

The Suppliers' Characteristics affecting the Supply Chain Disruption: A Case Study of RB (Reckitt Benckiser)

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Abstract

The present research project is carried out to investigate the impact of characteristics of suppliers on the supply chain disruption at RB. The relationship between characteristics of suppliers (persistence, agility, and adaptability) and cost and frequency of supply chain is explored through cross sectional research design. Researchers used pragmatic philosophy to carry out this research by using online survey questionnaire in a cross-sectional research design. The sample size for present study is 48 employees of RB selected through inferential statistic technique. In addition to that, the respondents are selected through convenience sampling technique. The findings showed that there is a strong relationship between the characteristics of suppliers and cost and frequency of supply chain process. Furthermore, the adaptability is most significant and visible characteristic of suppliers that is causing disruption, followed by agility and lastly persistence. Moreover, findings showed that flexibility is main contributing factor of agility causing discrepancies in supply chain process. The descriptive statistics, correlation and regression, and ANOVA test revealed that there is significant positive relationship between research variables. The suppliers' characteristics affect the cost and frequency of supply chain as 71% and 83% of respondents agreed to it. The ANOVA results showed 0.29 that confirms the relationship between research variables.

Keywords: Supply chain management; resilience; persistence; agility; adaptability; cost; supply chain disruption

JEL Classification: L25, L29, M11, M19

1. Introduction

Background and Context

The products and services produced for the consumers through the series of activities and procedures are part of organisations' network is generally regarded as supply chain (Christopher, 2005). The activities and processes are mainly designed in a specific manner that enhances the value of product and services. Supply chain's complexities and rapidly inclining scale has let to develop the immense challenges for firms to retain its resilience throughout the year. In addition to that, it is observed that, operational efficiency of supply chain is vulnerable in nature that enhances negative effects and unavoidable risks (Peck, 2005). There is large managerial and academic literature available that explores these different aspects of supply chain and its implications to MNCs and SMEs all across the world.

The annual survey conducted in collaboration of Zurich Insurance and Business Community Institute – BCI regarding resilience in supply chain and its tracking is more conclusive study on the aforementioned research (Alcantara, 2014). Over the period of five years, these surveys carried on by collecting data from various sectors and industries in order to investigate origins, causes, and consequences of disruption in supply chain in different parts of the world. Though information and data gathered in aforementioned survey is significant but analyses of findings through statistical literature is lacking in approach. This indicates that there is gap in previous

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empirical researches regarding statistical evaluation of resilience supply chain disruption.

No previous exploratory empirical studies have investigated the impact of suppliers for an organisation influencing the cost and frequency of supply chain disturbance through statistical analysis. Therefore, in this study researchers will be using the statistical comparison by splitting the last two years timeframe to measure the impact of frequency of suppliers on disturbance in supply chain and cost. At selected case study, through preliminary research, it is evident that the suppliers' frequency has increased in last one year therefore complexity in supply chain is being assumed to have an impact on supply chain disturbance in shape of cost and frequency. The aim of the current research study is *"to investigate the impact of suppliers' characteristics on the supply chain disruption at RB"*.

Overview of Case study – RB

Reckitt Benckiser (RB) is MNC operating in various parts of the world (RB, 2014). Supply chain process is very sophisticated for RB in Pakistan (RB, 2014). RB Pakistan is widely renowned for pharmaceutical and consumer household products that are developed through logistics and supply chain (Business Week, 2014). The vision of RB is, *"Our vision is to make communities worldwide where healthier and better lives are lived"*. The company highly depend on the suppliers for raw material it is using for finished products. The brand portfolio of RB consists of names that are renowned in its operating markets. Some of these brands include; Veet, Strepsills, Dettol, Calgon, Durex, Air Wick, and Lysol (RB, 2014). In more than 200 countries, premium brands are being sold by RB and it operates in more than 60 countries (RB, 2014). The firm has high off shoring and outsourcing strategies (RB, 2014). In addition to that, the number of suppliers has also increased over the passage of time. The entire supply chain process of firm is essential in creating and retaining strong brand presence.

