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Research Article

Is Organizational Ambidexterity a Good Booster to Supply Chain Flexibility in the Textile and Apparel Industry?

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ABSTRACT

The manner by which a firm's supply chain adapts to environment dynamics demands greater attention because the frequency and speed of change vary from industry-to-industry, business-to-business. Building on the relationship between manufacturing strategy and the environment, the purpose of this paper is to analyze the direct impact of environmental dynamism on supply chain flexibility, and the indirect impact of achieving supply chain flexibility the environment requires through organizational ambidexterity in the Sri Lankan textile and apparel industry, an industry under increased pressure to be more flexible and the highest export revenue contributor to the economy.

A positivism paradigm provided the foundation for this explanatory research. A cross-sectional survey method was used to collect data from operations or supply chain managers across firms in the Sri Lankan textile and apparel industry. Eighty-seven responses were received and analyzed using the SmartPLS software. As a preliminary result, this study finds that there is a significant positive impact of environmental dynamism on supply chain flexibility and this relationship is partially mediated by organizational ambidexterity. Moreover, the results reveal a significant positive impact among the variables; environmental dynamism, organizational ambidexterity, and supply chain flexibility.

In the practical context, managers need to be aware of environmental changes to identify areas that require investment in flexibility as it incurs both costs and risks for a firm. Practicing organizational ambidexterity helps managers to refine existing processes to maintain competitive advantage, and achieve the optimal degree of flexibility required by the firm and its environment.

Keywords: *Environmental dynamism, Organizational ambidexterity, Supply chain flexibility*

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Background

Flexibility is becoming ever more important to withstand vigorous progresses cropping up in the environment. Most studies on flexibility, have its beginnings associated to its internal manufacturing flexibility and later build up on recognizing that suppliers and customers are also responsible for flexibility and not only manufacturing capabilities (Rojo et al., 2016). As supply chain management concepts emerged, more and more researchers started linking flexibility to these supply chain concepts (Angkiriwang et al., 2014) because businesses realized that a company being competitive on its own was not sufficient but needed to consider the entire supply chain (Pujawan, 2004) which extends to more than the company's internal operations (Lummus et al., 2003).

With flexibility being defined as "the ability to change" (Slack, 1987), quickly adapting to environmental dynamics require flexibility. Most organizations that previously relied on order winning through low-cost production or improved efficiency, have understood the need of being flexible to compete and deal with dynamic demand (Angkiriwang et al., 2014; Stevenson & Spring, 2007). Given the dynamic nature of the environment, in order to compete sustainably, organizational ambidexterity which addresses the balance of exploitation vs. exploration is being demanded attesting that any organization cannot avoid addressing the need for ambidexterity (Wijeratne, 2019 from http://www.ft.lk/management/Ambidexterity--The-holy-grail-of-company-strategy/53-673136). Ambidextrous organizations "separate their new, exploratory units from their traditional, exploitative ones, allowing them to have different processes, structures, and cultures; at the same time" (O'Reilly & Tushman, 2004).

As it is now time to push forward crucial reforms to look attractive to industries looking to redraw their supply chains (Wijesinha, 2019), an industry that is becoming increasingly important is the textile and apparel industry because the textile and apparel sector around the world has grown as a product-concentrated sector in a dynamic and competitive environment (Sivalogathasan & Wu, 2015). Also, textile-clothing supply chains are pressurized to be flexible, and respond to frequently changing styles and consumer demands (Ciarniene & Vienazindiene, 2014). Along with these factors, the industry of concern in this study is the Sri Lankan textile and apparel industry as it is ranked as one of the best clothing export destinations in the Asia Pacific region for its reliability, quality and lead time, and is the largest export revenue contributor to the economy (https://www.bizvibe.com/blog/apparel-industry-in-sri-lanka/).

Many researchers (Pujawan, 2004; Lummus et al., 2003) show that Supply Chain Flexibility (SCF) has been an area of growing interest for research and there exists a need for research in this relatively new area. Thereby, it is necessary to identify how supply chain flexibility can be achieved in a rapidly changing, dynamic environment. In light of this situation, this study centres around finding solutions to two research questions through a survey of eighty-seven firms in the textile and apparel industry of Sri Lanka. 1) Do environmental dynamism and organizational ambidexterity have an impact on supply chain flexibility in the textile and apparel industry in Sri Lanka? 2) Does organizational ambidexterity mediate the relationship between environmental dynamism to supply chain flexibility in the textile and apparel Industry in Sri Lanka?

Objectives of the study

1) To measure the strength of the relationships among environmental dynamism, organizational ambidexterity, and supply chain flexibility.
2) To test the impacts of environmental dynamism and organizational ambidexterity on supply chain flexibility.
3) To test the impact of organizational ambidexterity, as a mediator variable, on the relationship between environmental dynamism and supply chain flexibility.

Literature Review

The research gap to align different environmental settings and SCF strategies (Rojo et al., 2018) is the foreground for this study because there is an inevitable trade-off and interaction between successfully achieving flexibility in the

supply chain alongside the uncertainties (Stevenson & Spring, 2007). Research in the area of SCF is aroused because supply chain and operations managers suggest flexibility as the means of making customers satisfied in dynamic markets (Kim et al., 2013). However, the best supply chain is not the most flexible one, but the one that offers the degree of flexibility the environment requires (Rojo et al., 2016). Therefore, organizations practicing ambidexterity will be able to strategically manage supply chains in coping with operational difficulties while successfully fulfilling customer expectations (Gligor, 2014).

