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PhD Title: Investigating development of logistics capabilities from a resource orchestration perspective.

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OVERALL MOTIVATION FOR THE STUDY

We all know the joke that starts with "Why did the chicken cross the road?". In 2018 a new variation of this joke arose: "Why *didn't* the chicken cross the road?". "Because DHL was unable to deliver it!". This was in response to the logistics debacle between DHL and KFC, leaving most of the UK market without their fried chicken fix. KFC UK decided to switch logistics providers, coupled with a total standstill of a major road, the M6, no truck loaded with KFC bound chickens, could reach the fast-food outlets. It was February 14, traditionally a busy day logistics wise for any company to complicate matters further.

The famous quote from Sun Tsu: "The line between disorder and order lies in logistics…" has never been more accurate. Long after this phrase was coined, one can easily cite industry examples of companies that have failed to adequately capture value in part or entirely due to sub-par logistics management. With the onset of the Covid-19 global pandemic, effective logistics management and distribution of the vaccine and all essential products in our global supply chains will determine the pace and level of recovery from the pandemic.

Characterised by the limited use of formal governance (Hoskisson, Eden, Lau & Wright, 2000; Tsui, Schoonhoven, Meyer, Lau & Milkovich, 2004), lacking infrastructure, volatile political and social systems, a lack of market intermediaries (Han, Dong & Dresner, 2013), and the dominance of informal markets (Dadzie, Winston & Hinson, 2015), success in emerging markets requires organisations to develop logistics strategies that are compatible with the contextual challenges in these markets (Craighead, Ketchen, Jenkins & Holcomb, 2017; Dadzie et al., 2015; Hirschinger, Spickermann, Hartmann, Gracht & Darkow 2015; Iyer, Lee & Roth, 2013; Shacklett, 2014).

Kuteyi and Winkler (2022) summarise the logistics challenges faced in sub-Saharan Africa and note that there are numerous opportunities for digitalisation in logistics. Many of these challenges are linked to infrastructure, transparency and general inefficiencies in logistics operations. However, it is essential to note that logistics activities are interdependent within a firm, requiring precise allocation of firm resources to achieve desired service goals. Failure to effectively orchestrate resources between various logistics activities can lead to several supply chain losses, including idle time, duplication of activities, lack of visibility, lack of integrity control, and increased logistics cost. A key finding of the Kuteyi and Winkler (2022) study focuses on human capital training and development. What is lacking theoretically is a clear understanding of the factors involved in logistics capability development within firms. The study aims to identify and understand the resource orchestration actions taken by managers to develop effective logistics capabilities.

By investigating the logistics capability of a firm from a resource orchestration perspective, the most appropriate resource commitments might become more visible to managers, resulting in more efficient logistics operations suitable to the context within which the firm operates, given their limited resource allocations. Furthermore, Done et al. (2019) posit that different combinations of resources lead to varying capabilities and performance outcomes in terms of logistics operations. By identifying the combinations of resources to

