

EXPLORING THE SUPPLY CHAIN AGILITY ATTRIBUTES IN FAST MOVING CONSUMER GOODS INDUSTRY: A CASE STUDY IN THE MIDDLE EAST

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Abstract

During the 1990s, supply chain management and agility have both received great attention. This is due to the fact that the business market place is characterized by being highly dynamic and complex. This paper aims to explore the need and the attributes of supply chain agility in FMCG business industry working in the Middle East markets. A case study of a multinational company working in the Middle East was chosen, where it faces the challenges of its business environment and its rapid changes in its markets. The findings show the case study supply chain working within such type of industry needs to be agile and that the attributes required for achieving agility within FMCGs supply chain includes: responsiveness; Customer service; flexibility; innovation; speed; quality; efficiency; and responsible people thinking.

Key words: supply chain management, supply chain Agility, information sharing, technology, fast moving consumer goods.

1. INTRODUCTION

Supply chain management, as a business and management concept, has received great attention from academics and practitioners. This is clearly demonstrated by the increase in the published articles by both practitioners and academics, the increase in supply chain management conferences, the increase in the development and delivery of training programmes for professionals, and even in the supply chain management courses taught in universities (Burgess et al., 2006). This emphasis on the supply chain and its management has increased when the practitioners and academics have recognised that it is a key factor necessary not just to compete, but even to stay in the market place. Companies consider supply chain management as a core means of success in the competitive business environment and the vehicle that can enable them to provide their product or service offerings to the market place in an efficient and effective manner (Jones, 1998; cited in Li et al. 2005). Cousins et al. (2006) argue that companies within both the private as well as the public sectors are recognising the importance of supply chain management and its role in achieving success inside their companies. Christopher (1992) argues that “competition in the future will not be between individual enterprises but between competing supply chains”. Van der Vorst (2000; cited in Van der Vorst, 2004) suggests that the business managers have recognised the importance of effective coordinating, integrating, and managing of core processes among all the supply chain members and consider it as the key factor affecting their firm’s success. Li et al. (2005) argue that most organisations are realising the importance of their supply chains and are increasing their efforts to enhance them. They argue that it is no longer enough for companies to improve their internal efficiencies, but that companies must also leverage their supply chains if they are to maintain a sustainable competitive position within their market place. Power et al. (2001, cited in Li et al., 2005) and Moberg et al (2002, cited in Li et al., 2005) similarly argue the importance of supply chain management to achieving sustainable profitable gains.

There are several factors that have led to the great importance of supply chain management, not least the emergence of the “globalisation” phenomenon and the “international economy”. These new bases of competition are affecting how organisations are dealing with organising and operating their supply chains (Jain and Banyoucef, 2008). Li et al. (2005) argue that competition, and especially global

competition, is now an important challenge facing organisations to provide their products and offering their services in the suitable place, at the suitable time, with the lowest cost. Lin et al. (2006) suggest that the competition faced by companies is now also affected by innovative technologies, business environmental changes, and the great variety in customer needs and wants. This view is echoed by Moron and Swierczek (2009) who argue that the factors that have led to the prominence of supply chain management are twofold: economic and technological environmental changes. These changes are forcing companies to be able to provide greater ability to serve customers; to gain greater control over new business markets; to deal with growing informational and technological pressures; to examine and respond to the growing trends in new management approaches for lower operational costs; and to deal more effectively with investment costs as well as research and development costs (Moron and Swierczek, 2009).

Although supply chain management has received much research and business focus, the success stories of its effective management are still relatively few. For example, Boddy et al. (1998; cited in Li et al., 2005) reported that more than half of their survey respondents were not applying their supply chain partnering successfully. It appears that supply chain management's application in an effective manner is still not widespread. It has been suggested that this is as a result of the supply chain management complexity and the lack in the research for identifying the means and methods that can help the organisations to implement its management effectively (Li et al., 2005). Moreover, Cousins et al. (2006) argue that although supply chain management has been studied from different disciplines and from different theoretical perspectives which leads to richness in the field, it also however leads to unclear literature as well as overlapping constructs and inconsistent results. Cousins et al. (2006) also argue that this unclear state and existing gap in the literature on supply chain management may be due to the lack of common literature linking the supply chain management literature and that of the buyer-supplier relationship literature. From their point of view, whilst there does exist some theories linking supply chain management and buyer-supplier relationship together, in general the field is significantly underdeveloped. Van der Vort, (2004) suggests that among the factors that make it difficult for companies to implement supply chain management successfully are the lack of trust between the company and its partners; different objectives; different managerial philosophies; and different reward systems.