Research Problem

In recent years, there has been drastic change in the number of suppliers for RB. Interestingly, the records of RB showed that these changes are not single dimensions. In other words, the drastic change is not a gradual increase or decrease, instead at certain time period (1/4th) of the year in 2013, there has been rapid increase in suppliers while in 2014, (3/4th) of the year, there was decline in the number of suppliers. Therefore, there is no evidence at present that discrepancies in number of suppliers are a reason behind disturbance in supply chain.

Significance

The outcome of present investigation will be very effective for the business professionals and researchers associated with the field of supply chain because through these findings (tested through statistical tool) will be enabling them in creating organisational policies and procedures. Furthermore, it will serve the basis for business professional to measure the disturbance in supply chain process. Moreover, the research will be helpful to future researchers as this research will be carrying the statistical validation to measure the disruption in supply chain. In addition to that, the resilience in supply chain will be explained through statistical tools which will be beneficial for the researches, MNCs, and business professional to enhance their body of knowledge regarding the topic.

2. Literature Review

Supply Chain and Disruptions

Present days' supply chains are exceptionally complex, and current lean approach have contributed to the networking establishment as additionally vulnerable (Dutta, 2011). Managers are striving to optimised supply chain through design of the inventory reduction, outsourcing company's noncore activities, limiting the suppliers and sourcing worldwide, on the basis of assumption that, the present-day world is a comparatively unwavering and predictable place

(ATKearney, 2003). However, in truth, it is otherwise. Presently Firms gradually are more dependent on the intricate network of worldwide partners and suppliers to ensure the right quantity of the product is delivered at the right location in a timely manner to inclining volatile markets in the presence of cost pressure (Dutta, 2011). The extensive complexity and the reach of present day worldwide supply chain network span, lower inventory levels and the absence of redundancies requisite to attain operational business exposure to a broad range of unexpected disruptions. The possibility of supply chain disruptions—indicates firm's inefficiency to meet the supply and demand—business is receiving inclined attention along with the academic press (Kilgore 2003; Billington et al. 2002; Radjou 2002; Fisher 1997; and Lee et al. 1997).

MIT research (2003, p30) describes the terms resilience as, *“the capability to response to unexpected disruption and reinstate standard supply network operations.”* Christopher and Peck (2004) describes the resilience of supply chain as capability of supply chain to go back to its innovative state or progress to a greater and highly advantageous state following the disruption. In current thesis, the term supply chain resilience is defined as beyond the capability to sustain control over performance variation in the presence of the disturbance nevertheless, it is a tendency of being adaptable and capability to maintain responsiveness to significant and unexpected environmental shifts in the context of uncertain demands.

The biggest challenge is to ensure adequate supply chain resilient for firm's survival in the perilous business environment, however, additionally alter resilience into a unique competitive advantage through benefits balance and risks related to various resilience for the strategies' enhancement.

Reasons for complication in Supply Chain Management

Christopher (1998, p. 19) characterize supply chain as, *“associated and interconnected network of organisations working in a mutual and co-operative manner to have control, manage it and progress the material and information flow from end users and suppliers.”* Highly authentic and realistic opinion of network of supply system attained with the conceptualisation in contrast to chain inter-organisational relationships (Pfohl and Buse, 2000). Greater volume of the value of end-product is delivered through the supplier network structure of tier along with the value network of various connections (Williams et al., 2002). As Nassimbeni (1998) persuasively proposes that, network enacts, a business steps into the complicated set of interdependencies with various other firms.

Diverse Conflicting goals

The companies do not initiate decisions in isolation any longer. Company's do impact and is affected by its network of suppliers and partners thus, a company's decision to enhance its profits may be affected by other firms resulting a sub-optimal decision worldwide, due to the conflicting objectives of the organisations (Simchi-Levi et al., 2000, p3). Conventionally functions of supply chain such as manufacturing, purchasing, marketing and distribution operate independently; the result of the conflicting objectives are waste and excessive costs of the entire business line (Villa, 2002).