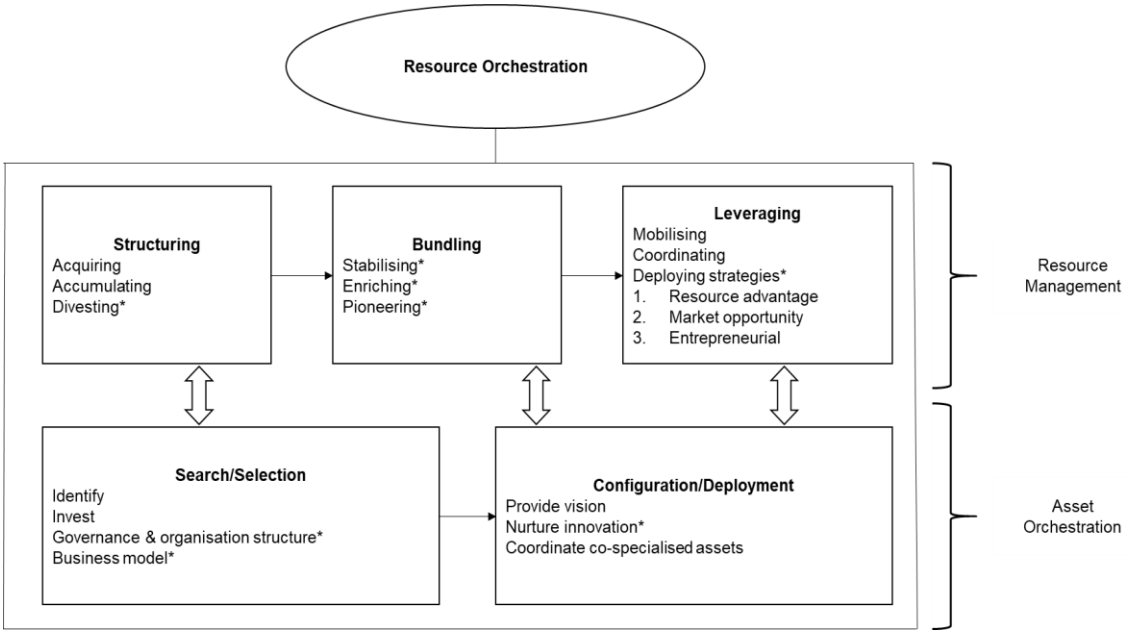
construct the most appropriate logistics capability, potential failures in terms of inaccuracies in delivery, excessive inventory levels and late deliveries, among other things, could be limited or overcome (Cobie, 2017).

THEORETICAL CONTEXT AND BRIEF LITERATURE REVIEW

Theoretical context

Resource Orchestration (RO) theory (Sirmon et al., 2007; Sirmon, Hitt, Ireland & Gilbert, 2011) sheds light on the understanding of capabilities development by considering the role of managers to orchestrate firm resources. Resource orchestration theory emerged in response to the critique of the Resource-Based View (RBV) of being fundamentally a static view of firm competitiveness (Sirmon et al., 2007). RO theory provides a specific focus on the active and changing role that managers play to effectively structure, bundle, and leverage a firm's resources (Liu, Wei, Ke, Wei & Hua, 2016a; Sirmon et al., 2007). RO as a theory is predicated on three main elements: 1) breadth (RO across the firm scope), 2) depth (RO across varying levels of the firm and 3) life cycle (the change in RO requirements in each maturity stage of the firm (Sirmon et al., 2011). This framework essentially consists of a marriage between two ideas: resource management and asset orchestration. The RO framework is depicted in Figure 1 below.

Figure 1: Resource orchestration framework



Source: Sirmon et al. (2011)

Several authors have also argued that capabilities evolve due to environmental changes. As a result, the sequence of these events leads to building appropriate capabilities for the current environmental conditions (Pan, Pan, Chen & Hsieh, 2007; Teece, Pisano & Shuen, 1997). In addition to RO theory, contingency theory will be employed as a secondary

theoretical lens to understand the changes in resource commitments and orchestration activities based on changes in the firm life cycle and changes in the competitive landscape, amongst other contingencies. Contingency theory proposes that as changes in contextual factors arise, firms will adapt their structures and technology systems to ensure fit and high performance (Donaldson, 2001; Liu, Prajogo & Oke, 2016b; Luthans & Stewart, 1977). As applied to the notion of logistics resources and capabilities, contingency theory suggests that alignment between each logistics resource and the combination of logistics resources to form logistics capabilities is necessary to ensure firm performance (Lyu et al., 2019b).

Resource orchestration and contingency theory will be employed as theoretical lenses to investigate the underlying mechanisms involved in the logistics capability building process. In addition to uncovering the mechanisms from the RO perspective, Peng et al. (2008) found that routines, measured as the collection of patterns of activity in a firm, form the basis of capabilities and is significantly related to the operational performance of the firm. By investigating logistics capabilities from the perspective of a bundle of routines and resources, the "means for delivering" logistics performance can be uncovered (Peng et al., 2008).