The preceding arguments highlight the fact that great attention has been given to supply chain management as a business concept and indicates that companies need to be aware of its importance in helping them to stay competitive in their market place. However, there still exists a gap in the supply chain management literature regarding how the companies can effectively implement it in a way that can enable them to respond as quickly and effectively as they can to the changes in the current highly dynamic and competitive business world.

Some solutions for the problem of how to deal with the environmental changes and uncertainty has been provided in some research contributions. Sherehiy et al. (2007: 445) suggest that organisations can face these business conditions through the use of several paradigms, such as 'adaptive organisation', 'flexible organization' and 'agile enterprise'. Most of the research on determining the means through which the companies can face business changes includes "adaptivity" (Sherehiy et al., 2007). Flexible organization is also defined as being able to adapt its internal resources and activities to deal with the business changes (Reed and Blunsdon, 1998; cited in Sherehiy et al., 2007). During the 1990s, the new approach for responding to the business environmental changes has been introduced as "agility", which has also been defined to include the ability to "adapt". Since the late 1990s, agility has received increasing attention inside the business world as well as the academic research arena.

The "agility" concept has been firstly introduced to be applied to the manufacturing function. The origin of agile manufacturing was first introduced by a set of researchers at Iaccoca Institute, Lehigh University 1991 (cited in Yusuf et al. 1999). Since then the concept has also been introduced to be applied to the whole organisation as a way of doing business. Following recognition that supply chains have become the most important players for competition in this dynamic business

environment, the agility approach has been introduced to supply chain management as a means for the companies to benefit from the winning strategy behind such approach in their supply chains (Harrison et al. 1999, cited in Sharifi et al., 2006). The main rationale behind the process of applying agility to supply chains is to provide a solution for the companies and other members within the supply chains to respond to the business market changes (Lee and Lau, 1999, cited in Sharifi et al. 2006; Christopher and Towill, 2000).

An examination of published work indicates that the literature on supply chain agility is limited. This can be due to the fact that agility as a business concept is considered as a new philosophy, especially in the supply chain literature. There are several researches discussing agility elements and capabilities in general. There is a lack in the literature for the required attributes necessary for achieving high level of agility within supply chains in specific and their importance. Moreover most researches in the literature are dealing with agility in some types of industries (Chakraborty and Mandal, 2011) such as electronics business industry and auto industry. However supply chain agility has to be a methodology implemented by all types of industries that face high level of complex and dynamic market changes.

Grounded on this, the authors aim to explore the need of supply chain agility and the required attributes necessary to achieve agility within FMGC supply chain of a multinational company working within the Middle East business environment. This type of industry is rarely examined in the agility literature and especially within the Middle East context. The researchers also attempt to increase the existing knowledge on the impact or the role played by information sharing and technology on achieving high level of supply chain agility in such type of industry.

The paper is organised as follow: The next section reviews literature on agility and agile supply chains: its definitions; capabilities and enablers. It is followed by the methodology applied by the research; findings and discussion, and finally a conclusion is presented.

2. Theoretical Foundation and Literature Review

The literature reviews agility within supply chain context as well as the role of information systems with supply chains.

2.1 A review on agility and agile supply chain: its definitions, capabilities and enablers:

The thinking behind solutions to help the companies to deal and respond to business environment has since the 1990s focused on the agility concept as a means for responding to business changes (Nagel and Dove; Goldman et al, 1995; cited in Ismail and Sharifi 2006). Jackson and Johansson (2003) argue that agility as a business concept cannot be considered as an aim for any company, however it can be considered as a requirement needed by any company to have a high degree of competitiveness inside this highly dynamic and complex business environment. Agility has been widely recognized as a winning approach for companies and can be considered as the main strategy for staying in the dynamic business environment (Ismail and Sharifi, 2006).