Environmental Dynamism

The vigorous progresses in the environment are an area of critical concern for businesses today because for organizations to sustain in business it is necessary that they adapt to environmental changes (Duncan, 1972; Cetingoz & Akdogan, 2013). In a rapidly changing environment, the success of businesses depends on fulfilling the changing needs of stakeholders (Pun, 2006) thus, making it important for organizations to understand the way they interpret the environment (Rojo et al., 2018). The environment can be identified in two-dimensions; the simple-complex dimension and the static-dynamic dimension, which is the number of factors considered in making decisions and the degree to which environmental factors changes or remains stable over time respectively (Duncan, 1972). With environmental dynamism being defined as "the rate by which customer preferences, competition, and technology change within an industry" (Wilhem et al., 2015), a changing environment is where dynamism is associated with the simple environment, while a turbulent environment is where dynamism is associated with the complex environment. Regardless of whether the environment is simple or complex, organizations in dynamic environments face more uncertainty than those in static environments (Rojo et al., 2016).

Environmental dynamism can also be conveyed as the product of several simultaneously operating forces such as the number and size of organizations, and the rate of technological change and diffusion throughout the industry (Simerly & Li, 2000). Hence, it is inevitable that varying degrees of environmental dynamism have different impacts across industries because of varying adaptive capabilities (Wilhem et al., 2015; Simerly & Li, 2000). Accordingly, researchers use different dimensions to measure the rate of environmental dynamism. Success in companies operating in highly dynamic environments can be achieved when internal market, and product research and development capabilities conjointly focus on changes in customer markets, competitor conduct and updates in technology (Wilhem et al., 2015; Garg et al., 2003). The three factors highlighted by these researchers can be elucidated using the facts put forth by them by scanning dynamic environments. Market turbulence reflects the changes in the composition of customers and their preferences enabling products to be modified to satisfy changing preferences. Competitive intensity allows competitor actions to be tracked and identify how they react to anticipated changes. Technological turbulence helps organizations working with new technologies and developing new solutions to obtain competitive advantages through technological innovation.

Supply Chain Flexibility

Flexibility refers to "the ability of a system to adapt in dynamic environments" (Ivanov et al., 2018) rather than being forced into committed adaptation to a given environment (Rojo et al., 2016). For manufacturing managers, flexibility is a supporter for productivity increases, for managers on the demand side, flexibility enhances the availability of supply (Slack, 1987. Flexibility in the supply chain denotes flexibility within and between all parties in the chain, encompassing departments of an organization, and external partners (Lummus et al., 2003; Kr Singh et al., 2017), and although may be viewed as a different concept from SCF, it contributes to the achievement of overall SCF (Mandes et al., 2017). Severe supply chain disruptions during the recent years have created a new appreciation for SCF (Mandes et al., 2017; Gosain et al., 2004). In response, more recently literature on SCF has emerged. However, it is limited and still in its infancy stage (Pujawan, 2004; Stevenson & Spring, 2007; Mandes et al.., 2017;

Stevenson & Spring, 2009). Thereby, along with the fact that SCF is a multi-dimensional concept, it has not hitherto been universally demarcated (Rojo et al., 2016; Pujawan, 2004; Lummus et al., 2003; Stevenson & Spring, 2007; Swafford et al., 2006).

Based on previous operations literature, the components of SCF include product, volume, new product, distribution, postponement, and responsiveness flexibility (Vickery et al., 1999). Different studies have used different names for the same dimensions, and some have invented new labels to cover several dimensions (Mandes et al., 2017) due to which many dimensions of SCF exist. Contemplatively, SCF could be pursued by using dimensions relating to supply chain activities (Pujawan, 2004). The Supply Chain Council developed the Supply Chain Operations Reference model (SCOR), a tool to address, improve, and communicate supply chain management decisions by considering the key supply chain activities. This model has been the cornerstone for identifying dimensions of SCF in research conducted by Swafford et al. (Swafford et al., 2006). using the activities of source, make and deliver. Another activity which is product development has been introduced to the above according to research conducted by Pujawan (Pujawan, 2004), bringing the number of dimensions impacting SCF to four. These four dimensions can be linked to the integrated supply chain structure consisting of plan, source, make and deliver which was introduced by Stewart (Stewart, 1995).

Supply flexibility associated to the dimension of source, is the ability for suppliers to provide raw materials at different speeds, include a mix of items in a delivery load and make extra supply capacity available to face unexpected increases in demand (Pujawan, 2004). Product development flexibility associated with the plan dimension, is the ability of the company to introduce new products and designs in a cost-effective and timely manner, while flexibly deploying resources across the supply chain (Pujawan, 2004). This also involves interchange of employees between departments and companies to support new product designs, cost reductions and quality improvements (Sanchez & MP, Perez, 2005). Manufacturing flexibility associated to the make dimension, is the ability to produce different types and volumes of products at an acceptable cost and speed (Pujawan, 2004). Delivery flexibility is the ability of the company to schedule the delivery routes, obtain vehicles from different sources, include product varieties in to a truckload, and use many transportation modes in delivering a large volume of products to customers (Pujawan, 2004).

Organizational Ambidexterity

Organizational ambidexterity is the ability to continuously and simultaneously maintain a balance between exploitation of current opportunities and the exploration of new ones (O'Reilly & Tushman, 2008; O'Reilly & Tushman, 2013; Tarody, 2016). Ambidexterity is one way in which managers encourage variation in an efficient manner (O'Reilly & Tushman, 2008). According to the traditional bi-polar view although exploration and exploitation are different logics, ambidexterity highlights the need to manage the trade-off between them to reap the possible synergistic effects (He & Wong, 2014). Challenging the widely held trade-off assumption of efficiency and innovation (O'Reilly & Tushman, 2008), it is commonly accepted in literature that ambidextrous firms are capable of exploiting existing competencies and exploring new opportunities, both at the same time (Cao et al., 2009). Exploration includes opportunity recognition, uncertainty and ambiguity management, optimization of organizational processes, evaluation of risk, acquisition of resources and development of new products. In contrast, exploitation includes low risk and short-term processes which uses existing capacities and initiates only minor improvements to existing products (Jurksiene & Pundziene, 2016; Lee et al., 2016) Organizational ambidexterity's exploratory process engages in a search for new knowledge and competencies, search for new markets, and creation of new products while exploitative process uses existing recourses, knowledge and competencies (Jurksiene & Pundziene, 2016).