Literature review

While there are sufficient studies on the relationship between logistics capabilities and factors such as integration, firm performance, and competitive advantage, little is known about the "how" behind logistics capabilities. I.e., "How do firms build logistics capabilities?" Factors such as increased geographical dispersion of customers and strategic facilities (Stock, Greis & Kasarda, 2000), constantly changing consumer demands (De Treville, Shapiro & Hameri, 2004), high interdependence on actors within and outside the firm (Lambert & Stock, 1993), competing cross-organisational as well as cross-functional objectives (Coyle, Langley, Novack & Gibson, 2016), unplanned and highly disruptive supply chain disruptions (Revilla & Saenz, 2017) and the inevitable rise in e-commerce (Wu & Lin, 2018), all add complexity to the logistics capability development process.

Managers must decide how, where, and in which quantities firm resources will be positioned; a concept termed resource commitment (Jack, Powers & Skinner, 2010; Rushton, Croucher & Baker, 2014). This notion gives rise to a series of resource commitment decisions that managers must make to realise the potential advantages associated with these decisions. Managers commit specific resources and gain feedback on the efficacy of these decisions. Chirico, Sirmon, Sciascia and Mazzola (2011) describe this as a process whereby each iteration of resource commitment accumulates eventually into building a firm capability. Some of the current problems with this process include managers' reliance on best practices and heuristics when making these decisions, resulting in short-term improvements but not necessarily translating into long term capability development, a prerequisite for a firm to differentiate amongst competition (Done, Voss & Rytter, 2019). Gruber et al. (2010) and Sirmon et al. (2007) argue that capability building of a firm needs to be investigated as a process to enable an understanding of how resources can be organised to generate synergistic effects; as well

as determining "ex-ante" which resource combinations could lead to improved competitiveness.

Research on logistics capabilities can be summarised briefly according to various phases. Phase 1 consisted of gaining a deeper understanding of what constitutes "best practice" in logistics, which was a relatively new field (Goldsby & Stank, 2000). Arguably the most significant work done in this phase was by Bowersox, Daugherty, Droge, Rogers and Wardlow (1989). Some of the critical assumptions and findings were that logistics best practices could be generalised across North American industries (empirical context) and between different links in a supply chain (various suppliers and customers). Most significantly, they found that these best practices are largely similar regardless of industry, firm size, or where a specific firm is in the distribution channel. From this phase, a set of 10 characteristics were identified and associated with what they termed "Leading-edge performers".

A focus on alliances characterised the second phase through various case studies. Bowersox, Daugherty, Droge, Germain and Rogers (1992) explain that internal process integration, followed by external integration of supply chain relationships, results in logistical flexibility, which was suggested to achieve higher performance than those firms characterised with lower levels of internal and external integration.

In phase 3, researchers built on the previous 2 phases by developing a framework to assess the logistics competencies or capabilities. The Global Logistics Research Team at Michigan State University (1995) conducted one of the most extensive studies on logistics capabilities. Their study identified four competencies, consisting of 17 capabilities or what they also term as "essential qualities" that are observable and measurable. Briefly, the World Class Logistics Competency model describes four areas of competence with a sub-set of 17 capabilities. These four competency areas include 1) positioning, which involves the overall strategy of the firm and the structure that supports it; 2) agility which is referred to as customer satisfaction or remaining competitive by adapting to customer needs and requests; 3) measurement, which refers to internally and externally monitoring and evaluating the performance of the logistics operations and 4) integration which some authors refer to as "what to do and how to do it creatively" (Goldsby & Stank, 2000; Michigan State University, 1995).

Subsequent research on logistics capabilities mainly uses The World-Class Logistics Competency model as a basis to further investigate the competency areas. The main reason behind this is that this model was tested with roughly 3700 respondents in North America, Europe and the Pacific Rim, refined via 111 in-depth interviews and revalidated in 1998 with approximately 308 respondents (Goldsby & Stank, 2000).