Agility as a concept has been first introduced to be applied to the manufacturing function, where it was defined by Kidd (1994, cited in Jackson and Johansson, 2003: 482-483) as "...agile manufacturing can be considered as the integration of organisation, highly skilled and knowledgeable people, and advanced technologies, to achieve co-operation and innovation in response to the need to supply our customers with quality customised products". Brown and Besant (2003; cited in Narasimhan et al., 2006) define agile manufacturing as the ability to deal with the changes in the business environment market quickly and effectively.

More recently it has been introduced to the whole company where it has been defined by Goldman et al. (1994, cited in Swafford et al., 2006) as the organisation which has a dynamic nature and an ability to gain a competitive advantage through this dynamic nature which enables it to focus on developing knowledge and flexible processes to be able to react to the environmental market changing conditions.

With the attention given to agility during the 1990s, parallel attention has been given to the important role played by supply chain management as a unit of competition (Bowersox et al.,1998; Christopher 1998: cited in Ismail and Sharifi,2006). Thus as a result of the attention placed on agility and supply chain management, agile supply chain has appeared as a philosophy and has been considered as a winning strategy of business competition (Ismail and Sharifi, 2006). Swafford et al.,(2008) argue that one important driver for agile supply chain is “mass customization”, where the company need to provide “customerised” products and services at a cost equal to or even close to the costs associated to “mass production”. They suggest that companies within an agile supply chain are able to deal with unexpected changes and are more able to match demand to supply, and therefore agile supply chain is a market-oriented philosophy.

Applying agility to the supply chain context has been supported by Harrison (2000), where he argues that it is not logical to limit the impact of the concept only inside the production department, and that this concept should be extended to the whole company’s supply chain. Christopher (2000) and Van Hoek, (2001) have exceeded the concept of agility to the organisation’s processes and relationships with other members within the supply chains to be able to respond quickly and effectively to the unexpected business environmental conditions (cited in Baramichai et al., 2007). Baramichai et al. (2007: 335) define supply chain agility as “an agile supply chain is an integration of business partners to enable new competencies in order to respond to rapidly changing, continually fragmenting markets. The key enablers of the agile supply chain are the dynamics of structures and relationship configuration, the end-to-end visibility of information, and the event-driven and event-based management....”.

Ismail and Sharifi (2006) define agile supply chain as the whole supply chain and its members’ ability to adjust their network rapidly and their operational activities to be able to face the dynamic and changing needs of their demand. Prater et al. (2001) define supply chain agility as the company’s ability to match its physical resources in sourcing, manufacturing, and delivery with its speed and flexibility capabilities.

All the definitions of agility at all its levels: manufacturing, company; and supply chain, suggest that this business philosophy is a broad, multi- perspective concept that includes several components and elements (Swafford et al., 2006). Ismail and Sharifi (2006) suggest that the theoretical basis for applying agility to supply chain is similar to the basis of applying agility to manufacturing systems. Yusuf et al. (1999) argue that the competitive foundations for agility are: speed; flexibility; innovation; proactively; quality’ and profitability. They also suggest 32 attributes for agile organisations and classify them into ten decision domains, which can be considered as agility enablers. The first is “integration” which involves attributes such as concurrent of activities implementation; organisation- wide integration; accessible information to all employees. The second decision domain is “competence” which includes attributes such as multi-dimensional abilities; building practices difficult to be imitated. The “team building” which includes attributes such as encouraging employees to team working; focus on cross - functional team working; developing teams across borders; decision making process is decentralised. “Technology” is another decision domain which includes the awareness of technology role; technology leadership; the availability of the required skills and knowledge; production system based on flexible technology. “Quality” is another decision domain for agile organisations which includes attributes such as product life quality; substantial value- addition products; right product design from first time; less development cycles times. Another decision domain is “change” including the emphasis on contious improvement; and focusing on developing culture of change. Among the decision domain is “partnership” which includes attributes such as quick formation and development of partnerships; close relationships with customers; strong relationships with suppliers; developing trustful relationships with customers/suppliers. “Market” is another decision domain which includes introducing new products; innovation based on customer- oriented; satisfying customers; dealing with market needs changes. “Education” is also a decision domain for companies to focus on to achieve agility, including focus on building learning organisational structures; having flexible- multi skilled human resources; upgrading of workforce skills ; focus on training and development for all human resources continuously. Finally

“welfare” is the final decision domain for agile organisation to focus on which includes emphasising and focusing on satisfying of its employees.