Dynamism in Supply networks

Various supply chain entities operate according to distinctive group of objectives and constraints in combination of their performance dependency on others' (Swaminathan et al, 1998). The vital operational challenge experienced by firms that is presented by a supply network is govern by the supply chain's dynamical behaviour due to the member's interactions (Parunak, 1998), moreover, such interactions develop over time establishing supply networks as a vibrant system.

The shift in the market place demands, ongoing variation in the product specifications, in combination with the continuous enhancement of the organization's initiatives and industry in its broader context reflect that supply chain in reality never attained stable state (Haywood and Peck, 2004). Similarly, the structures of supply chain should not be presumed to be steady (Fine, 2000). Fine (2000) demonstrates, the cycles of supply framework among vertical/integral and modular/horizontal forms affected by the industry's pace.

Complexity in Supply networks

Contemporary supply chains are highly multifaceted due to the physical parallel and information flow-taking place in order to make sure that right products, with the right quantity and at the right time place and time are delivered within a cost-efficient manner (Chapman et al, 2002). Since, organizations have complex and long supply chain involving various partners, buyers, and suppliers therefore leads to complicated communication process (Faizan & Haque, 2015). The diversification has enhanced distinct stakeholders' expectations to respond quickly. Research by Deloitte Touche Tohmatsu (2003) refers to three crucial trends that draw a part supply chain's manufacturers management difficulty:

- The insistent pressure to repeatedly minimise the cost of the supply chain costs from product perception to the delivery.
- The recreation of the new eye-catching channels and markets.
- The product innovation's quickening pace.

Vulnerability of supply networks to disturbances

There is constant disturbance impacting the supply chains. Such disturbances are volatile events that impact's the capability of a supply chains to accomplish the set performance objectives. Various sources can contribute to the disturbances within the external or internal supply chains. Saad and Gindy (1998) characterised disturbances into two wider categories – external and internal on the basis of their sources. The internal disturbances emerge due to the processes' fault and uncertainties that exists within the supply chain of an individual company. At times the enhancement process employed for supply chain efficiency can become a source of disturbance. During the current times, strive for highly efficient supply chain, such as TQM and lean concepts, have resulted in business' desire to progress towards near zero or zero inventory system. Therefore, in system there is frequently a minimal or no inventory for buffering the supply interruptions. As an outcome of the close association amid various supply chains with in a supply network, there could be far reaching effects of such disruption (Chapman et al, 2002). As proposed by Lee (2004), cost efficiency has relevant hidden costs that can contribute to significant disruption. Such disruptions could occur despite of strong affiliation amid logistics nodes, those in practice, obvious risks of probable conflict areas, for instance, global versus local interests (Duatta, 2006) along with strong disinclination of sharing mutual information (O'Donnell et al, 2006; McCullen and Towill, 2002; and Loughman et al, 2000).

Due to the display of supply networks unpredictable behaviour, there is never an entire control over top-down planning; nevertheless, there can be collaboration (Lawrie, 2003; Radjou, 2002; and McCarthy and Tan, 2000).

Carpenter et al (2001, p766) characterised resilience's three properties a) the extent of change a system can experience (and unconditionally, consequently, the extent of extrinsic force a system can maintain) and linger within the identical domain of attraction (i.e., similar controls on function and structure); b) an extent of system's capability of self-organization and c) the

extent of a system to develop and enhance the ability to learn and adapt.' Therefore, an adaptive capacity is a component of resilience that demonstrates the system's learning behaviour in reaction to the disturbance (Gunderson, 2000). Dovers and Handmer (1992) places an emphasis on the significance of the system's adaptive ability while defining proactive resilience that recognise change's predictability and strive to develop a system that is proficient in adapting fresh and new imperatives and conditions.

