DEVELOPMENT OF A MULTI-LEVEL LEARNING FRAMEWORK

ABSTRACT

Purpose

This paper examines multiple learning cycles across a UK housebuilder organization following changes made to their Quality Management routine at the organizational level, through to subsequent understanding and enactment at the level of the individuals involved.

Design/methodology/approach

This study uses a qualitative case study methodology based on an analysis of six-weeks of participant observation, semi-structured ethnographic interviews, and documentation within three of the organization's regional offices. Through an abductive process, it draws on gathered data and extant literature to develop a multi-level learning model.

Findings

Four levels of learning cycles are observed within the model: Individual, Team (within which Inter-Organizational relationships nest), Region and Organization. Three inter-related factors are identified as influencing feed-forward and feedback across the levels; time, communication, and trust. The impact of these levels and factors on the process of learning is conceptualized through the metaphor of coupling and decoupling, and discussed using examples from housing development projects.

Originality/value

Whilst previous models of organizational learning highlight important multi-level interaction effects, they do not explore how the different levels of learning synchronize over time for learning to move between them. This paper addresses this gap, by shedding important light on how layers of learning synchronize, and why and when this can occur within multi-level organizations.

1. INTRODUCTION

Learning is a key part of organizational life, linked to performance, success and survival (Casey, 2005; Argote & Miron-Spektor, 2011). As technology advances, the quantity and frequency of transmitted information increases, with workforces expected to do more in less time (Berends & Antonacopoulou, 2014). Learning to evolve in the face of such changes becomes a key requirement for organizations, as this process is played out across layers of the organization's hierarchy. This paper examines these multiple learning cycles within a UK volume housebuilder, following revisions to their *Quality Management* (QM) routine. These latter revisions attempted to introduce a more stringent inspection regime, streamlining the house building production process, and in so doing, reduce uncertainty and increase uniformity of product (Heras-Saizarbitoria & Boiral, 2013).

Whilst previous models of organizational learning (OL) highlight important interaction effects between individual, group, organizational and inter-organizational learning (March & Olsen, 1975; Kim, 1993; Crossan et al., 1995; Jones & Macpherson, 2006), they do not explore how levels of learning can synchronize over time for learning to move between them. This gap is addressed here by shedding important light on the context surrounding why, when and how layers of learning synchronize within a

multi-level organization. Drawing on rich empirical evidence from the volume housebuilding sector, and building on prior literature, this paper presents a multi-level learning model to conceptualize the process of learning cycle synchronization within the organization. Three inter-related factors are identified as influencing this learning process across the case organization; time, communication and trust. The impact of these are conceptualized through the metaphor of coupling and decoupling, and discussed using examples from the case.

The paper is structured as follows. First a brief review of the literature in this area is presented, followed by an overview of the research method adopted. The main findings from the study present a narrative that introduces the multi-level learning model, explores how the levels operate in isolation and subsequently synchronize over time to transfer learning; and consequently, identifies key aspects that influence this multi-level cycle synchronization. Finally, key contributions to the literature are explored in the discussion section.

2. THEORETICAL BACKGROUND

2.1. Social processes in OL

OL is a collective process bringing together, through social interactions, a plethora of individual and group learning cycles (Argyris & Schön, 1978; Kim, 1993; Nonaka, 1994; Kieser & Koch, 2008). Learning cycles co-evolve within a nested hierarchy (Breslin, 2011), with individuals for instance, accruing practice-based knowledge through their participation and membership of key peer groups (Lave & Wenger, 1991). Equally collective knowledge is learned through a process of continuous sensemaking between individuals (Brix, 2017). This social dimension thus shapes learning at and between organizational layers (Brown & Duguid, 2001; Elkjaer, 2004; Gerpott et al., 2017), with OL being more than the cumulative learning of its individual members (Crossan et al., 1995; Easterby-Smith et al., 2000; Argote, 2013) but defined through a collective social experience (Argote & Miron-Spektor, 2011). The associated accumulation of tacit practice-based knowledge within an organization is expressed through the everyday behaviors and routines of individuals and groups (Polanyi, 1966; Nonaka & Takeuchi, 1995). This knowledge is not only created through learning, but in turn shapes the process through which learning occurs at different levels of the organization (Brix, 2017). Routines thus reflect past, collectively learned, experiences, and shape future behaviors and interactions (Feldman & Pentland, 2003; Swift & Hwang, 2008). In summary, OL involves a complex interplay between learning cycles at different layers, played out over different time frames (Elkjaer, 2004; Antonacopoulou, 2006; Berends & Antonacopoulou, 2014), and understanding these social and temporal dimensions is key to unpacking the complexity of the process.