2.2 The impact of information sharing and technology on agile supply chains

Although inter-firm relationship role for firms is well recognized, there is a great failure rate in achieving its benefits (Muckstadt et al., 2001; cited in Hsu et al., 2008). A core reason can lie in the failure to provide sufficient information sharing and flows within their supply chain, which in turn may be due to an inability or unwillingness to provide this infrastructure, or a lack of knowledge on how to do this. Hsu et al. (2008) argue that the firms with inadequate or insufficient information sharing will be limited in achieving the supportive benefits from the relationships with other supply chain partners. With the growing technological advances and the emergence of the global information infra-structure, the companies should possess the suitable competitive inter-organisational informational systems to enable them to achieve the rapid and effective response to the customer needs and changing expectations (Hsu et al., 2008). The information and communication tools can enable the business activities to be integrated across the whole supply chain through the information flows which is required to coordinate the business process as a whole (Rippa, 2009). Schonsleben (2000) suggest the importance of information technologies to agility since they argue that agile companies are competing through the use of “knowledge and competency” (cited in Power et al. 2001). Power et al., (2001) also argue that in their analysis for “less agile” and “more agile” companies, the “more agile” companies are more willing to use high technology. Martin and Grbac (2003) argue that information sharing has a positive impact on supplier flexibility and that supplier flexibility has a positive effect on profit, customer loyalty, and responsiveness (cited in Kannan and Tan, 2006).

3. Research methodology

Unlike the positivism-paradigm researches, where the hypotheses are being tested, “Phenomenological” paradigm is more suitable for this research to achieve the research aim. The reason is that the concepts are newly adapted in the business environment. Attempting to explain and discuss supply chain issues and agility problems is a complex job. To explore the need and the required abilities or attributes to achieve agility within FMCGs manufacturing company’s supply chain needs to select the suitable methodological approach that can enrich the little literature exist on agile supply chains. Most researchers on agile supply chains have supported the use of qualitative approached when dealing with agility as a concept and especially agility within supply chain context. This is because agility is considered as a new business concept for the academics as well as the business practitioner.

This research has followed Case study approach which is defined as “the development of detailed, intensive knowledge about a single ‘case’, or a small number of related ‘cases’ (Robson, 1993, p.40; cited in Saunders et al, 2000, .p.94). It is considered as a process of testing or evaluating a specific phenomenon inside a particular context. The case study is considered as a research methodology under the phenomenological research paradigm (Collis and Hussey, 2003). It is also considered to be the best approach to answer that questions of ‘Why’ and ‘How’ ones (Yin, 1989) as well as ‘What’ questions (Robson, 1993; cited in Saunders et al., 2000). The case study company, which is used in this research, is as a single in depth case study. It is a multinational company working in FMCG business industry in the Middle East markets, where it faces the challenges of its business environment and its rapid markets changes. The supplier perspective has also taken into consideration where data also has been collected from two of its core suppliers.

Data collection and analysis

Data has been collected from four sites for the case study in the Middle East. The first two sites are located in Egypt and the other two are located in Dubai (UAE). There is a triangulation in the collected data. The data collected in this research comes from many sources; interviews and website

archival documents. Semi-structured interviews (see table 1) were conducted with the production and operation managers, procurement managers, marketing manager and supply chain managers and etc. in different sites of the case study company. The 'semi-structured interview' aims to let the practitioners discuss freely and openly their opinions and provide their own experiences. This is with the aim of enriching the collected data. Table 1 summarises the interviews conducted. It is important to mention that all the interviewees are from the managerial level and that they are managing different functional areas that are directly related to the company's relationship with suppliers. Finally, the collected records show the effect of this partnership on agility level of the company's supply chain. The collected records were obtained from two sources, one from the company's records with the permission to be published in this research and the other from the published data on the case study website. Data collection has taken place during the end of 2010 and beginning of 2011.

