpose of a scoping review is to provide an overview of literature and illuminate significant gaps. Figure 2 provides an overview of how the themes were identified and the dissemination was conducted. The authors also highlighted that tabular information were the likely outcomes of a scoping review, as can be evidenced in our five tables. They further emphasized that scoping reviews provide a map of literature but do not assess the quality of each respective study. As a result, methodological limitations are not required within scoping reviews. Scoping reviews are an approach consistently employed to evidence synthesis for researchers. They are removed from the necessity to compare, contrast and create analytical comparisons based on combining data results, and instead endeavour to describe and present relevant findings (Peters et al., 2022).

3.1 Approach to the Literature Review

Rather than take a reductive approach, which is the one that systematic reviews adopt, we preferred to start with a sufficiency of literature on each theme, and we were not afraid to add to those outputs if we felt that our exploration warranted such extension. In total, we reviewed 202 sources of information spanning over five decades. A scoping review is distinct from a systematic review in that the breadth of literature covered in a scoping review exceeds the more limited foci of a systematic review by design. We have explored and mapped existing literature on relevant topics related to the Syllk Model and have identified key concepts by determining the wide extent of available evidence. This was designed to tackle both the general and emergent research questions.

Our working question included what has been done before and what progress has been made in previous research. We used the framework adopted by Levac, Colquhoun & O'brien, (2010) to refine the research question for our scoping review. We wanted to review extant literature on PBOs' knowledge transfer to establish what it already tells us. From there our more targetted research questions were:

Research Question 1: *How does the Syllk model help interpret and categorize knowledge transfer dynamics in PBO contexts?*

Research Question 2: *What adaptations are required, if any, to the Syllk Model (Duffield & Whitty, 2015) to better facilitate knowledge transfer within PBOs?*

Research Question 3: *What are the key barriers to knowledge transfer in PBOs?*

It also made sense for us to consider the antecedents that go into knowledge transfer by reviewing literature on knowledge management, organizational learning, a learning organization, organizational culture and investigate how the knowledge management and learning infrastructure impacts PBOs. This allowed us to assess facilitators and barriers to organizational learning and thus identify the gaps in literature, as per a major output of any scoping review.

Consistent with the ethos of scoping reviews, this study identified a broad array of literature. Scoping reviews aim to map a wide body of knowledge. This led to the identification and use of a significant number of relevant literature sources. The development of a protocol that clearly describes the scoping review process is nascent, but not without growing acceptance and guidance (Peters et al., 2022). Figure 2 illustrates the wealth of topics reviewed to meet our target.