The under or overuse of ambidexterity comes at a cost, therefore should be well man-

aged. Firms that pursue exploration may enhance the firm's ability for knowledge renewal and change, but be trapped for digging too deep which may be unrewarding because of the difficulty in estimating returns without a priori knowledge (Raish & Birkinshaw, 2008; Wang & Li, 2008) Firms pursuing exploitation associate their activities to existing or similar solutions may enhance the current viability and short-term performance, but hinder the emergence of radical, breakthrough innovations (38,40)((Raish & Birkinshaw, 2008; Wang & Rafiq, 2014) . A one-sided focus on exploitation brings in certain and immediate returns however, the future prosperity cannot be ensured without appropriate investment on exploration because the unpredicted circumstances decide if present benefits are to be sacrificed for future success (Tarody, 2016).

Environmental Dynamism and Supply Chain Flexibility

SCF is being linked to the environment with SCF defined as "the ability of the supply chain to react to and compensate for changes in the environment" (Angkiriwang et al., 2014; Blome et al., 2013). SCF is capable of providing the ability to move ahead against uncertainties (Tiwari et al., 2015). Supply characteristics such as the nature of raw materials and availability of alternative sources, directly affect supply flexibility, while production and delivery characteristics indirectly affect it (Pujawan, 2004). This highlights the value of having flexibility spanning across the supply chain. Uncertainty can be classified as upstream uncertainty, internal process uncertainty, and downstream uncertainty in a supply chain (Angkiriwang et al., 2014) suggesting that flexibility in terms of lead time, volume and variety by all suppliers, manufacturers, distributors and retailers, is a requisite to meet dynamic market requirements (Singh et al., 2017).

With the increase in market turbulence and competition, the role of flexibility in improving supply chain responsiveness is intensified (Kim et al., 2013). Increased flexibility in manufacturing operations conveys an increased ability to counter customer needs and come closer to the market (Slack, 1987), attesting that flexibility is required to adapt to the environment (Rojo et al., 2016). Therefore, as environmental diversity and uncertainty increases, organizations respond by adding flexibility as an operational strategy (Sanchez & Perez, 2005). As flexibility enables a manufacturer to respond quickly to dynamic market changes, higher levels of environmental uncertainty arouse the need for one or more supply chain flexibilities (Vickery et al., 1999). This necessitates re-configuring and re-inventing supply chains to provide dynamic and evolutionary means of being flexible (Kr Singh et al., 2017; Gosain et al., 2004; Blome et al., 2013).

An organization's concern to face the dynamic environment can be affirmed to be linked to the four supply chain activities. It is stated that purchasing links to implementation of e-procurement systems, product development to development stages, production to implement new technologies, and distribution to use different sales channels to adjust its operating routines to dynamic environments (Wilhem et al., 2015). Thereby, it is necessary that the system continually learn to readapt to new situations with many possible outcomes (Rojo et al., 2018; Duncan, 1972). This brings forward, the first hypothesis;

H1: Higher the environmental dynamism, supply chain flexibility will be higher

Environmental Dynamism and Organizational Ambidexterity

With the increase in environmental dynamism, it becomes difficult to assess the present and future state of the environment accurately (Simerly & Li, 2000; Jiao et al., 2011) which is the expectation of organizational ambidexterity. Aligning an organization's two contradictory forces of being both; exploitative and explorative simultaneously (Jurksiene & Pundziene, 2016; Smith & Tushman, 2005) is a task of dynamic alignment rather than static alignment (Raish & Birkinshaw, 2008). According to research on strategy, firms facing dynamic environments (Garg et al., 2003). Also, exploration in terms of searching and flexibility, along with exploitation in terms of process efficiency is important when environmental dynamism is high (Frank et al., 2017). Hence, firms operating in highly competitive and dynamic environments are more likely required to become

ambidextrous (Rojo et al., 2016; O'Reilly & Tushman, 2013; Tarody, 2016; Raisch & Birkinshaw, 2008; March, 1991) to continuously reconfigure activities in meeting changing demands (Tarody, 2016; Tushman & Anderson, 1986).

Most empirical studies assess organizational ambidexterity in relation to firm's performance (Rojo et al., 2016; Jurksiene & Pundziene, 2016; Raisch & Birkinshaw, 2008) and concludes that highly ambidextrous organizations are likely to perform better (O'Reilly & ML, Tushman, 2013; Tarody, 2016; Tamayo-Torres et al., 2017) because engaging in exploration and exploitation activities simultaneously, support rapid environmental changes to be managed (O'Reilly & Tushman, 2008). In reconfirming the findings of Pertusa-Ortega and Molina-Azorín (Pertusa-Ortega & Molina-Azorin, 2018) which states that firms in dynamic environments develop ambidextrous behaviour, the second hypothesis for this study is introduced;

H2: Higher the environmental dynamism, organizational ambidexterity will be higher.