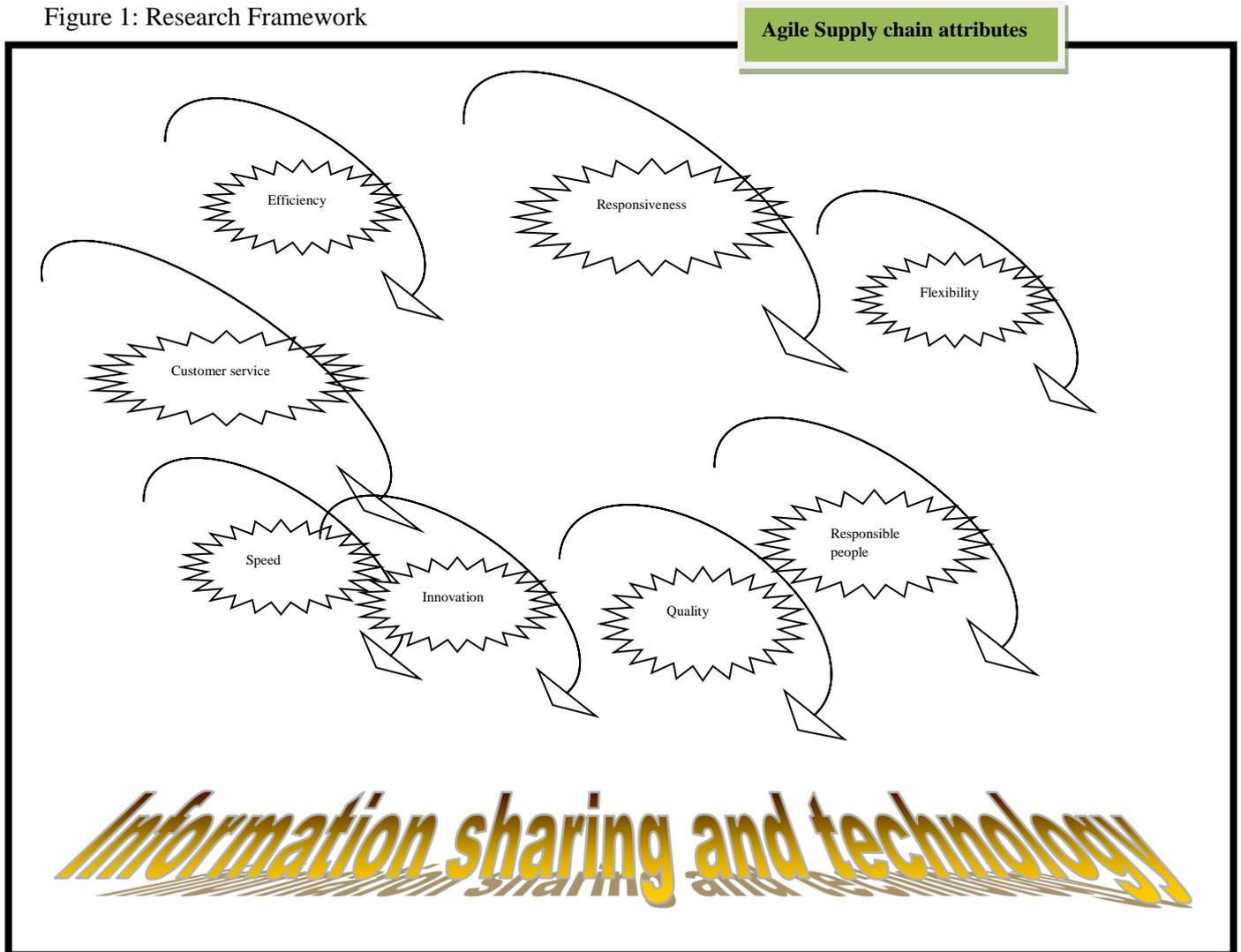
TABLE 1: INTERVIEWS CONDUCTED

In-depth case study (16 interviews with senior top managers)			
Egypt (Alexandria, Cairo)		United Arab of Emirates (Dubai)	
Corporate managerial site (A)	Corporate managerial site (B) [Tea Factory, Personal care Factory]	Corporate managerial site (C)	Corporate managerial site (D)
Marketing manager	Tea Factory manager	Demand manager for Kuwait and Qatar for all products	Planning manager for Tea Factory (Gulf area)
Supply planning and logistics manager	Personal care Factory manager	Demand planner for United Arab of Emirates for all products	Manufacturing manager
	National Supplier Development manager	Planning manager for Personal care (Kuwait and Qatar)	Customer services for Tea Factory
		Customer service for Gulf Business area.	Site quality manager
		Technical project manager for Gulf area.	
		Supply chain manager (Gulf area)	
↓	↑	↓	↑
↓	↑	↓	↑
One core suppliers (semi structured interviews and archival documents)			