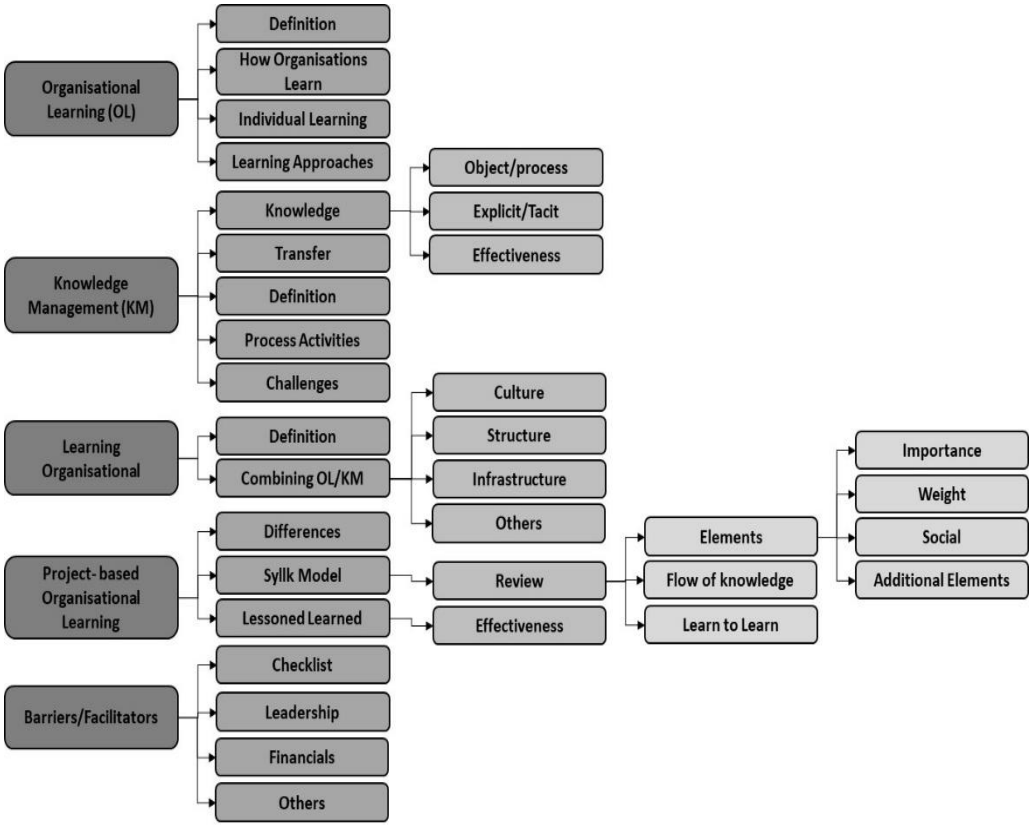


Figure 2: Themes and Dissemination Used Within the Scoping Review

3.2 Interpretive Structural Modelling (ISM)

Sage (1977) inspired several research outputs which, in turn, adopted ISM variants (see Singh, Garg & Deshmukh, 2007; Singh et al., 2021; Crupi et al., 2021). Instead of creating a new structural model, we employed the Syllk Model (Duffield & Whitty, 2015) as our antecedent ISM. This was supported by Singh and Kant's (2008) advice that ISMs are ideal tools to identify both facilitators and barriers to knowledge transfer. Thereafter we assessed if it was a good fit for the literature reviewed in its original format.

4. Findings

The folllowing findings provide a broad look at over 50 years of research to ascertain how PBOs transfer knowledge. We covered all the elements from the original Syllk Model created by Duffield and Whitty (2015).

4.1 Knowledge Management

Our research has problemetized the fact that knowledge management is still vaguely defined and often incorrectly construed as an offshoot of some other disciplines. These varying perspectives can lead to confusion in practice. Organizations may struggle to align their knowledge management strategies, choose appropriate tools, and communicate the value of knowledge management consistently. This lack of consensus could hinder the development of standardized knowledge management practices and metrics across industries.

To reduce this confusion, a more unified definition of knowledge management would be beneficial. We propose that this should balance process and capability perspectives, acknowledge both human and technological aspects, and clearly link knowledge management and knowledge transfer to organizational objectives while remaining adaptable to accommodate different contexts.

Our study reviewed previous scholars' work (Table 1) and we harmonized their outputs to provide the following definition:

Knowledge management is an integrated organizational capability and systematic process that leverages both human expertise and technological infrastructure to create, capture, organize, share, and apply knowledge assets. K*nowledge management should enhance organizational performance, foster innovation, and create*

sustainable competitive advantage by aligning knowledge-related activities with strategic objectives, while adapting to diverse operational contexts and evolving business environments.

Table 1: Definitions of Knowledge Management

Definitions	Author(s)	Field of Research
'A process of capturing, developing, sharing, and effectively using organizational knowledge'.	Nonaka (1994, p. 25)	Organization Science
'The systematic, explicit, and deliberate building, renewal, and application of knowledge to maximize an enterprise's knowledge-related effectiveness and returns from its knowledge assets'.	Wiig (1997, p. 9)	Knowledge Management
'Knowledge management is the process of capturing, distributing, and effectively using knowledge'.	Davenport & Prusak (1998, p. 2)	Organizational Management
'A systemic and organizationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees so that other employees may make use of it to be more effective and productive in their work'.	Alavi & Leidner (2001, p. 107)	Knowledge Management
'A process of knowledge creation, validation, presentation, distribution, and application'.	Bhatt (2001, p. 68)	Knowledge Management
'An organizational capability that allows people in organizations, working as individuals, or in teams, projects, or other such communities of interest, to create, capture, share, and leverage their collective knowledge to improve performance'.	Lakshman (2007, p. 58)	Organizational Learning
'The planning, organizing, motivating, and controlling of people, processes and systems in the organization to ensure that its knowledge-related assets are improved and effectively employed'.	King (2009, p.3)	Organizational Learning
'The deliberate and systematic coordination of an organization's people, technology, processes, and organizational structure in order to add value through reuse and innovation'.	Dalkir (2013, p. 4)	Knowledge Management
'The process of creating, sharing, using and managing the knowledge and information of an organization'.	Girard & Girard (2015, p. 20)	Knowledge Management
'An organization's ability to create new knowledge, disseminate it throughout the organization, and embody it in products, services, and systems'.	Massingham & Al Holaibi (2017, p. 62)	Knowledge Management
'A dynamic process of creating, storing, transferring, and applying knowledge to enhance organizational performance and create value'.	Asiaei & Bontis (2019, p. 371)	Knowledge Management
'The strategic and systematic management of knowledge assets, processes, and organizational environments to create value and enhance competitive advantage through innovation and organizational learning'.	Intezari, Taskin & Pauleen (2017, p. 494)	Knowledge Management

Source: Authors' own

4.2 Organizational Learning

Organizational learning refers to the process by which organizations acquire, share, and apply knowledge to improve performance and adapt to changing environments (Argote & Miron-Spektor, 2011; Crossan, Maurer & White, 2011; Argote, Lee & Park, 2021). It enables firms to develop new capabilities, innovate, and maintain a competitive edge (Easterby-Smith & Lyles, 2011; Hislop, Bosua & Helms, 2018). Research has emphasized the multilevel and dynamic nature of organizational learning, considering the interplay between individual, group, and organizational learning processes (Bapuji & Crossan, 2004; Marabelli & Newell, 2014).