A number of seminal multi-level learning frameworks have been put forward to conceptualize reciprocal social processes at play within this nested hierarchy of individuals, peer groups, organizations and external organizations. March and Olsen's (1975) framework explores the limitations of learning from experience at individual and organizational levels. Their cycle identifies four relationships; firstly, how an individual's beliefs determine their actions, which secondly, influence how the organization acts. Thirdly, this impacts on how the environment responds to the actions. Lastly, the consequences are observed, which challenge or change the individual's beliefs in relation to the action and, the cycle starts again. Each relationship can break down, however, leading to an incomplete learning cycle. The relationships thus influence the configuration of cycles of learning between different organizational levels and the

external environment. Kim's (1993) model of learning extends this further by identifying what is being learned (i.e. making sense of knowledge to inform mental models) and by examining how learning is transferred from an individual to the organization by lining up mental models at multiple levels. Kim consequently conceptualizes the hierarchical nesting of learning cycles within an organization.

Crossan et al.'s (1999) seminal "4I" model introduces important socialization processes into the wider understanding of OL. This model, comprising individual, group and organizational levels, explores how organizations learn through balancing tensions for both exploration (feed-forward) and exploitation (feedback) across organizational layers. The model begins from the individual-level process of "intuiting", or non-verbal subconscious ideas, experiences and thoughts at the individual level, to the collective level process of "interpreting". "Integrating" then takes place between group and organizational level, where the ideas, experiences and thoughts are condensed into something everyone in the group understands and agrees on. Finally, these concentrated thoughts are "institutionalized" at an organizational level by using them to develop and implement formal routines and procedures. Crossan et al.'s (1999) model lays the foundations for understanding complex, multi-level socialization processes which underpin OL. Cycles of learning at different levels thus line up, or align, to enact of processes of feedback and feed-forward. Their model however stops short at explaining why, when and how these processes of cycle alignment occur. This issue of alignment, and whether and how the organization needs to shift between the process of exploration and exploitation, depends on the organization's interaction with the external world. Jones and Macpherson (2006) take a step in this direction by extending the 4I framework to explore an inter-organizational perspective, highlighting the process of learning which occurs between organizations. Their fifth "I" relationship between the organization and external organizations is described as *intertwining*, continuing the feed-forward and feedback flows between these two levels.

2.2. Temporal processes in OL

Despite developments in the conceptualization of multi-level OL, there is a paucity in related empirical work related to time. The notion of multiple learning cycles aligning ignores temporal conditions surrounding the feedback and feed-forward processes. Berends and Antonacopoulou (2014) discuss how research focuses primarily on the duration of learning, which is beneficial as it adds to understanding around how organizational experience is accrued over time. They identify seven gaps in the literature that include: questioning what constitutes an effective experiential learning cycle length together with the conditions that affect it; how learning cycle rhythms could counteract waning memories; how value placed on experience changes as time passes; and whether multiple reassessments of events counteract superstitious learning. Berends and Lammers (2010) further argue that learning cycles do not follow sequential process steps in a process model (Huber, 1991; Kim, 1993; Nonaka, 1994; Dixon, 1999) but resemble, "a changing delta of meandering flows, some of which get blocked, while new flows emerge and others get reinforced" (Berends & Lammers, 2010, p. 1059). In sum, an important gap within the literature suggests a need to understand how the temporal context and conditions influence learning across hierarchical layers; i.e. how and why adjacent learning cycles synchronize over time.

3. METHODOLOGY

3.1. Research setting

The case study organization is a typical large UK volume housebuilder with employees working in different regional offices across England (as shown in Table 1). The organization was selected purposively, as it was experiencing a planned program of change in practices, representing a good exemplar in which to study complex multi-level learning (Eisenhardt & Graebner, 2007), and was keen to explore associated processes of learning across the regions.