Organizational Ambidexterity and Supply Chain Flexibility

Strategies to increase flexibility should be in accordance with the categorization of uncertainty (Angkiriwang et al., 2014) because the different elements of uncertainty affect different types of flexibility differently (Tiwari et al., 2015). As ambidexterity fosters flexibility, it allows the implementation of operations based on exploitation and exploration (Rojo et al., 2016), where exploitation builds on an organization's past, and exploration creates a future that is different to that of the past (Smith & Tushman, 2005) . Moreover, the type of flexibility required in some environments are more important than those in others (Slack, 1987; Mandes et al., 2017) because of the variations in frequency and speed of change from industry-to-industry and business-to-business. Thereby, having high levels of exploration coupled with high levels of exploitation brings a positive effect to supply chains and facilitate achieving the level of SCF required by the environment (Rojo et al., 2016). O'Reilly & Tushman (O'Reilly & Tushman, 2013) (says in order to compete in markets with mature technology where efficiency, control, and incremental improvement are valued, and in markets with new technology where flexibility, autonomy, and experimentation are prized, it is necessary to view these markets through the appropriate lens of ambidexterity, leading to the third hypothesis;

H3: Higher the organizational ambidexterity, supply chain flexibility will be higher

Subsequent to finding the relationship between the variables as discussed above through existing literature, this study also tests the impact of these variables through three hypotheses;

H4: Environmental dynamism will have an impact on supply chain flexibility

H5: Environmental dynamism will have an impact on organizational ambidexterity

H6: Organizational ambidexterity will have an impact on supply chain flexibility

The mediating effect of organizational ambidexterity to the two main variables tested in the study, leads to the final hypothesis;

H7: Organizational ambidexterity mediates the relationship between environmental dynamism and supply chain flexibility.

Methods

Survey design and sample

Data for this explanatory study was gathered using the survey methodology. The indicators tested through the survey are shown in Appendix I. The positivism paradigm followed, minimized the interference of the researcher while allowing the research to be conducted in a non-controlled and normal environment. The object of study were Sri Lankan textile and apparel companies. The population comprised of 274 companies in the textile and apparel industry in Sri Lanka and the sampling frame, the accessible section of the target population, was identified from the Sri Lanka Export Development Board (https://www.srilanka-business.com/apparel/), Sri Lanka Apparel Exporters Association (https://www.srilanka-apparel.com/current-membership/members), and International Bureau of Business and People Development (https://www.ibpd-bureau.com/) websites. Simple random

sampling technique was used to give each company an equal chance of being included.

The survey was addressed to managers responsible for operations or supply chain of organizations in the industry as they are the ones more familiar with and responsible for making decisions related to supply chain activities than those of other functional areas, thus being able to provide more credible information. Initially, the reasoning out of the purpose of the study and getting the consent to participate, was communicated to the managers through telephone to avoid ambiguity. Only managers who gave their consent were provided with the questionnaire via e-mail. The protection of respondents' anonymity was assured via both methods. A total of eighty-seven responses were received and used for the purpose of analysis.

Measurement

PLS-SEM was used in this study as it enables researchers to estimate models with many constructs, indicator variables, and structural paths without imposing distributional assumptions on the data (Hair et al., 2018). The limited sample size upheld that PLS-SEM was preferable to be used (Hair et al., 2016). The two-step approach using SmartPLS was followed for the systematic application of the structural and measurement models (Hair et al., 2016) in analyzing the data.

Measurement Model

Initially, the measurement model, as shown in figure 1, assessed internal consistency reliability, indicator reliability, convergent validity, and discriminant validity of construct measures, given that the measurement model of the current study is of reflective nature.

All three variables tested in this study are Higher Order Constructs (HOCs) which are measured at a higher level of abstraction and simultaneously includes several subcomponents. Therefore, the generally applied method for assessing HOCs, the repeated indicator approach (Hair et al., 2018) was used. Initially assessed is the measurement model of the Lower Order Constructs (LOCs), followed by the measurement model of the HOC as a whole (Sarstedt et al., 2019).

The LOCs were assessed as per the reliability and validity criteria, and a summary of the results after the refinement of the LOCs of each construct is shown in Table 1, while the results of the Fornell and Larker criterion, and the heterotrait-monotrait ratio (HTMT) used to assess discriminant validity of the LOCs are shown in Appendix II.

Internal consistency reliability was measured using composite reliability. Only the variables within the satisfactory range of 0.70 to 0.90 were retained, although values between 0.60 and 0.70 are considered acceptable (Hair et al., 2018). High loadings on a construct indicate that indicators capture most of what is relevant to the construct. Indicator reliability was measured by eliminating indicators with loadings below 0.40 and retaining those above 0.70, while indicators with loadings between 0.40 and 0. 70 were removed only if the deletion lead to an increase in the composite reliability or content validity (Hair et al., 2018). A construct's convergent validity was assessed through average variance extracted (AVE) for all items on each construct. As per the generally acceptable criterion (Hair et al., 2016), items with a value above 0.50 were retained. Even though AVE was below the accepted threshold of 0.50, items whose composite reliability was above 0.60, were retained considering it to be valid. The cross loadings of indicators, the Fornell and Larcker criterion, and the HTMT were used for the assessment of discriminant validity. In assessing the cross loadings, the indicator's outer loading on the associated construct had to be greater than all of its loadings on other constructs (Hair et al., 2016) and this was satisfied for each construct. According to the Fornell-Larcker criterion the square root of each construct's AVE should be greater than its highest correlation with any other construct (Hair et al., 2018) and was proven with the results obtained. In measuring the HTMT ratio of the correlations proposed by Henseler et al.. (Henseler et al., 2015) a threshold of 0.90 was used for this study, although it was debatable where some authors suggest 0.85 or 0.90 (Henseler et al., 2015). The threshold value of the constructs with each of the indicators were below 0.90, indicating that discriminant validity was established.