Despite an evolution of over half a century, no single agreed definition prevails for organizational learning (Wang & Ahmed, 2003; Antunes & Pinheiro, 2020). A standalone theory purporting to encapsulate organizational learning does not exist (Crossan, Maurer & White, 2011). Notwithstanding 50 odd years of theorizing, the terminology remains open to interpretation. Some of the working definitions academics have adopted over the years are included in Table 2.

Table 2: Definitions of Organizational Learning

Definitions	Author(s)	Field of Research
'The process of improving actions through better knowledge and understanding'.	Fiol & Lyles (1985, p.803)	Organizational change and strategic management
'The means by which knowledge is preserved so that it can be used by individuals other than its progenitor'.	Sinkula (1994, p.3)	Market information processing
'The development of new knowledge or insights that have the potential to influence behaviour'.	Slater & Naver (1995, p.63)	Market Orientation
'Roughly defined as an information management strategy that consists of systematic efforts to transfer knowledge throughout an entire organization'.	Spector & Davidsen (2006, p.64)	Education
'A continuous transformation process of transferring individual knowledge to organizational systems'.	Yang (2007, p.85)	Knowledge Sharing
'Concepts which capture and describe the process of gaining information and transforming it into knowledge at a firm's operational level'.	Franco & Hasse (2009, p.628)	Entrepreneurship
'Includes processes of creating, retaining and transferring knowledge and has implications for performance and competitiveness of organizations'.	Argote & Hora (2017, p.579)	Management of technology

Source: Authors' own

To synthesize the best of the definitions above, we advocate that organizational learning is:

The composite of individual knowledge shared with the wider organization, which is captured and used within organizational systems. Knowledge preservation itself is a continuous process which fascilitates performance enhancement using optimized understanding of information and insights.

4.3 A Learning Organization

Cyert and March (1963) are credited with making the first reference to 'organizational learning'. Its development within the fields of management, leadership and business studies literature did not emerge until the late 1970s/ early 1980s (Argyris & Schon, 1978; Hedberg, 1981; Fiol & Lyles, 1985).

Edmondson's (1999) framework highlights the role of psychological safety in facilitating learning behaviours such as speaking up, seeking feedback, and experimenting . She described learning as an "ongoing process of reflection and action characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of action" (Edmondson 1999, p.353), thus placing the individual at the centre of the learning.

The 4I framework (Intuiting, Interpreting, Integrating, Institutionalizing) was created by Crossan et al. (1995) and links individual, group, and organizational learning processes. It was further developed by Bapuji and Crossan (2004). Intuiting refers to the subconscious recognition of patterns and possibilities by individuals; interpreting is the explaining of an insight to oneself and others; integrating involves the development of shared understanding and coordinated action at the group level; and institutionalizing is embedding learning into organizational systems, structures, and routines. Crossan et al. (1995, p.525) elucidated that "institutionalizing is the process of ensuring that routinized actions occur". This last step seems missing for most PBOs. Institutionalization was also described as "the process of embedding learning that has occurred by individuals and groups into the institutions of the organization including systems, structures, procedures, and strategy" (Crossan & Bedrow, 2003, p.1090). This suggests that the embeded knowledge has to be captured, commissioned and communicated deliberately so that it can be applied to future learning scenarios.

Argote and Miron-Spektor (2011) emphasize the importance of knowledge transfer and creation through social interaction and experience accumulation. The authors claim that organizational learning occurs through the interplay of knowledge acquisition, distribution, and implementation, which are shaped by factors such as organizational context, network ties, and the characteristics of the knowledge itself. The need for social networks in project management has been acknowledged by many authors (e.g. Lin & Lo, 2015; Grant, 2016; Balle et al., 2019) but appear not to have been incorporated into the Syllk Model expressly, since Duffield and Whitty's (2015) definition of *social* did not mention networks specifically.

As with organizational learning, there are multiple definitions for a learning organization. Some of the working definitions academics have adopted are included in Table 3, but they are in no way exhaustive.

Table 3: Definitions of a Learning Organization

Definitions	Authors
'Organizations where people continually expand their capacity to create the results they desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together'.	Senge (1990, p.3)
'An organization skilled at creating, acquiring and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insights'.	Garvin (1993, p.80)
'An organization that facilitates the learning of all its members, and consciously transforms itself and its context'.	Pedler, Burgoyne & Boydell (1997, p.3).
'A company that learns effectively and collectively and continually transforms itself for better management and use of knowledge; empowers people within and outside the organization to learn as they work; utilizes technology to maximize learning and production'.	Marquardt (2011, p.247)
'The aim of a learning organization is a continuous organizational development. With this, the company extends constantly his ability to form own future creatively and to adapt itself to changed market conditions'.	Luhn (2016, p.11)

Source: Authors' own

It is not our intention to provide a definition for a learning organization. Instead, we will offer an amended model and recommendations when we conclude this review to help guide PBOs towards incorporating learning logs.