The book by Bowersox, Closs and Stank (1999) served as another foundational text for logistics capability research, generally in addition to some combination of logistics capabilities identified from the Michigan State Global Logistics Research Team (GLRT). It is important to note that the Bowersox et al. (1999) book has a strong focus on integration across firms and thus tries to identify best in class performance; again, the focus is on identifying capabilities rather than understanding the process of development of these capabilities.

From roughly 2001, the research on logistics capabilities has seen a wave of focus on various elements, many of which are still based on the World Class Logistics Competency model. It is also important to note that most of the papers aimed to understand best in class performers or identify those capabilities that constitute a high performing logistics capability. What is lacking in most of these studies, and the majority of the papers that follow is an explanation of how to create these capabilities. The research on logistics capabilities has been disparate and unfocused despite the call for a unified theory toward the field by Mentzer *et al.* (2004). Secondly, there seems to be no generally accepted consensus regarding the categorisation or classification of logistics capabilities. Many of the studies explain the different categories and then provide little to no justification for why they have chosen a specific categorisation to test in their research. The RBV of the firm as a theoretical lens to explain logistics capabilities has been the dominant theory within the field since logistics capabilities have been mostly conceptualised as a bundle of resources. However, the changing competitive landscape with a broader focus on supply chain management (Hausman, Johnston, Gundlach, Bolumole, Eltantawy & Frankel, 2006), SKU proliferation, mass-customisation and increased pressures for improved customer service (Daugherty, Bolumole & Grawe, 2019) all place competing requirements on the logistics capabilities of a firm.

Firm resources are spread thin; managers can benefit from understanding how to orchestrate these scarce resources. Thus, given the dynamic nature of logistics capabilities development and logistics, a new theoretical lens might yield more insight and clarity regarding logistics capabilities. Wong and Karia (2010) are exceptions to this and were some of the first authors to use the framework created by Sirmon *et al.* (2008) to investigate resource bundling processes for logistics service providers. The framework by Sirmon *et al.* (2008) has since been updated. Thus, there is an opportunity to gather new insights regarding logistics capabilities and the related resource bundling actions mainly through using resource orchestration view to understand underlying logistics capabilities.

RESEARCH QUESTIONS

Consequently, this study will be guided by the following main research question, as well as the successive, supporting sub-questions:

- What are the factors for developing logistics capabilities for firms?
    - What are the underlying resource-focused actions taken by logistics managers to build appropriate logistics capabilities?
    - How are resource-focused actions aligned across firm functions to develop logistics capabilities?
    - What combination of resource orchestration activities results in appropriate logistics capabilities?
    - How do contingency factors influence logistics capability development?

METHODOLOGY

Motivation for research design

Edmondson and McManus (2007) state that it is critical to constructively align the methodology to the nature of the research conducted. Accordingly, an appropriate methodology can be utilised based on the state of prior research, namely, mature theory, nascent theory, or intermediate theory. Intermediate theory will best explain the state of prior research for this study as new constructs will be introduced in combination with existing ones. When a theory is within an intermediate stage or a transitioning phase, ideally, a new study investigating a phenomenon in this stage should ensure openness for new ideas to emanate. Logistics capabilities are complex and constantly evolving; by employing a qualitative approach to this topic, one will gain a more expansive understanding of what is required to develop logistics capabilities successfully. More specifically, a multiple case study research design will be utilised.

According to Yin (2017), some of the problems investigated within supply chain management and logistics can be considered unstructured, leading to a more exploratory research design. McCutcheon and Meredith (1993) state that case study research is beneficial when investigating "real world" examples. Additionally, Stuart, McCutcheon, Handfield, McLachlin and Samson (2002) add that case study research can be used as this allows the identification of essential variables and the descriptions of these variables. Logistics capabilities have been researched in supply chain literature; however, logistics capabilities have not been thoroughly investigated through the lens of RO theory. The case study design will allow the researcher to gain in-depth knowledge regarding the unique characteristics of each market (case) investigated to build our understanding of this topic (Wu & Choi, 2005).