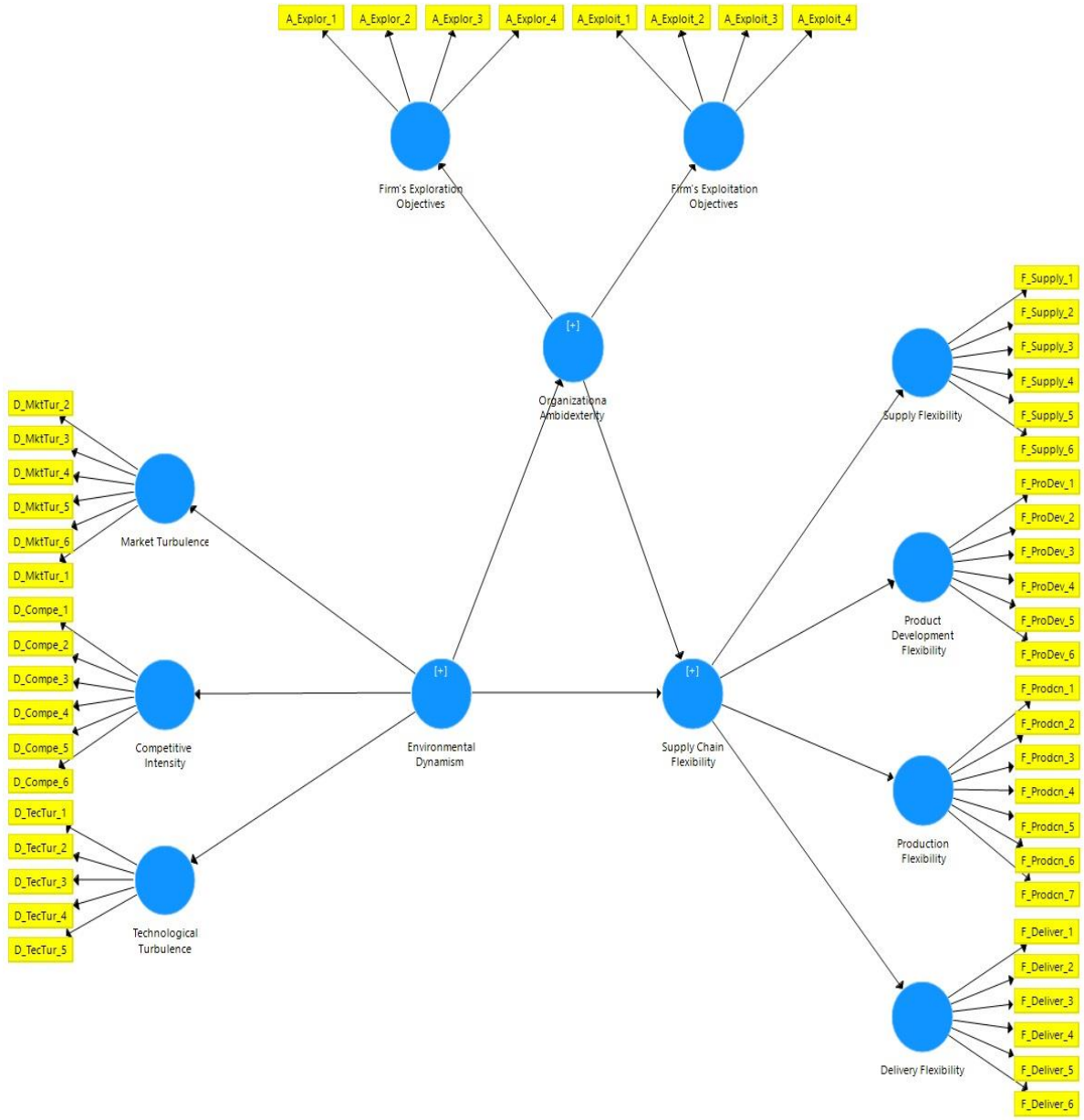

Figure 1. Measurement Model

Table 1. Reliability and Validity of LOCs

HOC	LOC	Code	Outer Loadings	Cronbach's Alpha	Composite Reliability	AVE
Environmental Dynamism	Market Turbulence	D_MktTur_2	0.541	0.687	0.827	0.616
		D_MktTur_4	0.846			
		D_MktTur_5	0.686			
	Competitive Intensity	D_Compe_1	0.791	0.457	0.738	0.493
		D_Compe_2	0.837			
		D_Compe_3	0.722			
	Technological Turbulence	D_TecTur_1	0.741	0.662	0.816	0.598
		D_TecTur_2	0.848			
		D_TecTur_4	0.726			

HOC	LOC	Code	Outer Loadings	Cronbach's Alpha	Composite Reliability	AVE
Organizational Ambidexterity	Firm's Exploration Objectives	A_Explor_1	0.744	0.677	0.800	0.503
		A_Explor_2	0.796			
		A_Explor_3	0.846			
		A_Explor_4	0.676			
	Firm's Exploitation Objectives	A_Exploit_1	0.729	0.765	0.839	0.400
		A_Exploit_2	0.809			
		A_Exploit_3	0.636			
		A_Exploit_4	0.647			
Supply Chain Flexibility	Supply Flexibility	F_Supply_4	0.847	0.777	0.857	0.600
		F_Supply_5	0.706			
		F_Supply_6	0.718			
	Product Development Flexibility	F_ProDev_3	0.769	0.821	0.881	0.651
		F_ProDev_4	0.868			
		F_ProDev_5	0.796			
		F_ProDev_6	0.790			
	Production Flexibility	F_Prodcn_2	0.713	0.810	0.868	0569
		F_Prodcn_3	0.745			
		F_Prodcn_5	0.817			
		F_Prodcn_6	0.727			
		F_Prodcn_7	0.764			
	Delivery Flexibility	F_Deliver_1	0.817	0.649	0.802	0.577
		F_Deliver_2	0.762			
		F_Deliver_4	0.735			
		F_Deliver_5	0.782			