4.4 Organizational Culture

Organizational culture comprises of core beliefs, values and hidden assumptions shared by its members (Schein, 1985; Hofstede, 1997). These affect the behaviour of individuals, groups, and organizations, as well as serve to facilitate learning activities (Cook & Yanow, 2011). Organizational culture has many facets according to authors. For example, it can enshrine openness supported by transformational leadership (Hult et al., 2000; Park & Eun-Jee, 2018), or a participative decision-making culture; where tolerance of errors and a readiness to spot errors and learn from them prevails (Schmitz et al., 2014). Culture can inculcate motivation to share information (von Zedtwitz, 2002), learning orientation (Hurley & Hult, 1998) and positive supervisory behaviour and organizational support (Ramus & Steger, 2000). All of these are aspects of organizational culture that can positively influence learning (Bapuji & Crossan, 2004; Papmehl, 2004). Conversely, the lack of learning culture can hinder or prevent learning and knowledge management innovation (McDermott & O'dell, 2001). The authors listed beforehand did not disaggregate culture's attributes, (present or in omission). There are also national organizational cultural considerations such as clan and adhocracy (Oh & Han, 2020) alongside multi-national organizational culture influences driven by leadership styles (Kortsch, Bashenkhaeva & Kauffeld, 2023) that are generally unconsidered.

Academic literature hinted that the fundamental driver behind a learning culture was a collective desire to improve through learning (Spector & Davidsen, 2006). There are limited empirical studies testing the link between learning culture and knowledge management practices (Schmitz et al., 2014).

Organizational culture is widely recognized as a critical factor in shaping learning behaviours and outcomes (Senge, 1990; Schein, 2017). A culture characterized by trust, openness to change, and a focus on continuous improvement supports organizational learning (Jyothibabu, Farooq & Bhusan Pradhan, 2010; Edmondson & Lei, 2014). In such an environment, employees feel psychologically safe to experiment, share knowledge, and challenge existing assumptions (Edmondson, 1999). In contrast, a culture of fear, blame, and rigid hierarchy can inhibit knowledge sharing and the application of new insights (Carmeli & Gittell, 2009; Bunderson & Boumgarden, 2010). When individuals perceive the risk of speaking up or admitting mistakes as too high, they are less likely to engage in the learning behaviours necessary for organizational adaptation and innovation.

Leaders play a crucial role in cultivating a learning-oriented culture by modelling desired behaviours, encouraging knowledge sharing, and allocating resources to support learning initiatives (Vera & Crossan, 2004; Annabi, 2022). Aligning organizational systems, such as performance management and reward structures, with

learning priorities is also important for reinforcing the desired cultural norms (Jyothibabu, Farooq & Bhusan Pradhan, 2010; Schein, 2017).

4.5 How Does Knowledge Management and Learning Infrastructure Impact upon Project-Based Organizations (PBOs)?

In PBOs, learning faces unique challenges due to the temporary and fragmented nature of project teams (Lindner & Wald, 2011). Knowledge tends to reside within project teams and can be lost when projects end, unless deliberate mechanisms are in place to capture and disseminate lessons learned (Sense, 2011). The transient nature of project-based work limits the opportunities for sustained knowledge sharing and collective sense-making across the organization (Bartsch, Ebers & Maurer, 2013). Project teams may operate in silos, with limited interaction and integration with the broader organizational context, hindering the transfer of insights and the development of organizational capabilities.

Adapting organizational learning processes to the project-based context is crucial for leveraging knowledge across the organization. This may involve implementing robust project debriefing procedures, designing knowledge repositories that transcend individual projects, and fostering a culture that prioritizes cross-project collaboration and learning (Sense, 2011). Failing to do so could result in the loss of valuable lessons learned and missed opportunities for organizational improvement and innovation.

4.6 Barriers to Organizational Learning

There are a significant number of barriers to lessons learned regarding organizational learning. Whilst each organization may not be subject to the same combination of barriers, they are more than likely to be subject to multiple barriers (Williams, 2007). To successfully transfer the lessons learned to organizational knowledge, barriers need to be overcome through the creation of facilitators (Duffield & Whitty, 2015). Therefore, having the fullest understanding of barriers is of primary importance. The barriers identified by previous research in Table 4 have been widely considered and are provided as a guideline and not suggestive of their existence or omission in all organizations. As part of our ISM approach, the barriers noted in Table 4 were interpreted and aligned to each of the six elements depicted in the Syllk Model.

