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THE FUTURE OF SUPPLY CHAIN MANAGEMENT: ACHIEVING THE PERFECT BALANCE BETWEEN THEORY AND PRACTICE

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Abstract: The supply chain field is a relatively new discipline that has seen its fair share of intellectual plurality. This plurality has served to enrich the field, but it has also made it difficult to define the core principles of supply chain management. This paper proposes a set of five core principles that are essential for any effective supply chain management system. These principles are:

Customer focus: The supply chain should be focused on meeting the needs of the customer.

Collaboration: The supply chain should be collaborative, with all participants working together to achieve common goals.

Visibility: The supply chain should have visibility into all aspects of the process, from raw materials to finished goods.

Flexibility: The supply chain should be flexible enough to adapt to changes in demand or supply.

Technology: Technology can be used to improve the efficiency and effectiveness of the supply chain.

These five principles provide a foundation for developing and implementing an effective supply chain management system.

Keywords: supply chain management, core principles, customer focus, collaboration, visibility, flexibility, technology

1. Introduction

Although intellectual pluralism is a sign of a healthy discipline in the sense that viewing a discipline through multiple perspectives creates valuable insights (Shook et al., 2009), the dictates of disciplinary development along scientific lines, at some point, necessitate the development of a common understanding of the key concepts pertaining to the discipline (Amundson, 1998; Defee et al., 2010).The supply chain field has seen its fair share of intellectual plurality since the early 1990s when academic enquiry into it began; this plurality has served to enrich and weaken it at the same time (Chicksand et al., 2012:474). The weakness arises from the fact that the supply chain body of knowledge fails to meet the criteria of coherence, breadth and depth, and quality which constitute the scientific tests of an academic discipline (Chicksand et al., 2012). Therefore, “this subject is neither well defined nor easily implemented, but encompasses an enormous breadth of topics requiring radical new thinking” (Robinson & Malhotra, 2005:316). For newcomers to the subject, in particular, this formlessness tends to create a lot of confusion as to what are the core principles and boundaries of the subject. Although some attempts have been made at determining whether supply chain qualifies to be characterised as a discipline (e.g. Harland et al., 2006; Chicksand et al., 2012), no conscious effort seems to have been made so far to identify the core principles of the subject.

This paper is of the view that supply chain has reached the stage where its key concepts and objects of research ought to be agreed upon so that its boundaries can clearly be demarcated. Therefore, the aim of this paper is to

set the tone towards breaking the subject into two parts: *Principles of Supply Chain* and *Applied Supply Chain*. The specific objectives are:

1. To identify the concepts upon which the principles of supply will be based; and 2. To determine the residual concepts that will constitute content for applied supply chain.

Being a theoretical paper, this paper relies exclusively on the review of literature as well as on the author‟s personal experience of teaching the subject in a university setting for five years. As such, there are no primary data to be reported. This gives the paper a constructivist worldview. According to Amineh and Asl (2015:9), constructivism deals with "how people make sense of their experience." After this introduction, the paper goes on to discuss discipline demarcation, followed by understanding what constitutes the principles of a subject, and what goes into the applied part of a subject. The next two sections then specifically identify and suggest core principles for supply chain and content for applied supply chain. A summary and conclusion as well as a section indicating compliance with ethical standards complete the paper.

2. Discipline Demarcation

The *Oxford English Dictionary* defines a discipline as an area of knowledge: a subject that people study or are taught, especially in a university. Fabian (2000:351) sees it as "the common focus of a set of researchers who might perform research in varied paradigms and/or theoretical perspectives." According to Krishnan (2009:9), some features that help distinguish a discipline from others are: 1) the particular object of research; 2) theories and concepts that can organise the accumulated knowledge effectively; and 3) some institutional manifestation in the form of subjects taught at universities or academic departments. The demarcation of a discipline may become necessary for a number of reasons. For instance, demarcation becomes necessary when a discipline is evolving from varying disciplines (Klaver et al., 2014:755). Demarcation also becomes necessary when the professionals of a discipline want to distinguish themselves from professionals in related fields through the acquisition of intellectual authority and career opportunities; denial of these resources to professionals of rival disciplines; and protection of the autonomy of scientific research in the discipline from political interference (Gieryn, 1983:781). As supply chain is still evolving from varying other disciplines (Chicksand et al. 2012:2), it is necessary for its boundaries to be demarcated to distinguish it from other disciplines. However, it is important to first determine supply chain‟s current place in the universe of disciplines. A framework for knowing supply chain‟s current status and where it ought to be is Fabian‟s (2000) triple test of a discipline: 1) coherence, 2) depth and breadth, and 3) quality. In this current paper, the test of depth and breadth is called „scope‟. This is depicted in the ensuing figure.