Source: Survey data, Sample size=87

The statistics for assessing the HOC's reliability and validity (Sarstedt et al., 2019) were calculated manually by using the indicator loadings and the correlation between constructs as the input. The results of the manual calculations are shown in Appendix III and a summary of the results are presented in Table 2. As each element had a loading above 0.5, indicator reliability for each HOC was established. The internal consistency reliability was also ensured in all three HOCs with composite reliability values being more than 0.70. The presence of convergent validity is clear as the AVE for each HOC was above the 0.5 threshold. The HTMT values of environmental dynamism indicate discriminant validity was established with both organizational ambidexterity and SCF because the results are below the 0.90 threshold value, while the HTMT value between SCF and organizational ambidexterity, indicated an issue with discriminant validity. However, HTMT inference explains "even if two constructs are highly, but not perfectly, correlated with values close to 1.0, the criterion is unlikely to indicate a lack of discriminant validity, particularly when the loadings are homogeneous" (Henseler et al., 2015), there upon discriminant validity was established even with the HTMT value of 0.913.

The variance inflation factor (VIF) was calculated to measure collinearity (Sarstedt et al., 2019) because path coefficients might be biased if estimation involves significant levels of collinearity among the predictor constructs (Hair et al., 2016) and the results are shown in Table 3. As the VIF values in this study were between one and three, there were no correlation issues to be addressed.

Table 2. Summarized Results of Reliability and Validity of HOC

LOCs	Loadings	Composite Reliability	AVE	HTMT		
				Environmental Dynamism	Organizational Ambidexterity	Supply Chain Flexibility
Market Turbulence	0.776	0.805	0.583			
Competitive Intensity	0.628					
Technological Turbulence	0.867					
Firm's Exploration Objectives	0.884	0.848	0.737	0.664		
Firm's Exploitation Objectives	0.832					
Supply Flexibility	0.574	0.856	0.603	0.703	0.913	
Product Development Flexibility	0.827					
Production Flexibility	0.851					
Delivery Flexibility	0.822					

Source: Survey data, Sample size=87

Table 3. VIF

Dependent Variable (DV)

Model	Collinearity Statistics	
	Tolerance	VIF
Environmental Dynamism	0.712	1.404
Organizational Ambidexterity	0.712	1.404
DV: Supply Chain Flexibility		
Environmental Dynamism	1.000	1.000
DV: Organizational Ambidexterity		

Source: Survey data, Sample size=87

Structural Model

After refinement of the measurement model, to determine how well empirical data supports theory and decide if the theory tested is empirically confirmed (Hair et al., 2016), the model's predictive capabilities and relationships between constructs were tested using the structural model. The structural model used for testing the hypotheses set to answer the research questions applicable to this study is portrayed in Figure 2.

The results of hypotheses H1 to H3, proposed to test the relationship between variables are shown in

The results of hypotheses H4 to H6, proposed to test the significance of variables in order to identify their impact are shown in Table 5.