Table 4: List of Barriers to Organizational Learning and Knowledge Management

Barriers	Publications	Syllk model Element
Lack of understanding of the value of lessons learned	Carrillo, Ruikar & Fuller (2013)	Learning
Organizational learning as a cost, not an investment	Matzdorf, Price & Green (2000); Zollo & Winter (2002)	Learning (Financial)
Not enough time	Keegan and Turner (2001); von Zedtwitz (2002); Carrillo et al. (2004); Williams (2007); Shokri-Ghasabeh & Chileshe (2014)	Learning (Financial)
Lack of resources	Shokri-Ghasabeh & Chileshe (2014)	Learning (Financial)
Lack of or delayed feedback	Rahmandad, Repenning & Sterman, (2009)	Learning
Focus on problem-solving and single-loop learning	Argyris & Schon (1978).	Learning
Lessons are not transferable	Williams (2007)	Learning
Wrong people are involved	Williams (2007)	Learning
Lack of incentive	Bandow, Gerweck & Self (2015)	Culture (Financial)
Lack of management and leadership support	Steiner (1998); Bontis, Crossan & Hulland (2002); Lin (2007); Miklosik & Zak (2015); Anlesinya (2018)	Culture
Lack of organizational learning culture	Stonehouse & Pemberton (1999); Carrillo et al. (2004)	Culture
Organizational blame culture	Papmehl (2004)	Culture
Fear of employees being poached	Panagiotakopoulos (2011)	Culture
Organizational readiness to change	Jafari & Kalanaki (2012)	Culture
Arrogant Organizational Disorder	Godkin & Allcorn (2009)	Culture

Barriers	Publications	Syllk model Element
Employee resistance	Carrillo et al (2004)	Social
Employee egos due to defensive routines and denial	Argyris (1992); Argyris & Schon (1978); Henfridsson & Soderholm (2000); Desouza (2003); Yang, Secchi & Homberg (2018).	Social
Lack of attention, personal interest and ability	von Zedtwitz (2002)	Social
Already put in enough effort	Williams (2007)	Social
Fragmentation of project teams once projects are completed	Keegan &Turner (2001); Disterer (2002); Wiewiora et al. (2009); McClory, Read, & Labib (2017)	Process (Financial)
Lack of understanding between process review, lessons learned and process improvement	Pitagorsky (2000)	Process
Lack of clear guidelines	Carrillo et al. (2004); Newell et al (2006); Williams (2007); Shokri-Ghasabeh & Chileshe (2014)	Process
Process does not capture useful lessons learned	Cooke-Davis (2002); Williams (2007).	Process
Knowledge too hard to capture, categorise and disseminate	Desouza (2003)	Process
Inadequate or ineffective infrastructure and communication	Argyris (1999); Pemberton & Stonehouse (2000); Desouza (2003); Carrillo, Ruikar & Fuller (2013).	Infrastructure (Financial)
Lack of organizational structure to support organizational learning	Steiner (1998); Schilling & Kluge (2009)	Infrastructure
Lack of human resources	Williams (2007)	Infrastructure
Data repository too hard to search	Williams (2007)	Technology

Source: Authors' own

For *Learning* it seems that research has determined that *time constraints* were a barrier, given the competing priorities of project timelines. Learning, or lack of it, and time constraints are both detailed as being driven by the organization.

Barriers for *Culture* include staff resisting new methods due to the time it would take to learn a new approach. Conversely, if the expression of the change requirement was staff generated, it may be considered a criticism by the management team. Management and leadership are areas that are either co-joined or distinctly separated by various authors and therefore, a stipulation of what each means would be needed for any ISM to be applied consistently. Furthermore, both the preceding points are interlinked in that change would still experience resistence even if change was welcomed by some organizational members. These barriers relate to the individual's attitudes. The most acknowledged facilitators included management/leadership support and a culture of supporting others' ideas and views, which are driven by the organization.

Working in silos and ineffective social networks were heralded as the top barriers under the *Social* element. Whereas, attitude, willingness to share/be open and informal communication channels were the main facilitators. To a large extent, these are driven by the individual.

From a *Technology* perspective: Associated barriers included a lack of IT training. This emphasizes that whereas the six elements are seen as discrete within the Syllk Model, this is not wholly representative given that training could arguably also fall within the *learning* element and *technology* can be seen as *infrastructure*. Technology can also be a facilitator. Hence, barriers and facilitators often form a contradiction.

Under the element of *Process*, previous researchers found that team members can provide dissimilar viewpoints probably due to lack of harmony in what a process actually means to the individual and therefore decide that it could incorporate one or more of the other plate items. Isolation could equally be considered a social element concern. Governance and policies of isolation could involve geographical location and resultantly, this element holds several potential meanings depending on the context of usage.

In the same way that isolation was considered under *Process*, geographical distance was the dominant barrier for *Infrastructure*. Further barriers included, a lack of infrastructure available for organizational use (Kezar &

Holcombe, 2020) which equally seemed pertinent to technology. Additionally, researchers have opined that organizations are unwilling to adopt new infrastructure to support outcomes if costs cannot be recharged to a specific project. Nomenclature and definitions tend to mean different things to different people, and sometimes even different things to the same people depending on the context.

4.7 Identifying The Gaps

There are two additional elements which should be included in the Syllk model: *Leadership* and *Financial*. We have indicated that studies such as that of Kortsch, Bashenkhaeva and Kauffeld (2023) acknowledge that leadership style influences organizational learning capacity (see also Turner & Müller, 2005). We are cognizant of the fact that leadership is often researched under the lens of transactional leadership (Aga, 2016) or ethical leadership (Bhatti et al*.,* 2021) or competencies (Mai, Do & Ho Nguyen, 2022) and we acknowledge the expertise within these studies and simply state that we are refering to leadership as a category without classifying the type/style or components of leadership therein.