Data analysis process has followed Grounded theory principles as a way for analysing the data. Strauss and Corbin (1990) suggest that the researcher should follow some coding stages or procedures. According to Strauss and Corbin (1990) coding process includes three main procedures: open coding; axial coding; and selective coding. It is important to mention that these three processes can be considered as stages, however it does not necessarily for the research to follow them from open to axial to selective in a strictly manner. The GT researcher goes forward and backward throughout his/ her research.

4. Findings and analysis

Figure 1: Research Framework



The analysis (see figure 1) shows that agility as a new business concept is very important factor for success in such type of industry, where FMCG uncertain business environment is characterized by high level of competition, dynamic, and complex variables. This has been suggested by the Customer Service Manager for Gulf business unit where he said that “It’s very competitive. It’s very challenging. ...I mean there is no set trend to follow to be on the top of the market, so it’s an everyday exercise where we have to come up with new plans. We face new problems, we give new solutions and that’s how the business works”. He also added that “We are already very dynamic...FMCG is actually stands for Fast Moving Consumer Goods, right, so these – this business is very fast”.

This has also been supported by Demand planner for UAE for all products, where he said that this type of industry is always fast and complex as he stated that “Definitely, FMCG in general is a very complex industry because I mean we produce products, we sell them almost immediately. It’s a very fast moving so the cycle between supply and demand is almost continuous, so it’s a really complex business”.

The case study adapts agility as it recognises its importance to be able to grow in their dynamic business environment. This has been suggested by the tea factory manager in Egypt as he mentioned “let us agree on agility importance, as without agility there will not be continual growth, we can grow, however we will not continue to grow without high level of agility”. Supply and logistics planning manager in Egypt said also “it is very important to be agile now and especially after the dynamics of our business environment”.

The case company also considers agility as one of its main goals for improvement in the near future. For example the Demand planner for UAE supported this idea where he mentioned that there is no business not facing changes and that they have to be able to cope with and deal with such changes and that the solution for this is to be agile as he said that “Definitely, I mean no business is every constant. For you to improve you need to come up with changes, so definitely this company is open to changes whenever they come. We adjust, we improve the process, and we review and find whatever part of the business needs to be improved. That’s agility to take up the main dynamic changes”.

Form the analysis of the data collected, the following attributes are derived as important characteristics for achieving supply chain agility within FMCG business industry: responsiveness; Customer service; flexibility; innovation; speed; quality; efficiency; and responsible people thinking.

Innovation has been considered as an important attribute for achieving high level of agility within case study’s supply chain. This has been suggested by most of the interviewees, for example the Technical project manager, Gulf, For all products on ranking and explaining the attributes necessary for achieving high level of agility within the company’s supply chain, he mentioned that innovation is considered as the most important factor for achieving agility besides quality level as he stated that “Innovation is one and then you have quality...Yes, we need to innovate anyway”.

Speed is an important attribute or ability that should be possessed by any company to be able to achieve high level of agility within its supply chain. It has been considered by some interviewees as the most important for achieving agile supply chains and a key factor for being able to face the high competition that exists within a type of business environment as that of the FMCGs. For example, the Tea Factory manager has considered speed as a very important and essential factor as he mentioned that “... you need to take share of the market from competitors and to take share from competitors you need to be faster than them, to be able to reach to high level of speed.., as we previously agreed on that about 80% of the your (ability to react) is in your supply chain and therefore to be leader and reach to your customer with such new, your supply chain need to be agile, flexible and to be faster to be able to adapt to any change in the market and to deliver faster than others.