Level	Organizational level	Regional level	Team level
Membership	All Regions Executive Management Team, (Inc. Quality Team) - provides support to Regional offices	All Teams	Development Technical Commercial Build Customer Care Sales Finance
Leadership	Chief Executive Officer (CEO) heading a Board of Directors	Managing Director (MD)	Team Director (TD).

Table 1: Structure of case study organization

Following a review of internal quality processes, the Quality Team reintroduced a revised QM routine across the organization in 2014. An overview was presented verbally to individuals in each region by the Quality Team. The QM routine comprised three 'mini-routines': firstly, a *Quality Assurance Handbook* (QAH), setting out the construction standards expected for each trade that a site manager on a housing project within a given region will accept; secondly, a *Local Quality-Control Inspection* (LQCI), a twelve-stage inspection carried out by site managers for each new dwelling during construction; and lastly, a *Global Quality-Control Spot Check* (GQCSC), carried out by the Quality Team with the relevant regional Site, Build, and Technical Managers and Project Architect present in relation to the project. The QAH and guidance documentation was given as digital files or hard copies depending on the individual's role. The GQCSC looked at a sample of dwellings at different construction stages, to establish whether the QAH standards were being met. A written report listing discrepancies was sent for the regional Build and Technical Teams, plus Project Architect, to action.

3.2. Methods

A qualitative case study approach has been adopted (Creswell, 2013). As emphasis is placed on day-to-day learned practice-based knowledge or routines, the means of inquiry have been informed by that literature (Pentland & Feldman, 2005). A combination of 33 semi-structured and ethnographic interviews (Spradley, 1980; Qu & Dumay, 2011) captured participants' individual interpretations and perceptions of the QM routine. To compliment this, participant observation was undertaken to capture the actual performances carried out by individuals when enacting the routine. Finally, associated company documentation was collected to reflect on how these routines were formalized and codified within the organization (Howard-Grenville, 2005).

3.3. Data Collection

Data was gathered between October 2015 and February 2016. Three regions exhibiting maximum differentiation of activities, were selected as 'mini-cases' within the case study (Eisenhardt, 1989; Dyer & Wilkins, 1991; Creswell, 2013). In each region, one mid-construction development project was selected where the QM routine had been introduced. For constant comparison purposes (Corbin & Strauss, 2008), key individuals from each Build, Technical and Commercial Team (assigned to those projects) and Quality Team members were observed as they enacted their daily practices, for between one and three days. To gain further insights into how the QM routine was enacted alongside the organization's other procedural routines, staff within the Development and Customer Care Teams, as well as at Head Office level were also interviewed (summarized in Table 2). Further data comprised routine guidance documentation, fieldnotes of observations and audio recordings.

Region	Semi-structured interview	Semi-structured interview & participant observation	Ethnographic interview & participant observation	Total no. Participants
Region 1	1	3	4	8
Region 2	1	2	7	10
Region 3	4	2	3	9
Head Office	3	2	1	6
Total				**33**

Table 2: Breakdown of Interview and Participant Observation data collection by Region

3.4. Data Analysis

A large number of 'first-order' concepts were identified from the data using manual coding in NVivo 11 software (Van Maanen, 1979; Corley & Gioia, 2004; Gioia et al., 2013). Following several iterations and peer discussions within the author team, and drawing on related literature, these concepts were then grouped into a number of 'second-order' themes. The relationship between these themes was then explored through the development of a multi-level learning model (as discussed below), which highlighted three aggregate dimensions observed to shape synchronization processes. The analysis could thus be described as an abductive process, outlined by Van de Ven (2007, p. 104) as "erasing, inserting, revising, and re-connecting ideas scattered on many papers that are scribbled full of experiences, insights, and musings of ours and others". In this manner, extant multi-level learning models were used to make sense of emergent second-order themes, and to conceptually 'simulate' examples from the data. This involved the systematic distillation of evidence, alongside reading related literature in the emergence of new insights (Locke, 2003). This use of multi-level models was also key in making sense of the consequences of the movement of learning cycles and synchronization of levels within the organization.