Many of the barriers listed in Table 4 are influenced by organizational leadership. Popper and Lipshitz's (2000) research uncovered that leadership is a significant variable that impacts organizational learning. Vera and Crossan (2004) suggested that its influence is far-reaching and affects each element of the learning system. From a wider perspective, organizational leadership influences strategy, structure and establishes culture (Chang & Lee, 2007), approves processes and hiring employees, and supports transformational change (Garcia-Morales, Jiménez-Barrionuevo & Gutiérrez-Gutiérrez, 2012). Similarly to leadership, finance appears to impact all elements of the Syllk model.

One specific barrier identified in Table 4 was that organizational learning is seen as a cost, not an investment (Zollo & Winter, 2002). Lack of financial support appears to be the underlying causes of many other barriers (e.g. lack of resources, inadequate or ineffective infrastructure and communication, not enough time, lack of incentive).

It is apparent that all the barriers listed in Table 4 could be minimized through effective leadership. Another key pointer is that organizational learning requires financial commitment and that this linkage remains an under-researched area, despite the intrinsic value of learning being addressed by many scholars (Wiewiora, Chang & Smidt, 2020; Do et al., 2022; Ivaldi*,* Scaratti & Fregnan, 2022). Nonetheless, the cost of creating that value is not given any attention.

5. Discussion

The following discussion answers the three research questions that guided this study.

- Firstly, it examines **how does the Syllk model help interpret and categorize knowledge transfer dynamics in PBO contexts**. By applying the Syllk model as an analytical lens, the discussion provides insights into how the interplay of systems and components within the model elucidates the complexities of knowledge transfer processes in such organizational settings.
- Secondly, it considers **what adaptations are required, if any, to the Syllk Model (Duffield & Whitty, 2015) to better facilitate knowledge transfer within PBOs**. This allows us to present a revised Syllk Model, which we named the Aspirational Syllk (Asyllk) Model.
- Thirdly, it explores **what are the key barriers to knowledge transfer in PBOs**. This question aims to uncover the factors that hinder effectiveness of knowledge movement within the dynamic and often temporary structures typical of PBOs.

5.1 Application of the Syllk Model

Duffield and Whitty's (2015) Syllk Model holds relevance regarding some elements (i.e. learning, culture, social, technology, process and infrastructure). Nonetheless, it was evident that ambiguity is introduced when describing facilitators and barriers in relation to each discrete element. The uncertainty with regards some of the issues, outcomes, inputs or processes and where each should be located is worthy of further research. For example, would software fall within either the *technology* or the *learning* element? Should isolation be considered within the *process* or *social* or *infrastructure* elements? The ambiguous nature of what concepts belonged within which element showed that the elements, and the components of the elements, were interpreted differently by various authors. To that effect, Duffield and Whitty themselves later incorporated *leadership* into both *social* and *cultural* silos (Duffield & Whitty, 2016).

We used the Syllk Model to establish if it could be representative of existing literature on knowledge transfer. However, it raises questions on what interpretation ISMs scaffolds: the interpretation of the participant, or the researchers' interpretation of the participants' interpretations. Furthermore, there is no guidance regarding whether all elements are equally important to transferring lessons learned from projects to the mother organization. It has not been established if the *people* element is more important than the *systems* element. That would seem contrary to much of the literature covered in this scoping review, which found people to be crucial to both individual and organizational learning success. Equally, the linear flow of knowledge in the original Syllk Model seems optimistic and unrepresentative of other studies (Meyers, 1990; Vance, Zell & Groves, 2008). Often leadership is construed as fundamental to successful knowledge transfer within organizations, yet there is not a preferred way of representing leadership within the existing Syllk model.

Without a formal means of capturing the lessons learned, individual knowledge cannot be transformed into organizational knowledge. Nevertheless, project-to-project learning exists, facilitated by components within the *People* element. The dissemination and application of lessons learned is not inevitable.

These challenges are particularly significant in the context of PBOs, where teams are temporary, knowledge is distributed and formal systems often take a back seat to relational and experiential learning. The ambiguity in how elements are categorized in the Syllk Model reflects the broader challenge of codifying and transferring knowledge in environments with high staff turnover and limited structural continuity. As such, the model highlights the preeminent barriers mentioned earlier; those of unclear leadership roles and lack of systems emphasis. Additionally, the enablers where informal networks and cultural elements that shape how knowledge is retained or lost between projects. This aligns with the findings of this review, which suggest that while project-level learning occurs, mechanisms for institutionalizing that knowledge are weak and inconsistently applied.

We acknowledged that the Syllk Model served as an interpretive lens to categorize and analyze the barriers and enablers of knowledge transfer explored across the literature. Each element, i.e. *people*, *systems*, *technology*, *process*, *infrastructure*, and *learning* was used as coding to help sort findings into thematic clusters. This allowed us to observe where the literature concentrated, for instance, on *people* and *social* elements, and where significant gaps existed. This identified the underdeveloped areas or the insights gleaned on *infrastructure* or *financial* enablers. In this way, the Syllk Model helped structure the review by guiding attention to both *social* and *technical* subsystems, even if certain concepts resisted clear categorization. These interpretive challenges became the basis for proposing the new ISM Model.