Resilience in organisational science

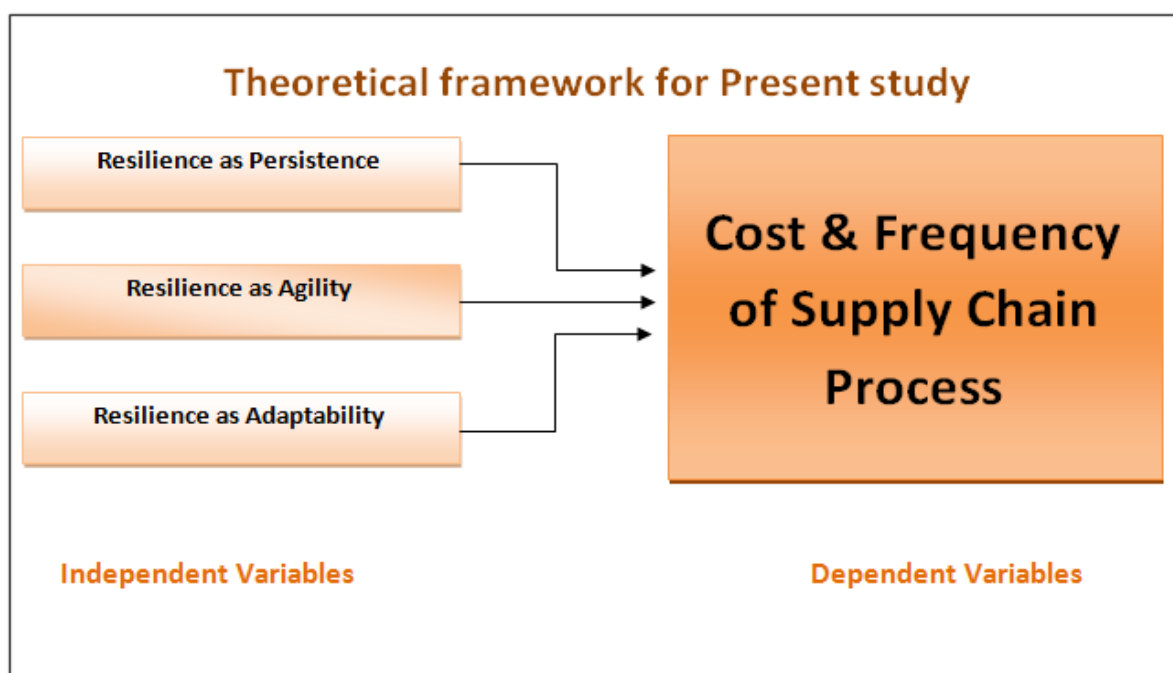
Within organisational science, the term resilience refers to (a) positive adjustment sustention under demanding conditions (Worline et al, 2004), (b) the capability to revert back from the untoward events (Sutcliffe and Vogus, 2003) and (c) the ability to uphold desirable functions and results amid the strain (Bunderson & Sutcliffe, 2002). Organization's adaptability through its dynamic capacity to expand over time is resilience (Wildavsky, 1988). Resilience is not a static characteristic that organisations may or may not acquire. In contrast, it is an outcome of the process that assist organisations to preserve resources in the form of adequately flexible, convertible, storable and malleable to prevent maladaptive inclination and cope in a positive manner with the unexpected (Worline et al, 2004; and Sutcliffe and Vogus, 2003). The organizations with resilience are prepared for crisis (or proactive)' encounter minimal debacle and improve from hardships in an efficient manner (Mitroff and Alpasan, 2003). Anderson (2003) remarks that, there is distinction between recovery and resilience, recovery suggests being adequately flexible to adapt to a positive as well as negative. *"Resilience is a reaction, an approach of facing and comprehending the world. It is a capability to bend and revert back from the hardship"* (Coutu, 2002, p 55).