4. DETAILED FINDINGS

4.1. Developing a Multi-Level Model of Learning

As noted above, a model of multi-level learning was created and used to make sense of emergent themes from the data. Building on Elkjaer's (2004) notion of the 'third way' of learning, this model combines elements of March and Olsen's (1975) experiential approach, and Crossan et al.'s (1999) multi-level 4I

framework, alongside Jones and Macpherson's (2006) extension. As such, it is structured on four levels; (see Table 1); *Individual* as the base unit of analysis, *Team*, *Regional*, and finally, *Organizational* (see Figure 1). At the lowest collective level, the process of learning involves a number of parties including team members within each region and a nested *Inter-Organizational* level through relationships with external organizations[1] (Jones & Macpherson, 2006). Generated knowledge includes both bottom-up individual creative insights through intuiting (Crossan et al., 1999), and top-down experiences from the regional level. This diversity of inputs is interpreted through social interaction at the team level, via a collaborative sensemaking and sensegiving process (Morgeson & Hofmann, 1999; Crossan et al., 1999; Brix, 2017). This process results in a set of collective beliefs being established and associated actions being taken, leading to responses from the housebuilding environment beyond the organization (see Figure 1). The team in turn observes these responses, and collectively discusses the actioned knowledge and learning in relation to their shared experience, i.e. reflecting on the relationship between action and response (Elkjaer, 2004). Learning at the regional level mirrors the team level; however now, inputs arrive both via feed-forward for the lower team level, and via feedback from the higher organizational level (Crossan et al., 1999). Again, learning occurs through the integration of collectively discussed observations of regional actions, feeding learning forwards and back to their adjacent levels (see Figure 1). Finally, at an organizational level, collective learning from regions and head office support functions, is fed forward, as strategic leaders thus evaluate and revise policy-level practices such as procedures and routines. At this level, learning occurs as executives collectively observe responses across the external environment in relation to organizational actions, subsequently feeding this learning back to the lower levels. The external context is also acknowledged, as unforeseen external changes at specific points in time often require immediate decisions and subsequent actions at one or all levels depending on the circumstances (see Figure 1).

[1] Whilst external organizations contribute their knowledge and experience to the team during the construction process, they also enact their own experiential learning cycle, independent of the team's.