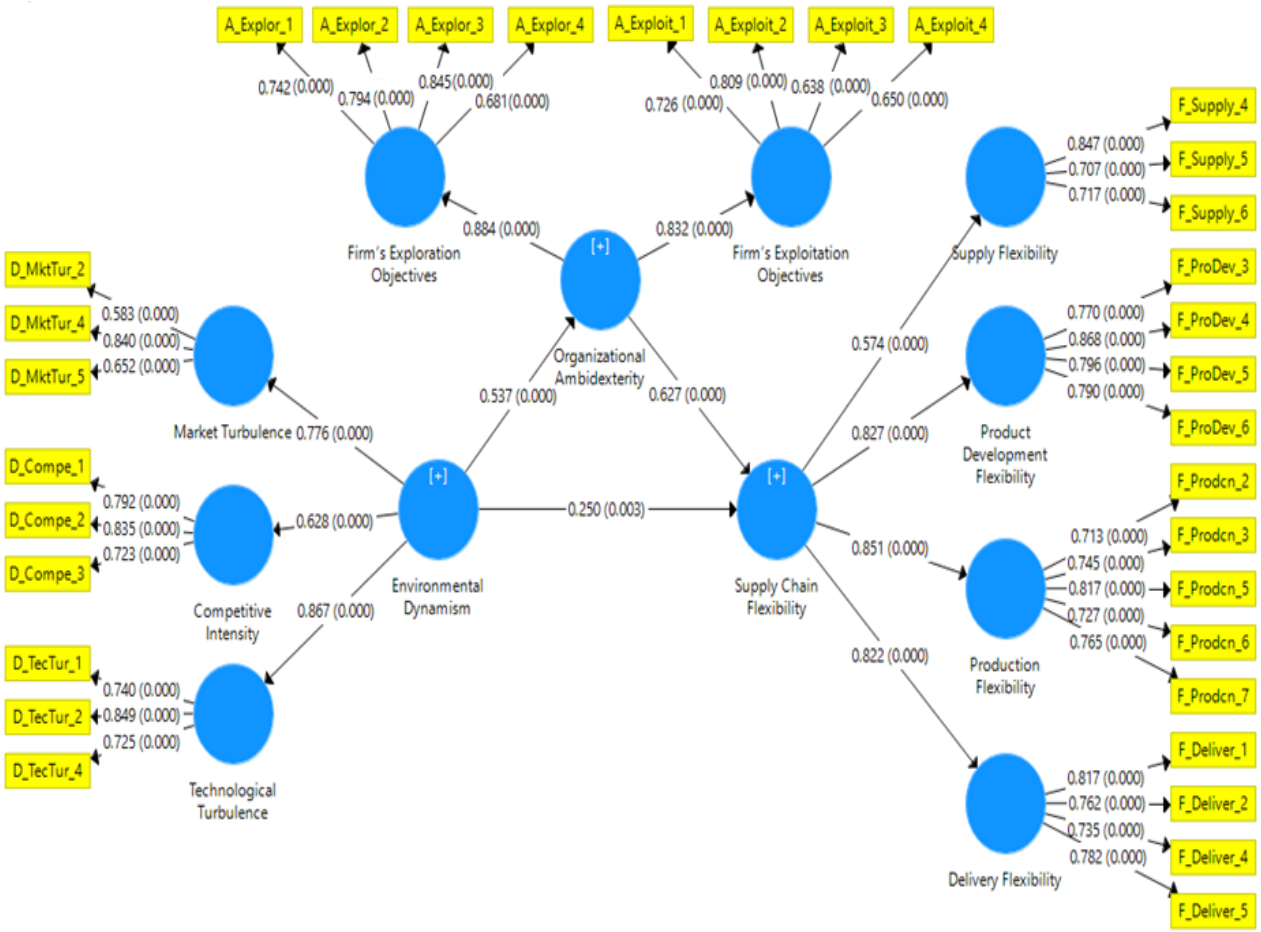

Figure 2. Structural Model with Bootstrapping Results

Table 4. Analysis of the hypotheses to test the relationship between variables

Hypotheses	Path	Path Coefficients (β)	Relationship	Decision
H1	Environmental Dynamism -> Supply Chain Flexibility	0.250	Weak positive relationship	Supported
H2	Environmental Dynamism -> Organizational Ambidexterity	0.537	Moderate positive relationship	Supported
H3	Organizational Ambidexterity -> Supply Chain Flexibility	0.627	Moderate positive relationship	Supported

Source: Survey data, Sample size=87

Table 5. Analysis of the hypotheses to test the significance of variables

Hypotheses	Path	P Value	Decision
H4	Environmental Dynamism -> Supply Chain Flexibility	0.003	Supported
H5	Environmental Dynamism -> Organizational Ambidexterity	0.000	Supported
H6	Organizational Ambidexterity -> Supply Chain Flexibility	0.000	Supported

Source: Survey data, Sample size=87

Significance level of 0.05

Table 6. Analysis of the hypothesis to test the mediating impact

Hypothesis /Effect	Path (Excluding mediator)	Path Coefficients	P Values	Decision
Direct	Environmental Dynamism -> Supply Chain Flexibility	0.578	0.000	Supported

Hypothesis/ Effect	Path (Including mediator)	Path Coefficients	P Values	Decision
Direct	Environmental Dynamism -> Supply Chain Flexibility	0.250	0.003	Supported
Direct	Environmental Dynamism -> Organizational Ambidexterity	0.537	0.000	Supported
Direct	Organizational Ambidexterity -> Supply Chain Flexibility	0.627	0.000	Supported
H7 / Indirect	Environmental Dynamism -> Organizational Ambidexterity -> Supply Chain Flexibility	0.337	0.000	Supported

Source: Survey data, Sample size=87

The proposed hypotheses H7 tests the mediating effect of organizational ambidexterity. The results are shown in Table 6.

H7: Organizational ambidexterity mediates the relationship between environmental dynamism and supply chain flexibility

By excluding the mediator variable, the direct effect between environmental dynamism and SCF was tested. A significant direct path relationship between the two variables was identified at 0.05 level of significance, making it possible to continue the mediator analysis by including the mediator construct in the PLS path model. The indirect effect was also significant at a 0.05 significance level which meant that the mediator absorbed some of the direct effect. The VAF was calculated to be 57.4% indicating organizational ambidexterity partially mediates the relationship between environmental dynamism and SCF. Although the direct effect of environmental dynamism to SCF is not very strong, the total effect is 0.587 and is quite pronounced, indicating the relevance of environmental dynamism in explaining SCF. This result suggests that the direct relationship from environmental dynamism to SCF is mediated by organizational ambidexterity. Thereby, the proposed H7 hypothesis is accepted.

The coefficient of determination (R^2) was assessed to measure the model's predictive accuracy. The R^2 value for SCF means that 62.3% of the variability of SCF is explained by environmental dynamism and organizational ambidexterity, while the R^2 value for organizational ambidexterity indicates that 28.8% of the variability of the has been accounted for. The results are shown in Table 7.

Table 7. Analysis of R^2 Values

Endogenous Variable	R^2	R^2 Adjusted
Organizational Ambidexterity	0.288	0.280
Supply Chain Flexibility	0.623	0.614

Source: Survey data, Sample size=87

The f^2 values as depicted in Table 8 shows that the effect size of environmental dynamism on SCF is small, and the effect size of organizational ambidexterity on SCF is large, according to Cohen's (1988) guidelines where, $f^2 \geq 0.02$, f^2

≥0.15, and f^2 ≥0.35 represent small, medium, and large effect sizes, respectively (Selya et al., 2012).

The Q^2 for the variables; organizational ambidexterity and SCF are 0.105 and 0.218 respectively with an omission distance of seven. As the values are larger than zero, it indicates the predictive relevance of the path model for both constructs.

The q^2 effect size which is used to compare the relative impact of predictive relevance was calculated by excluding the environmental dynamism variable and organizational ambidexterity variable, and the results are shown in Table 9. The q^2 effect size being less than 0.15 indicates that the predictive relevancy of the path model towards SCF is small (Hair et al., 2016).