The primary purpose of this qualitative study will be to identify and understand the basic resource orchestration actions taken by managers to build effective logistics capabilities. This will also assist in identifying the most prominent contingency factors that impact the orchestration actions for logistics capabilities. The unit of analysis for the case study phase will thus be companies that require significant logistics capabilities for their operations.

Empirical context

It is essential to note the empirical context of this study is in South Africa. Data was collected from medium to large South African firms. According to the World Bank's Logistics performance index (LPI), South Africa has the highest-ranking LPI in Africa and is ranked 33rd globally. Although not immune to often-cited "African" challenges such as lacking infrastructure, informal markets, safety issues and the like, generally, the logistical performance in South Africa is comparative to more developed markets. As such, one would not expect the findings to offer uniquely African insights. The study's overall purpose is to understand logistics development, explicitly focussing on what managers do with firm resources. The case study method will allow unique insights into each case's logistical development via contextual explanations of the resource orchestration actions of managers. Propositions will be developed after a cross-case analysis which will serve as a foundation for further research.

Case study design

Stuart *et al.* (2002) propose a five-stage approach to the case study research process. These five stages include (1) defining the research question, (2) instrument development and site selection, (3) data gathering, (4) analysing data and (5) disseminating the research findings. According to Seuring (2008), although this process is shown as a sequential and linear process, revisions may need to be made, especially once data is collected, as most qualitative research, especially case studies, are considered an iterative process. Many authors have a similar approach or process regarding the case study research process (Eisenhardt, 1989; Mentzer & Kahn, 1995; Yin, 2017).

For this, a case study protocol, the primary documents required to focus on the research, organise the visits, and keep a proper trail of evidence was developed. The guidelines of Yin (2017) were used to create the case study protocol.

The predominant data within case study research is the interview transcripts; secondary data like company documents and researcher observations can also enhance the findings. The primary method of data collection will be through semi-structured face-to-face interviews. Eisenhardt (1989) states that a case study research design is sufficient between 4 and 10 cases. Anything less will fail to capture enough detail, and any more than ten will result in an overload of data to process.

The goal of the proposed study is to conduct multiple case studies, which will allow not only for in-case comparison through multiple interviews but also for cross-case comparisons to strengthen the findings (Seuring, 2008). According to Glaser and Strauss (2017), qualitative data analysis and collection should coincide, which will ensure that most of the "real world" occurrences are adequately captured.

Before getting into the details of the data analysis and techniques, the issue of rigour should be discussed. Lincoln and Guba (1985) propose that to demonstrate the trustworthiness of qualitative data, one has to comply with internal validity, external validity, reliability and objectivity. Miles, Huberman and Saldañha (2014) propose a more comprehensive set of criteria that can avoid many of the quality-related issues in qualitative research. These criteria are: (1) objectivity/confirmability (2) reliability/dependability/auditability, (3) internal validity/credibility/authenticity, (4) external validity/transferability/fittingness, and (5) utilisation/application/action orientation.

For data coding and analysis, the approach suggested by Saldaña (2021) has been followed. The first coding round consists of creating first order codes, identifying, and categorising the structuring, bundling and leveraging resource orchestration actions in each case. Together with this, contingency factors will be identified that influence or impact the logistics capability development in each case. These first-order codes will then be transformed into second-order themes, capturing the specifics of these actions for each case. Once the second-order themes have been developed for each case, a cross-case comparison and analysis will be made to extract those resource orchestration actions most prevalent in the sample. Saldaña (2021) note that this method of data analysis is most appropriate for studies with multiple participants and multiple sites.