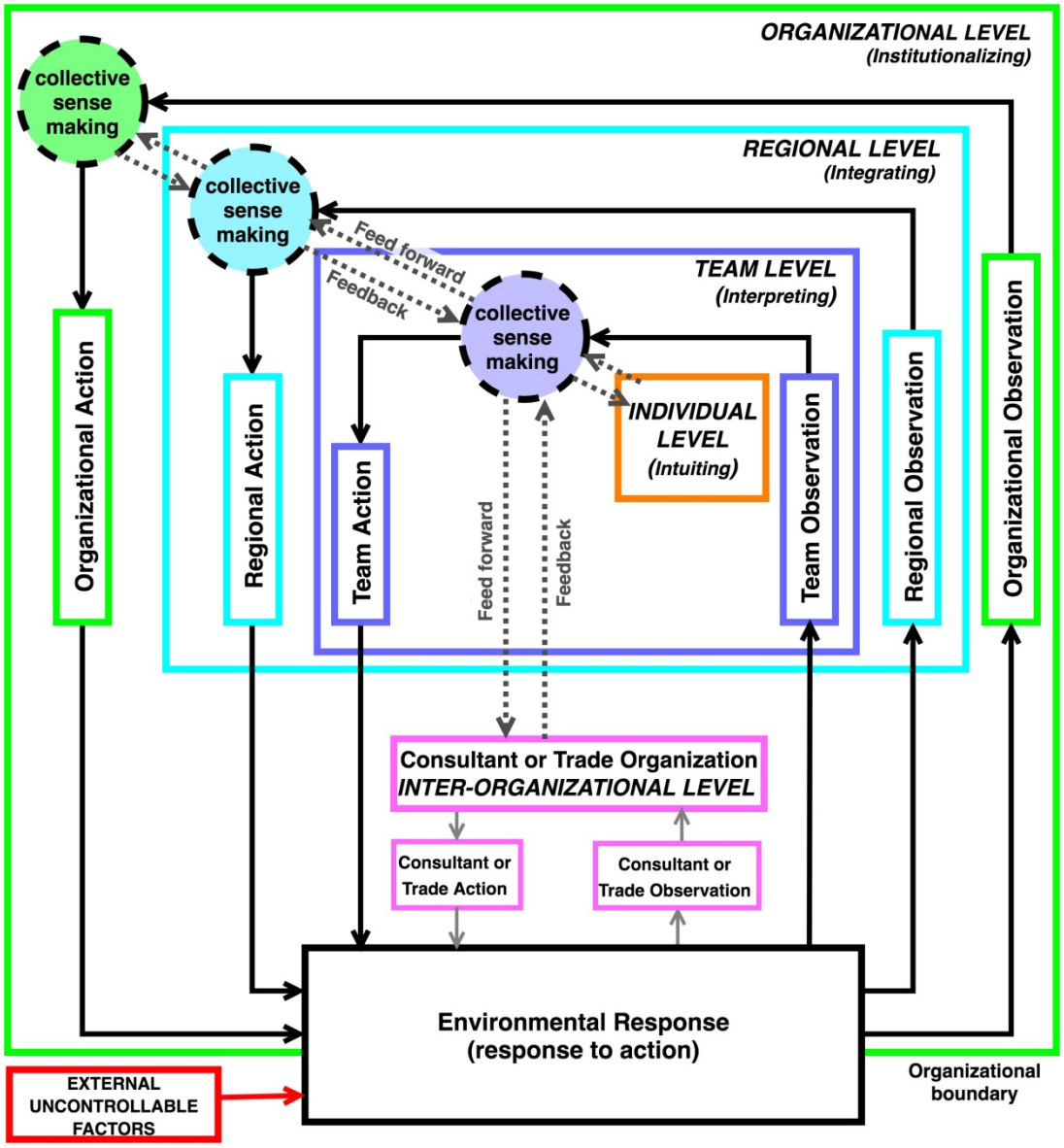

Figure 1. Housebuilder case study organization multi-level learning model

4.2. The Synchronization of Learning Cycles through the Metaphor of Coupling and Decoupling

Through the analytic process, using the model presented in Figure 1 above, a number of findings from the study were observed. However, this paper focuses on the three key inter-related aggregate dimensions of time, communication and trust that emerged. These were found to shape how the learning processes unfolded by influencing the ability of each level's learning cycle to synchronize (or fall out of step) with those adjacent to it over time. To illustrate here these processes of synchronization, the metaphor of coupling is used, which describes how adjacent levels adjust their cycle speeds to match each other, mesh together and subsequently move harmoniously in unison, allowing learning to transfer. Metaphors can be useful tools for the generation of new insights (Ortony, 1993) and have been used here to make sense of the complex interrelationships in the case organization. The cycle of learning at each level in the model centers on a process of collective sensemaking, driving actions, and assessed observations of environmental responses (see Figure 1), despite clear differences in learned knowledge at each level (e.g. from project to strategic) (Morgeson & Hofmann, 1999; Berends & Lammers, 2010). The multi-level learning process commences when adjacent levels synchronize by collective sensemaking activities at both levels directly engaging with one another (see Figure 1). By synchronizing collective sensemaking through a two-way link, both feed-forward and feedback is facilitated (Crossan et al., 2005), leading to

each cycle at different levels becoming entrained (Zellmer-Bruhn et al., 2003), like metaphorical cogs. Thus, the synchronization of learning cycles between levels might be metaphorically conceptualized as a roller chain connecting layered cogs, as in a bicycle. The cogs turn together in unison, "coupling" the learning cycles. In contrast, the chain can "fall off", as sensemaking processes at different levels "decouple" and layered learning cycles revolve independently (Breslin & Wood, 2016; Macpherson et al., 2018). Drawing on this metaphorical model, the different learning experiences observed at the case organization are now explored in more detail.

4.3. Dimensions of Learning Cycle Synchronization

Appendix 1 outlines the three main dimensions observed to influence the multi-level learning cycles across this organization. Select examples from the data analysis are used here to illustrate circumstances surrounding the synchronization of layered learning cycles, through the metaphor of coupling and decoupling.