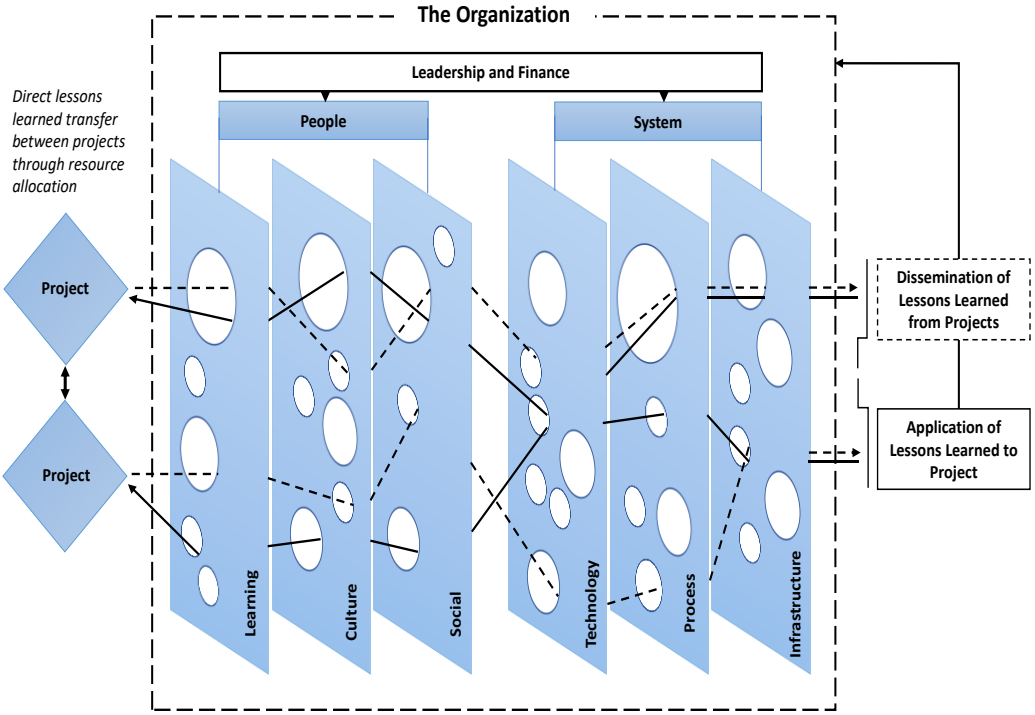
5.2 The Aspirational Syllk Model (Asyllk)

Applying an ISM was a valuable methodological tool to use for the scoping review because it allowed us to analyze the complexity of barriers to the six elements within the original Syllk Model and also explore the broader antecedents of knowledge transfer. Through an extensive examination of existing literature, covering over 200 sources, we were able to illustrate a detailed understanding of barriers to knowledge transfer within PBOs. This scoping review serves as a powerful resource for researchers and practitioners by offering insights into a plausible ammended model to employ in future research.

We offer the Aspirational Syllk (Asyllk) Model in Figure 3 and recommend that PBOs incorporate detailed learning logs within their project termination stage documentation capture. We found that the Duffield and Whitty's (2015) Syllk Model did not fully represent facilitators of, and barriers to, the knowledge transformation process noted within existing literature. This provides practical implications for other researchers because it illustrated that the six key elements within the original model omit fundamental factors such as *leadership* and *finance* and non-linear knowledge transfer. The expansive nature of our research explored the six elements (learning, culture, social, technology, process and infrastructure). Despite these topline headings The categorization of the elements is fuzzy which leads to misidentification and classification of facilitators and barriers. These barriers are often related to factors such as an internal fear culture, under-developed internal and external social networks and time pressures. Learning is not formalized and resources, including technology and infrastructure, was widely held to be a barrier within existing research.

The ASyllk Model is a useful tool for future researchers to investigate the dynamics related to other facilitators and barriers to organizational lessons learned (Figure 3). In the ASyllk Model the organizational environment is supported by *Leadership* and mandated by *Finance* hierarchies. The remaining six plates permit non-linear knowledge transfer and value the existence of both *People* and *Systems* within the learning ecosystem. Given the decentralized, short-cycle nature of PBOs, a more adaptive and systemically grounded model like ASyllk can help organizations codify learning more reliably across projects, where continuity and memory are often lacking.

The outcome facilitates and sustains dissemination and application of lessons learned. Sitting aside the *Systems* elements, this learning should systematically be enshrined in processes, procedure and policies.



Source: Authors' own

Figure 3: Aspirational Systemic Lessons Learned Knowledge (ASyllk) Model

The Asyllk has the capacity to consider the most appropriate elements to assess knowledge transfer. However, we recommend that the plates might need to be nuanced to incorporate the complexity of each project. For example, sustainability is often deemed a standalone concern. Over and above that, researchers may also want to embody the wider environment and issues relating to KE.