The Supply planning and logistics manager added that people and how they are able to and willing to accept change is another factor for achieving agile supply chain where he stated that “...it can be implemented across the people that are running the supply chain themselves. For those people are the people who can make it agile or solid or whatever”

Quality is also considered as essential factor for achieving agility. Some interviewees have considered as important factor for improving supply chain agility. For example the Demand planner for UAE, all products has considered as essential factor as he said that “Quality also is very important”. Customer service and flexibility have been considered also by the most of the interviewees as important attributes leading to agile supply chains. For example the General planner handling the Kuwait and Qatar for all products also has considered the customer service, flexibility and quality as core attributes for achieving agility as he said that “I would say flexibility would be one of the most important factors. I’d follow by quality and customer service”.

Efficiency has been considered as an important attribute for achieving agile supply chains. For example the National Supplier Development Manager as he mentioned that “I mean my mind is more technical about having better agility. It’s like efficiency on the lines; the production lines themselves, having continuous improvement monitored”.

Finally one of the most important attribute for achieving agility is having high level of responsiveness. For example the Planning Manager of tea for Gulf mentioned that being agile and responsive is one core aim for her company as she mentioned that “...we have some really, really.. Targets as being agile in our mark;, to react to market changes as fast as we can”.

The findings analysis shows also that information sharing between the company and its supply chain members through the use of high level of technological means important element that enable the company to achieve agility within its supply chains. This has been suggested by the Planning manager for personal care for Kuwait and Qatar where she mentioned “Of course, yes ...The less of the manual working the better, so if I'm able to use systems to transfer information at the right time the supplier is able to use that information to produce the right thing... It will increase agility, reduce time, lead times, so works better”.

5- Discussion

In a type of industry like FMCGs, the business environment can be considered as dynamic and complex one. This has enforced the companies working within this type of business to search for adapting agility within their supply chains. In order to be able to achieve their goals, to respond and to deal with such high level of uncertainty, agility is considered as the successful way to stay inside their market place. A study by Agarwal et al. (2006) where they aim to explore the relationship between the competitive dimensions: quality; cost; lead time; and service level for leanness and agility within a FMCG case supply chain, they suggest that the case supply chain has to implement leagility approach. This study can support our research results because this can show the great need for high agility level for supply chains working within FMCGs industry. This is because our research outcomes do not exclude the suggestion that the company is not implementing leanness as supported previously in the literature that agility approach should include leanness approach. This has been suggested also by Van Hoek et al.(2001), where they argue that lean thinking is one ,if not the most important element for achieving agility.

the supply chain attributes that have been derived as important characteristics for achieving supply chain agility within FMCG business industry are including responsiveness; Customer service; flexibility; innovation; speed; quality; efficiency; and responsible people thinking. Some of these attributes have been suggested previously by researchers as important agility characteristics such as a definition by Yusuf et al.(1999) for agility includes speed; flexibility; quality; and innovation as important characteristics . Emphasising on the importance of the people and their impact has also been suggested by Goldman et al.,(1995; cited in Jackson and Johansson 2003).

The emphasis on the importance of information sharing and technological tools has been also supported in a conceptual framework showing the important characteristics for agile supply chain suggested by Harrison et al. (1999). They emphasis on the important role played by information sharing and information technology for achieving agility.

The research provides a proposed conceptual framework showing the importance of developing and maintaining supply chain agility within FMCGs industry. The research has conducted its empirical

study within a multinational company working in the Middle East where there is little literature on this context. The research also helps in building on the existing knowledge on supply chain agility attributes as well as on the impact on information sharing and information technology on achieving agility within FMCGs supply chain.

As this research has its own contributions, also it has some limitations such as the fact that the conceptual framework is generated from one case study working within FMCGs industry and therefore the research results can't be generalised in other types of industries. Therefore future research is needed to explore other supply chain agility attributes in other types of business, industries as well as service sector.

Conclusion

Nowadays businesses have to possess means to meet rapid market changes in an effective manner to satisfy its customers. Agility has been introduced to be applied to the supply chain context to enable the business entity to face the business environmental changes and to deal with them. Agility can enable the business entity to be differentiated from other competitors as competition has been very high and especially after globalization. From this point, this paper contributes to the existing literature by emphasising on the importance of implementing high level of agility within FMCGs business as well as its required attributes for the applying of agility within the supply chain of such type of industry.

The research has managerial implications as it provides guidance for the manufacturing companies and especially those working within FMCGs industry to the importance of supply chain agility. The attributes derived from this research can be considered as a checklist for companies to determine the required attributes necessary for achieving agility within their supply chain.

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