4.3.1. Time

The learning cycle speed for each hierarchical level, i.e. its metaphorical 'rotation speed', was seen to decrease as the number of individuals participating in collective sensemaking activities increased (Figure 1). The organizational level cycle was therefore slower than the team level cycle, as more individuals were involved at that level in reaching consensus. For adjacent levels to couple, additional effort was required by one or both parties to slow down or speed up each level, so they matched. Therefore, the variation in rotation speeds hindered multi-level synchronization, as *successful coupling required additional effort and precision timing* (see Appendix 1). This was observed when QM routine feedback from the organizational level was passed through to the regional and team levels to assimilate (e.g. to perform a GQCSC). Here, it required an increase in collective effort at the team level, as the learning cycle slowed down to sustain multi-level coupling:

> *"It's great that we are trying to improve quality…but it creates more work for everybody by doing it. Site and them lot have got to do it. We've now got to meet, now we've got to read up on this, and relook at that but I can see why [the Quality Team] are doing it."* *(Region 3: Participant M)*

However, additional time to interpret this learning was not sought by the team, questioning how much learning they could achieve in the time available. This issue was also illustrated with the LQCI, as participants across all regions admitted to rarely carrying it out, citing it as too laborious to complete within the given timescales. The difference between cycle speeds was also problematic when coupling did not occur at a point in time to suit the receiving level's learning cycles, e.g. when project teams queried QAH requirements:

> *"When [the Quality Team] came to me, it was, 'you are using the wrong products', well, hold on a minute, [the trades] have been told to use this product and now it's wrong – so what do we use? 'Oh, we need to work that out.' So, we need to get on with it still. I've still got bricklayers, I've still got to get people started on stuff, but they haven't finalized the details yet, and it's like how long do we wait? So, in the end you tell the groundworkers to crack on because it's not failed before. It's already been done on 70 houses."* *(Region 1: Participant A)*

This implies that when new knowledge is not timely from another level, the levels decouple and collective sensemaking activities simply rely on member experience as the basis for action. Therefore, if the levels attempt to recouple at a point in the learning cycle *after* an action has taken place, the new knowledge may be ignored until the cycle completes and collective sensemaking activities take place again. In tandem with the timeliness of coupling was the rhythm with which coupling took place. As one team level learning cycle completed when a phase of a housing development came to an end, and the next phase and learning cycle began, repetition of organizational level knowledge through the QAH was needed at a specific point in the learning cycle for collective interpretation, and to avoid it being overlooked:

> *"You've got to keep revisiting [the QAH] as well. You can't just assume. So, we were [following it] on the first phase and then we've gone to start another phase and it's been forgotten about. So, we have had to pick it up again and that happens on a lot of things." (Region 3: Participant L)*

A common learning deficiency raised by participants centered around *no time being allocated by any level for formal and collective sensemaking activities to review observations* (see Appendix 1). Once a site was complete, no collective reflection took place; time was dedicated instead to new projects. At the team level, individuals were allocated to new project teams, taking their own day-to-day observations and learning tacitly with them:

> *"I think there is a glaring omission in terms of the way we shut down sites. In that we just say, 'right, we are off now' and there is not really a closedown meeting to see what went wrong." (Region 2: Participant F)*

This was also noted at the organizational level, as no formal feed-forward mechanism was in place to couple the levels and transfer any lower-level learning.

4.3.2. Communication

Coupling occurs to communicate learning between levels at a specific point in time. However, its success was found to be *influenced by the infrastructure* in place between levels (see Appendix 1), which had been shaped over time by attitudes at the organizational level:

> *"I think previously, from the top, the message was that we accept that regions want to do their own thing... Now the message is more, for us to be a truly successful resilient business, we have to have more consistency, share best practice and learn from each other…. So that message is feeding down now… Without the tone from the top being incredibly strong, and it generally hasn't been, it's just too much effort for everybody to try and tackle." (Head Office: Participant U)*

Therefore, at the regional level, driven by a culture of autonomy, there was reluctance to couple with the organizational level, either to embrace new knowledge passed down, or feed experiences forward. Participants described the competitive relationship between regions, and between the regional and organizational levels in terms of conflict and secrecy, as each sought dominance over the other:

> *"If there has been a big cock-up on a site, anyone at [the organizational level] is the last person they will tell. They entirely keep that to themselves." (Head Office: Participant V)*

At the regional level, knowledge fed forward from teams was occasionally selective or embellished. However, at an individual and team level, coupling occurred frequently with both feed-forward and feedback being primarily tacit and free-flowing. Across regions, middle management in most teams did not know their counterparts, making horizontal coupling difficult. Cross-regional coupling occurred more effectively at the most junior level, with individuals from the graduate scheme communicating freely across regions.