5.3 Key Barriers to Organizational Learning

Beyond the barriers that have been listed in Table 4, we found that additional organizational factors acting as barriers to knowledge transfer included the dearth of a knowledge-sharing culture, the paucity of time dedicated to knowledge transfer, experiential learning being unsupportive of mistakes, staff turnover, inadequate communication, cultural differences, and technological and infrastructure concerns, or lack thereof. Many of these reported issues were prevalent in organizations failing to optimize learning opportunities. These are shown in Table 5.

Table 5: Other Factors Acting as Barriers to Organizational Learning

People have to be allowed to make mistakes, it is an important part of the learning process, both individually and organizationally. If people are penalised for making mistakes when learning on-the-job they are less likely to take risks in the future, diminishing the potential for learning and development (see Bourne & Walker, 2004; Cannon & Edmondson, 2005; Frese & Keith, 2015).
Turnover of staff and the loss of knowledge that goes with them impacts the organization's ability to learn from an on-the-job, mentoring, project-learning perspective as well as from an organizational learning perspective unless their knowledge is captured and stored by the organization (see Massingham, 2018; Haughton, 2021).
Working with many different nationalities brings with it its own challenges of culture, attitudes, language barriers, approaches to learning, and ways of doing things (see Mesly *et al.,* 2013; Nnaji, 2024).
There are a lot of other learnings, not just technical, that happen on a project that are completely lost. These consist of behavioural and cultural elements, with each project having its own eco-system of characteristics, behaviours and dimensions. It is considered that these are not generally transferred to the organization (Lima *et al.,* 2019; Ram, 2023).

Source: Authors' own

Creating a list of facilitating tasks to overcome barriers is too simplistic. The answers are complex in that mostly they address ways to communicate and deal with the social aspects of staff management and the cost of creating conducive processes and procedures, including the infrastructure. These probably reside within the leadership and financial mantles that we mentioned in the preceding section. This reinforces the importance in having these areas directly accounted for within the Asyllk Model. Whilst the Asyllk Model assumes that staff management and technological support costs falls under leadership and finance respectively, a glossary of terms to explain the elements and umbrella themes is fundamental before any direct utilization is made of this or any other ISM.

6. Conclusion

PMI does not offer any specific guidance on what and how to tackle project termination in any of the iterations of their PMBoK guides (2008, 2013, 2017, 2021). The PMBoK mentions project termination but omits instructions beyond that. Project termination falls at the end of individual, collective and organizational learning opportunities. Schindler and Eppler (2003, p.220) poignantly stated that "If their specific knowledge of that project is not directly needed, organizational amnesia begins". Typically project fees include items necessary for project fulfilment from a client perspective and PBO learning falls outside that scope. When a project terminates, external partners/consultants, generally move on to their next undertaking and this may mean leaving the organization at project completion, thus losing expert knowledge. Clients are resistant to paying extra fees for documentation and knowledge if it is not for their benefit. Post-project reviews are more likely to happen where knowledge is a major project outcome (von Zedtwitz, 2002). Yet the issue of losing this knowledge should be viewed as a risk for PBOs. There seems little cognizance that future project teams could reduce costs by eliminating past failures. PBOs should formalize learning capture and knowledge transfer opportunities within appropriate systems as part of their own competitive ethos (Barney, 1991; Antunes & Pinheiro, 2020).

We conclude that the significant gap in literature on facilitating knowledge transfer has not helped in solving the bona fide scarcity of effective knowledge transfer mechanisms in PBOs. This might be rectified if project management included a distinct *how-to* manual providing tools, guidance and practical steps which will direct knowledge management and knowledge transfer at project closure. It seems apparent to us that a formalized and structured 'lessons learned' should be an output of every project in order to capture both knowledge and deficits, experienced by the project team. The omission of such a practical pathway is one that needs urgent attention. Our scoping review indicated that despite so many scholars highlighting the barriers to knowledge transfer over the last fifty years, we discovered that the more things change, the more they stayed the same.

6.1 Future Research

We recommend conducting empirical research in organizations, directly testing the Asyllk Model to ascertain whether it requires further modifications. Furthermore, improving knowledge management processes and approaches requires wider assessment of social and economic impacts for knowledge transfer in PBOs (Bucci and El-Diraby, 2018), which rightly contributes to a buoyant KE. Whilst some headway has been made, there is an imperative to foster increased professional and academic engagement in research that considers the KE capacity, particularly because contemporary research outputs show a marked difference between sectorial, regional and national studies (Marginson, 2010). It is still more typical to disaggregate knowledge and the economy as separate inputs rather than consider the synergy that can be gained through harnessing their duality for optimum effect.

6.2 Limitations

Despite our best auspices, there will undoubtedly be scholars whose work we missed irrespective of our wholehearted endeavours to represent the wealth of credible relevant research. We thank all these scholars whose diligence made this work possible.

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