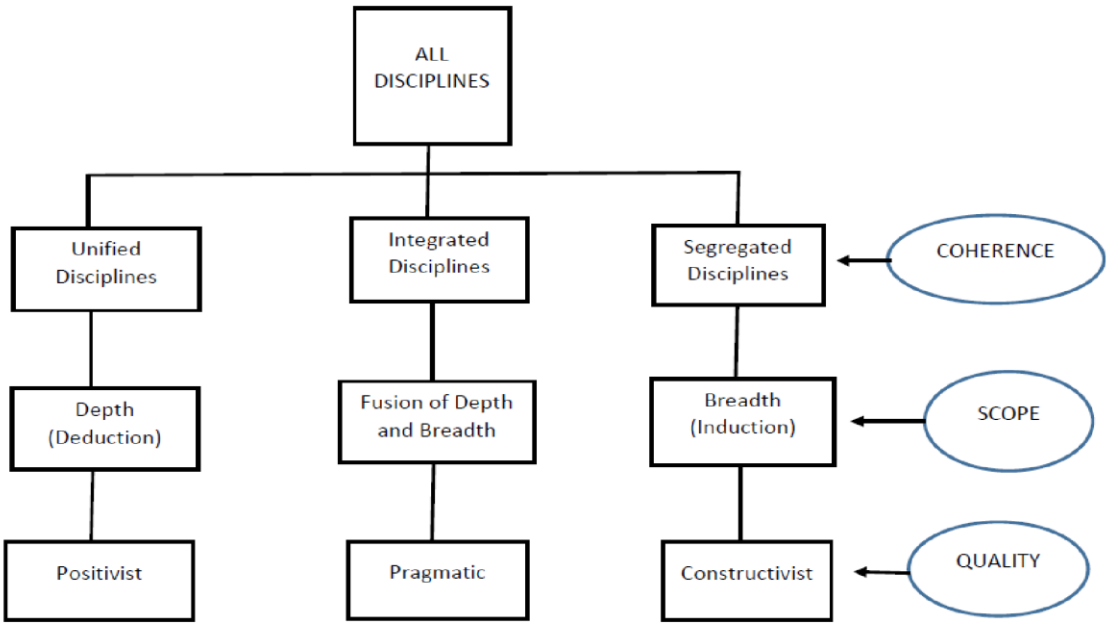

Figure 1: Demarcating Disciplines with the Criteria of Coherence, Scope, and Quality

Figure 1 shows that all disciplines when subjected to the test of coherence will end up falling under one of three categories: unified disciplines, integrated disciplines or segregated disciplines.

Unified disciplines are the most coherent, followed by integrated disciplines, with segregated disciplines being the least coherent. In a unified discipline, researchers share a common understanding of the world they seek to describe (i.e. single paradigm) and tend to be resistant to new ways of looking at key problems. A segregated discipline, on the other hand, does not have an overarching theory or common approach that is easily visible (i.e. no paradigm). Therefore, a segregated discipline is one in which „anything goes" (Fabian, 2000:358). Integrated disciplines are the middle ground between unified disciplines and segregated disciplines. Integrated disciplines are open to new ideas, but desire new entrants to fit in (i.e. multiple paradigms with some common ground) (Fabian, 2000:357; Chicksand et al. 2012:4). The second test of a discipline is to determine if its focus is to increase knowledge vertically or horizontally. This is the scope test. If the test reveals a preference for depth (vertical growth) over breadth (horizontal growth), then the discipline is a unified one that has well established first principles, at least, that can be tested using the hypothetico-deductive framework to yield new insights. If the preference, however, is for breadth rather than depth, then the discipline is a segregated one. In integrated disciplines, the test will reveal a combination of depth and breadth as an orientation for growing knowledge. In this situation a fusion of deductive and inductive methods will be employed to increase knowledge (Fabian, 2000:357; Chicksand et al. 2012:4). Finally, the quality test classifies disciplines based on how they review and evaluate new and existing contributions. Disciplines that employ rigorous universal (positivist) standards of judging contributions such as pertains in the natural sciences and economics are likely to be unified whereas those that use varying standards to judge the varying truths that they seek (constructivist) are likely to be segregated (Fabian, 2000; Chicksand et al. 2012:5). Quality assurance in integrated disciplines will fall somewhere between these two extremes (pragmatist).