Once learning had been communicated from one level to another, individuals receiving the *new knowledge were found to assess it for value against their level's experience* prior to taking any action (see Appendix 1). At each level, combined collective experience was used to appraise, select, action and learn from only the elements deemed beneficial to the level. QM routine feedback moving down the hierarchical layers was subjected to selective integration and interpretation. In one region, only specific parts of the QAH were learnt and consistently adhered to, whilst the necessity of some sections in the QAH were questioned in the other two regions:

> *"Sometimes there are maybe details that are part of our policy and process that we might not necessarily agree with. For 20 years [site managers] have done it one way and now they are being told to do it another way and why do we have to change?"* *(Region 1: Participant B)*

Conversely, learning fed forward up the hierarchical layers by individuals communicating small scale innovations (developed from their experience), were often not acknowledged by higher levels. For one individual, the absence of a response regarding suggested QAH improvements led the individual to carrying out their improvements locally, as their experience indicated these produced a positive outcome for the house purchaser.

4.3.3. Trust

Trust is defined here as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other part" (Mayer et al., 1995, p. 712). For this organization, vulnerability comes from crucial two-way relationships between teams as they rely on external organizations to firstly design and then build new homes[2]:

> *"Our role really is project management…we project manage the Consultant Team because we haven't got the capacity."* *(Region 3: Participant P)*

> *"You put a lot of faith in the [trades] that you've got on site."* *(Region 1: Participant A)*

Relationships were found to exist between each team and multiple external organizations for the duration of a development site, bringing unique and diverse interpretations together, often only for one project. This created long, constantly evolving feed-forward and feedback communication chains; particularly between technical teams and consultants, and build teams and trades. These *long communication chains*

[2] The external organizations comprise primarily *consultants* to design housing developments, and *trades* to build them.

created high levels of performance uncertainty over time for each team (see Appendix 1); would what was envisaged at the design stage end up being built on site? Participants within teams felt consultants selectively read, assessed and interpreted the learning they fed forward, meaning previously made mistakes could be repeated. Teams also faced a challenge with trades to minimize the degradation of learning, as it was communicated across multiple organizations. Often information relaying design intent was not passed directly to those carrying out the work but their superiors:

> *"You do the meeting with the directors, and they nod their heads like puppies, 'yeah we will do that'... They're never on site. They never tell the guy on site this is what they need to be doing. So it doesn't happen."* *(Region 2: Participant H)*

However, *uncertainties across these relationships were found to decrease* following multiple revolutions of shared learning cycles, *as trust built* up between parties (see Appendix 1):

> *"All you are trying to do is improve, and to make your life easier, from a selfish basis, use somebody that you know that you have a good rapport with, who you know is going to deliver a good job, then it makes your life a hell of a lot easier than if you start from scratch with somebody that you don't even know."* *(Region 1: Participant E)*

The passage of time appeared to improve the knowledge sharing and learning. Each party had an opportunity to observe and assess the other's performance, thus demonstrating competent ability, leading to a degree of trust and subsequent attachment developing between the two (Mayer et al., 1995; Schoorman et al., 2007).

5. DISCUSSION

This paper contributes to the literature by exploring the temporal context and conditions necessary for multi-level learning within a housebuilder organization. The point within the model where time, communication and trust intersect highlights the essential role that collective sensemaking activities (denoted by dotted circles in Figure 1) play in successful multi-level learning. In the case organization, they were found to be the power source for each hierarchical level, marking the start and end of every learning cycle. At the start, as each level's learning cycle occurred within a different timeframe (Berends & Lammers, 2010), these activities provided the energy required to synchronize levels prior to coupling. They also established a relationship with the process of collective sensemaking at other levels through the feed-forward and feedback infrastructure. In connecting learning levels, the infrastructure's context was assessed collectively, affording each transmitting level the opportunity to decide the learning content suitable for communication. This hindered the effectiveness of the learning process, as often abridged, distorted or fragmented knowledge was fed forward to the organizational level and subsequently fed back down for other regions to reinterpret, resulting in doubts over the integrity of the source region's knowledge (Swift & Hwang, 2008). Once the levels had coupled and learning had been fed forward or back, collective sensemaking at each level determined the length of time those same levels would remain coupled, and the frequency of coupling repetitions. In ideal circumstances, the point in time when coupling occurred would suit the learning cycle at each level, so that learning was received in a timely fashion, prior to any action being taken. Collective sensemaking activities were also seen to influence each level's belief system, as they negotiated meaning (Brix, 2017); using trust developed over time, as the basis for assessing new knowledge received. Comparisons were made across the levels against what was already known from shared experiences, in light of time and resources available, to determine how to best interpret, integrate or institutionalize new learning, thus informing future actions. At the end of each