Finally, the data must be presented in a logical and understandable format. Authors agree that there does not exist a standard format of reporting case study findings (Miles & Huberman, 1984; Yin, 2017). For multiple cases, it is vital to provide a rich and detailed description of each case to make the outcome self-evident to the reader (Barratt, Choi & Li, 2011). Mostly visual aids, tables and graphs can add more clarity and structure to the representation of the findings (Miles & Huberman, 1984). In addition, the validity and reliability of the findings must be clear when presenting the results. For case study research specifically, Yin (2017) proposes that construct, internal and external validity criteria be met. Construct validity shows that the researchers have employed appropriate operational measures for the constructs being investigated. Key informants can analyse the data and provide feedback on the results, or a chain of evidence should be kept as to how the specific constructs were conceptualised (Kidder & Judd, 1986). Internal validity is when the research can clearly show links or connections between proposed relationships. This is done through pattern matching, which is the ability to show that "actual data patterns match proposed patterns" (Campbell, 1986). Lastly, external validity states the ability of the findings to be generalised; with a case study, this can prove difficult due to the various critique on the method's rigour. However, a distinction has to be made between statistical generalisation and analytical generalisation. Statistical generalisation is achieved with survey research methods, where analytical generalisation appropriate in case research "is from each case to a broader theory not from samples to populations" (Stuart *et al.*, 2002).

PRELIMINARY RESULTS

To date, 21 interviews have been conducted with 28 total participants across 9 case companies. Data analysis is currently in progress. The data collection efforts are summarised in Table 1.

Table 1: Data collection information

Case	Industry	Participant role	Pseudonym	Interview length
1	Farming Conglomerate	Manager: Logistics	C1:P1	1 hour 20 minutes
		Director	C1:P2	56 minutes
		Transport Manager	C1:P3	1 hour 02 minutes
		Logistics Manager	C1:P4	1 hour 29 minutes
2	FMCG	Chief Executive Officer	C2:P1	1 hour 06 minutes
		National Sales & Operations Planner	C2:P2	1 hour 28 minutes
		Logistics Manager	C2:P3	
		Site Manager & Customer care	C2:P4	56 minutes
		Warehouse Manager	C2:P5	
		Operations manager	C2:P6	

		Secondary Fleet Manager	C2:P7	
		National Sales & Operations Planner	C2:P8	
3	Brewing, Beverage	Logistics Planner	C3:P1	1 hour 18 minutes
		ICT Business Analyst & Project Manager	C3:P2	1 hour 01 minute
		TMS Specialist	C3:P3	1 hour 35 minutes
4	Retail	Head of Transport & Engineering	C4:P1	1 hour 13 minutes
		Head of Logistics & Facilities Management	C4:P2	51 minutes
		Head of Distribution Centres	C4:P3	1 hour 43 minutes
5	Retail	Group Logistics Director	C5:P1	1 hour 19 minutes
		CEO	C5:P2	1 hour 03 minutes
6	Food Manufacturer	Production Manager	C6:P1	57 minutes
		Supply Chain Manager	C6:P2	1 hour 07 minutes
7	Furniture Manufacturer	Group Supply Chain Manager	C7:P1	1 hour 32 minutes
8	Roofing and Waterproofing Manufacturer	Supply Chain Manager	C8:P1	1 hour 08 minutes
		Warehouse and Distribution Exec	C8:P2	1 hour 07 minutes
9	Tissue and Paper Manufacturer	Group Supply Chain and Procurement Executive	C9:P1	1 hour 02 minutes
		HOD Distribution	C9:P2	
		Group Warehouse Manager	C9:P3	

Total participants: 28 **Interviews: 21** ***Some interviews included more than one participant**	**Total interview time: 25 hours 13 minutes** **Average interview time: 1513 minutes / 21 interviews = 72 minutes average per interview.**

The researcher is in progress with first-order coding. Thus far, two new resource orchestration actions have been identified:

Under the leveraging action, "Springing" is captured as the flexibility in the resource allocation process to solve operational issues in a timeous manner. This is not captured in the original RO framework. Secondly, under the structuring action, "Persuading" has been coming up as an essential resource orchestration action where managers need to expand and coordinate resources to convince all levels of management that improvements are required even though the general notion of "if it's not broken don't fix it" is widely accepted with regards to logistics. Several contingency factors have also been identified, including levels of disruptions, organisational structure, scope of IT implementation and business strategy.

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*The references above include those in the full proposal.