Applying these three tests to supply chain for more than a decade, a number of researchers have come to the conclusion that supply chain is still not developed enough to be called a discipline because it lacks core principles and overarching theory. First, Harland et al. (2006) came to the conclusion that the field was too immature to be classified as a discipline even though there was some evidence of growing coherence and quality. This was followed six years later by the study of Chicksand et al. (2012) which also found supply chain to be an increasingly segregated discipline rather than moving towards becoming a coherent (unified) discipline. Therefore, it still "has some way to go as an academic field to be viewed as a discipline" (Chicksand et al. 2012:21). It is noteworthy that these two studies employed the rigorous positivist method to arrive at these conclusions. Teaching this subject in a university from January 2015 until now, the author of this paper can confirm through personal experience that the situation is still not any different from Chicksand et al."s (2012) conclusion. It is still very difficult to tell what the core principles of the subject are whereas the foregoing discussion has shown that principles help make a discipline coherent. Instead, any semblance of core principles is left to the design of various authors. Therefore, different textbooks on the same subject largely cover different topics with little room for commonality. As a result, newcomers to the subject find it difficult to navigate the labyrinth of incoherence that they are confronted with. Perhaps an easy way of achieving coherence may be to make a conscious effort to determine the elements that will constitute the principles of supply chain versus those that will be grouped under applied supply chain. The external boundaries of supply chain will then naturally fall in place once this internal demarcation has been made.

3. Understanding What Constitutes the Principles of a Subject

Boyce and Kraft (1985:154) suggest that principles are the foundation stones of theory. According to them, a principle is "a single fundamental law, generally an empirically regularity based on continued observation" [sic]. Therefore, a theory, in their view "incorporates a body of such principles and suggests new principles that can be tested as hypotheses, both to increase knowledge and to invalidate or strengthen the theory itself". In a nutshell, theory cannot exist without principles. Furthermore, principles go beyond being passive laws governing a discipline to providing the framework for solving problems in everyday life. According to Michel et al. (2009:399), students are able to discover the solution to a problem if only they have learned the basic principles of a subject. Therefore, principles precede application. The fact that a discipline must separate its principles from its applied part and that the principles part must precede the applied part is aptly captured in the foreword of a book edited by Jacobs et al. (2008) as follows: "during the construction of this book we have as much as possible tried to keep the same flavour, of first outlining the principles of a subject, and then its clinical application".

4. What Goes into the Applied Part of a Subject

The *Merriam-Webster Dictionary* defines „applied" as "put to practical use; especially: applying general principles to solve definite problems".

This confirms that the applied aspect of a subject depends on its established principles and that both principles and application are required for problem solving. Therefore, the applied part of a discipline is aimed at bringing to life the principles embedded in theory for the solution of everyday problems. In this regard, most disciplines have clearly distinguished their applied part from their principles or theory part, for example, applied mathematics (Murray, 1993); applied psychology (Haslam et al., 2009); applied behaviour analysis (Cooper at al., 2007). Therefore, what should go into the applied side of a subject are the topics and concepts that discuss the tools and processes to put the principles into action.

5. Identifying the Core Principles of Supply Chain

To identify the core principles of supply chain, it is necessary to be reminded of Boyce and Kraft‟s (1985) definition that a principle is a fundamental law and that a collection of principles constitutes a theory. It is also necessary to recall that although supply chain has no unanimous definition (Caddy & Helou, 2007:320), it nonetheless indicates the interconnectedness that exists among organisations involved in the provision of goods and services to end users (Walker & Jones, 2012:15; Irvine, 2015:143). This interconnectedness is informed by the need for supply chain participants to achieve a common purpose: the derivation of value by the organisations involved as well as the end users (customers) of the good or service (de Figueiredo et al. 2014:21). The notion of disparate parts coming together to achieve a common purpose indicates that a supply chain is a system (Montgomery & Oladapo, 2014:175). The salient points emerging from the foregoing are the interconnectedness attribute and the systemic nature of supply chains. In addition to these, supply chains function within a broader context – just as all systems operate within an external environment –therefore, the wider economy is also an important element to consider in fashioning the core principles of supply chain. If a principle is referred to as a fundamental law whereas the attributes of *interconnectedness*, *system*, and *context* are deemed as fundamental to the theory of supply chain, then the core principles of supply chain should emanate from these three attributes. With this reasoning, this paper has upon review of literature identified possible areas that the principles of supply chain can be based on. These are shown in Table 1.

Table 1: Suggested Concepts to Constitute the Principles of Supply Chain

Attribute	Suggested Concepts	Source	Rationale
Context	Economic Sector; Industry; Similarities and differences between them; Where supply chain fits in these two concepts.	Hirschmann (1958); Medic et al. (2014); Goode et al. (2014); Bourlakis et al. (2014); Wang (2015); Pinjaman & Aralas (2015:34); Urbancova & Vnouckova, (2015:70); Fort & Klimek (2016); Alshehhi & Olah (2017:40)	Understand why supply chains terminate with the customer and are largely vertical in shape.
Interconnectedness	Linkages; Inter-organisational relationships; Integration; Differentiation/Specialisation; Diversification; Synergy	Badinger & Egger (2008:1); Liu et al. (2009:6); Terjesen, Patel & Sanders (2012:6); Andreou et al. (2012:1223); White et al. (2013:715); Herger & McCorriston (2014:4);	Understand why the whole tends to be greater than the sum of its parts.