learning cycle, collective sensemaking could enable members to understand the relationship between action and response, consequently acquiring new knowledge (Elkjaer, 2004). However, with no formal feed-forward or feedback mechanisms in place to couple levels and transfer this new knowledge, each level's learning cycle was incomplete, impacting the overall effectiveness of learning across the organization and making every level susceptible to ambiguous learning (March & Olsen, 1975).

This research draws on, and complements, earlier OL studies by exploring them through a temporal lens. It does this firstly, by using the proposed model to illustrate a mechanism for accruing collective practice-based skills and experience in relation to individual knowledge acquisition over time (Elkjaer, 2004). Secondly, it adds a temporal dimension to Crossan et al.'s (1999) 4I framework to shed light on the context surrounding multi-level alignment over time. Thirdly, it expands Jones and Macpherson's (2006) research to study how a larger organization interacts with the external environment over time. It reinforces the notion that inter-organizational relationships are fundamental to learning, as they provide a primary source of innovation for organizations. Conversely, intertwining is viewed from a nested perspective within the case organization at the team level. Lastly, it builds on Berends and Antonacopoulou's (2014) exploration of duration, timing and use of past, present and future across the OL literature. They question what constitutes an appropriate learning cycle length; however, it is argued here that length may not be the determining factor. For this organization, learning cycle completion is essential to acquire new knowledge, in tandem with a formal multi-level coupling mechanism to capture collective experience and reflections. The timing and repetition of this capture and couple is crucial, so that it occurs at the right point in the relevant learning cycle, informing actions in a timely manner as well as improving memory. Although, the begged question here is - where does responsibility lie for this to happen; is it for the team level to ask, or the organizational level to offer, or somewhere in between? Another point discussed is how individuals engage with their past, present and future to influence learning. Findings here make this challenging to assess, as reflecting on past learning occurred selectively in isolation. Finally, when looking at ways to synchronize different time horizons (i.e. past, present and future) with time rhythms (here, clock time, project cycles and learning cycles), for this organization the future focuses on meeting clock time targets, the present with achieving project cycle requirements, and learning from past actions. The latter only occurring if time permits.

The organization could be encouraged to take actions to better synchronize its learning cycles. Firstly, for the QM routine to be learnt across levels, additional organizational level time and effort investment may assist in maintaining timely coupling, and keeping communication channels open (Swift & Hwang, 2008). Secondly, trust and communication channels might be improved by temporarily rotating employees between teams and regions to develop collective sensemaking experiences. Here, the emphasis is on relationship creation and reducing mistrust, rather than injecting hierarchical or political influence. Thirdly, by introducing a formal review for teams at the end of every completed project, together with a multi-level feed-forward mechanism to share these experiences, more effective learning may take place across the organization.

6. CONCLUSION

Whilst the findings here only relate to six weeks of fieldwork, and further longitudinal research is required, they suggest that timely collective sensemaking activities are fundamental to successful multi-level learning within large organizations. At the single hierarchical level, collective sensemaking triggers action whilst generating reflection of past experiences to shape future actions. Multi-level learning is

initiated when collective sensemaking activities at one level reach out to establish a relationship with adjacent levels. Informed by level-specific pressures and priorities, this relationship controls the resources available for coupling; influencing the timing, duration and frequency of learning cycle synchronization for feed-forward and feedback. The communication of learning occurs within an organization's time-constrained, social infrastructure, forged by trust across, and between, levels. Collective sensemaking activities are the gatekeeper for good communication, improving or hindering how new knowledge is received by each level, interpreted, acted on and subsequently learnt from. In summary, to improve learning, organizations need to focus on when, how and why collective sensemaking occurs.

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