Table 8. Analysis of f^2 Effect Size

	R^2 Included	R^2 Excluded	f^2 Effect Size = Change in R^2/ (1-R^2 Included)
f^2 Environmental Dynamism-> Supply Chain Flexibility	0.623	0.581	0.111
f^2 Organizational Ambidexterity-> Supply Chain Flexibility	0.623	0.334	0.767

Source: Survey data, Sample size=87

Discussion

As an investment in flexibility will be a cost and a risk for an organization (Rojo et al., 2016), the investment needs to be added at the right place (He et al., 2012). Multinational companies and the larger companies are seen to better respond to environmental changes than small and medium sized firms because of diversified organizations, wide product ranges, and vast markets (Frank et al., 2017). The level of flexibility needed by multinationals and larger firms will be different to the need by smaller firms due to differences in the environment they operate in. However, with the conceptualization of SCF always being referenced to adaptation to the environment (Rojo et al., 2016), operating in highly dynamic environments, require firms to develop SCF (Rojo et al., 2018). This suggests that when perceived environmental uncertainty is higher, it engenders a greater emphasis on SCF capabilities, and is revealed by the study of Sánchez and Pérez (Sanchez & Perez, 2005) that flexibility and environmental uncertainty are positively related (β=0.183; p <0.05). The results for hypotheses H1 and H4, empirically provides evidence that the relationship between environmental dynamism and SCF is weak yet significant (β=0.25, p=0.003). The same relationship had been tested previously through the mediator variables of operational absorptive capacity and organizational learning, and it was revealed that dynamism has a positive and direct impact on SCF (Rojo et al., 2018) although it was not a hypothesized relationship that was tested in the study.

The testing of H2 and H5 demonstrated empirically that environmental dynamism has a significant and positive impact on ambidexterity (β=0.537; p=0.000). The results of the study by Pertusa-Ortega and Molina-Azorín (Pertusa-Ortega & Molina- Azorin, 2018) has proven that environmental dynamism has a direct significant positive impact on ambidexterity (β=0.316; p<0.001). The fact that more dynamic the firm's environment, the higher the likelihood of ambidexterity is also stated in the research of O'Reilly & Tushman (O'Reilly & Tushman, 2008). Companies need to seize opportunities that are created in the environment due to high levels of dynamism by adapting their operating routines to serve shifts in customer trends and absorb new technological directions in a timely manner (Wilhem et al., 2015), and this is made easier for organizations practicing ambidexterity.

Many research has been conducted to identify the impact of ambidexterity on a firm's performance but there is less research on its implementation within the supply chain context,

and this has received little attention in literature up to date (Rojo et al., 2016). Therein, filling the identified gap, the empirical support for H3 and H6 mean firms develop SCF when organizational ambidexterity is practiced, and the impact of it is significant (β=0.627; p<0.000). A similar study conducted by Rojo et al. (Rojo et al., 2016) to test the impact of supply chain ambidexterity on SCF fit, demonstrated a significant positive impact of supply chain ambidexterity on SCF fit (β=0.500; p<0.05) because developing exploration and exploitation practices improves supply chain's efficiency in achieving the level of flexibility that is required.

A study conducted by Rojo et al. (Rojo et al., 2018) on SCF in dynamic environments showed that operational absorptive capacity and organizational learning mediated the relationship between dynamic environments and SCF, while suggesting that future research could use other variables like innovation and ambidexterity as mediators. Exploring the above research possibility and the fact that, adaptation to the environment requires flexibility, and ambidexterity strengthens flexibility with ambidexterity permitting implementation of operations based on exploitation and exploration (Rojo et al., 2016), organizational ambidexterity was tested as a mediator, and proven through H7 that the relationship between environmental dynamism and SCF is mediated by organizational ambidexterity (β=0.337; p<0.000).

Conclusion

The findings affirm that environmental dynamism calls for SCF, and when organizational ambidexterity is practiced by firms, their ability to achieve SCF required by the environment is strengthened.

Theoretical Implications

The findings of this study help academics and scholars interested in fields of strategic management and operations management to recognize how dynamic environments will impact supply chains. The fact that integrating environmental concerns with ongoing practices of a business is a starting point for valuable operations management research (Newman & Hanna, 1996) validates the importance of the study to academics of the relevant fields. Further, the study being based on an industry facing high environmental dynamism, the textile and apparel industry, sheds light to all those interested in the field.

Managerial Implications

Managers, particularly those in the textile and apparel industry, will be able to identify the impact dynamic environments have on supply chains and recognize the level of flexibility that should be allowed. The study also assists managers to understand and appreciate the importance of taking a balanced view on exploitation and exploration of opportunities because it motivates them to simultaneously develop both practices rather than having to choose one. This study also motivates and incentivizes managers to learn and to develop a culture of recognizing, evaluating, acquiring and implementing new knowledge to align the supply chain with the environment because of the significance of organizational ambidexterity on the relationship between environmental dynamism and SCF.

Limitations and Future Research

The data collection was cross-sectional thereby involving a risk of not identifying a wide variety of possible environmental changes that will affect SCF over time. This highlights the need for research on SCF based on longitudinal data when possible. Data was collected only from operations or supply chain managers, limiting the responses collected due to problems in accessing the managers. Furthermore, the responses received, especially those related to environmental dynamism, could have been biased towards the manager's perception. This study was limited to the textile and apparel industry of Sri Lanka, it is exciting to conduct similar studies in other industries and other countries to identify if results would significantly differ. It is also possible to extend this research to provide a comparison on how different industries would be affected by environmental dynamism and the varying level of SCF required by those industries. Moreover, only the impact of one mediating variable is

tested although many variables such as innovativeness and capital structure would mediate the relationship tested, suggesting further research.

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