System	General systems theory and its axioms	Bertalanffy (1972); Skyttner (1996:17); Larsson (2007:16); Zeilar & Savanovic (2009:218); Chikere & Nwoka, 2015:3); de Florio (2015); Rousseau et al. (2016)	To show why a supply chain is a system.
Generic supply chain	Supply chain; Value chain; Similarities and differences between the two		Discuss supply chain and value chain within the framework of the preceding concepts

In Table 1, the attributes and their related concepts have been arranged in a logical sequence. Therefore, the principles surrounding the context of supply chains are those proposed to be discussed first in the principles part of the subject. Generic supply chain, which is really not an attribute and was not discussed previously, is placed in the table as the last topic to be discussed because discussing all the other principles without relating them to the supply chain itself defeats the purpose of establishing the principles in the first place. Therefore, the preceding principles are supposed to be established with supply chain in mind. With such a clear demarcation of the material for the principles of supply chain, it becomes easy to group all other concepts related to the practicalities of supply chain under applied supply chain.

6. Aspects of Applied Supply Chain

As the applied side of a discipline deals with actualising the principles to solve everyday problems and the concepts to constitute the principles of supply chain have already been identified in Table 1, it becomes easy to bring any residual concepts to the applied side of supply chain. However, rather than do this in a haphazard manner, this paper chooses to approach it systematically. The systematic approach involves grouping the concepts around two simplifying words i.e. „software“ and „hardware“. These two words are not used in the conventional sense as pertains in the information technology (IT) field. However, they bear some similarities in meaning to their IT counterparts in the sense that „software“ here means the management aspect of supply chain whereas „hardware“ means the physical tools, equipment or infrastructure part of the supply chain. Therefore, Table 2 below is constructed with this understanding.

Table 2: Proposed Contents for Applied Supply Chain

Component	Suggested Concepts	Source	Rationale
Software	Supply chain strategy; Demand management; Acquisition management; Logistics management; Production management; Applied marketing; Disposal management; Performance management; Customer Service	National Treasury (2004); Mbanje & Lunga (2015:8); Kruger, Ramphal & Maritz (2015:45); Pienaar & Vogt (2016:14)	Understand which areas the principles of supply chain should be applied to on dayto-day basis for competitive advantage.
Hardware	Warehousing; Transport; Machinery & equipment; Factory & office space; Information & communication technology; Legislations, policies & procedures	Kruger, Ramphal & Maritz (2015); De Villiers et al. (2015); Pienaar & Vogt (2016);	Understand what the infrastructural needs of supply chain management are.

The suggested contents in Table 2 are only indicative and are not meant to be seen as the complete list of concepts on applied supply chain. Their purpose is to suggest an angle from which applied supply chain can be tackled.

7. Summary and Conclusion

Applying Fabian‟s (2000) tests of coherence, scope, and quality, a discipline will fall under one of three characterisations: unified discipline, integrated discipline or a segregated discipline. Unified disciplines have well defined principles and agreed upon grand theory or theories based on which vertical knowledge is pursued in a structured manner to reveal new insights. Segregated disciplines, on the other hand, do not have identifiable core principles or overarching theory and therefore can be referred to as realms where „anything goes‟. Such disciplines engage in horizontal knowledge seeking without any universally defined structure. Disciplines that fall within this category tend to be incoherent and are normally deemed as immature. Integrated disciplines lie in between these two. Integrated disciplines have identifiable principles on which theory is grounded and research conducted, but continuously test their boundaries by accommodating new principles from horizontal knowledge seeking. Using Fabian‟s (2000) three tests, some prior studies (e.g. Harland et al. 2006; Chicksand et al. 2012) seem to validate the author of this paper‟s perception that supply chain lacks well defined principles with theory still at the formation stage. As such, supply chain is a segregated discipline. This gives an opportunity to researchers from related fields to contribute their quota to its shaping. However, the threat posed by this is the confusion created in the minds of newcomers to the subject owing to the varying angles that supply chain research and textbooks adopt.

Therefore, to bring clarity to the teaching and learning of supply chain, this paper has proposed a clear delineation of its boundaries by identifying its core principles as separate from the applied concepts. This way it is easier for teachers and learners to clearly distinguish between the content for the *Principles of Supply Chain* as against that for *Applied Supply Chain*. This may also pave the way to bring supply chain from the realm of segregated disciplines to that of unified disciplines. Table 1 and Table 2 contain this paper‟s suggestions of how this differentiation can be achieved.

8. Compliance with Ethical Standards

Funding: There is no funding source to be acknowledged for this study.

Ethical approval: This article does not contain any studies with animals performed by the author.

Ethical approval: This article does not contain any studies with human participants performed by the author.

Informed consent: As there were no studies on human participants, informed consent was not necessary.

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