Business Resilience

One of the significant roles of any organization or company is to ensure its capability of fast and efficient recovery and damage minimization of its products or business model through effective and unique strategies. This is a vital element of business "resilience". One of the fundamental questions, in term of resilience, is the business's capacity of adaption and resilience-due to the environmental stability avoidance to be taken for granted (McDonald, 2006). As the businesses are venturing into the turbulent 21st century, the best of the business industry will have to perfect their resilience process in order to progress well. The resilience's ultimate objective, as per Hamel and Valikangas (2003; P. 54), is establishing *"a firm where the change revolution takes place in a lightning-quick speed, in evolutionary steps with no appalling surprises, no colossal write-offs, no convulsive reorganisations as well as indiscrimination, across-the-board layoffs"*. They propose an argument that, resilience is lacks concern of flexibility, recovery, or crisis attentiveness, there is in-depth meaning that it *"reference is made to the continuous reconstruction ability, it necessitate innovation. A company that can comprehend its environment develop strategic alternative and conduct resource realignment in a swift manner to be able to benefit from decisive advantage. This is defined as the essence of resilience"* (Hamel et al, 2003; P.55, 63).

Dimensions of Resilience

The three distinctive dimensions of resilience in supply chain are explained below. These dimensions are evident to be linked with supply chain disruption in previous empirical researches.



Persistence

In present available managerial and academic literature, three main attributes of supply chain resilience have been identified to construct a theoretical framework. Persistence is a most commonly termed used for defining the resilience in supply chain (Alcantara, 2014). Persistence is considered as, *"in the presence of disturbance for any given product, system of production's preservation and maintenance"* (Cited from Allen et al., 2006; 298). Conventionally, this notion is linked with risk management and inherited supply chain's uncertainties (Lee, 2002; and Christopher and Lee, 2005). On the other hand, in recent literature the phenomenon is explained by Walker and Salt (2012) stating that, following a systematic parallel approach to recover from disruption while keeping in according with the complex nature of processing in supply chain at all stages. Thus, resilience in supply chain is one significant factor that is interlinked with supply chain during disruption.

Agility

Agility is the second attribute which reflects the promptness or quickness of firm through constructing a strong network that enables firm in responding in quick manner to the dynamic and consistently changing environment (Allen and Dutta, 2006). Furthermore, to determine and measure agility, velocity and visibility are two widely used techniques (CLSCM, 2003). Velocity is regarded as speed and quickness during which material flow from one department to another in supply chain process whereas visibility refers to end-to-end viewing ability of members involved in supply chain process (CLSCM, 2003). In addition to that, networks of both natures; virtual as well physical are involved in this process (Dong et al., 2009). This provide a digital platform to the management to ensure that supply chain activities are moving in swift and desire manner (Rai et al., 2006). In recent literature, flexibility, decisiveness, swiftness, alertness, and accessibility are distinctive dimension of agility that has been identified (Gilgor, et al., 2013).

Adaptability

Adaptability is the third distinctive attribute that is considered in present research investigation. According to Higgins et al., (2013), in order to meet rapidly changing environment, the firm's ability to evolve its operation as per requirement and demand of the situation is generally

showing the adaptability factor of the organisation. On the other hand, Lee (2004) strongly suggest that adaptability is not just limited to coping with environmental changes, as grasping technological (modernized) and social trends is also essential component for firm to consider while evolving its operations. However, the adaptability is not only functioning to meet environmental, social, and technological changes as it is a method used by firm to adjust its functioning in accordance with needs and demands of the customers, various stages of product life cycle, and operational drivers (Melnik et al., 2013).

In the time of crises, resilience experts firmly state that a way to prosper and survive is by having the adaptability attribute in operations (Alcantara, 2014). Considering the supply chain process, a firm's ability to be proactive by thriving and responding to various types of uncertainties through embracing required changes (cited from Alcantara, 2014). Moreover, in adaptability, the willingness of the organisation to embrace change is significant (Alcantara, 2014).

Source for Competitive Advantage

Resilience step beyond the crisis preparation, recovery or flexibility, it is a unique source of sustainable competitive edge (Hamel and Valikangas, 2003). Resilience is one of critical ability for organizational success (Coutu, 2002, p55). Emphasising on resilience as a characteristic potential, Stoltz (2004, p17) states that, *"Resilience is a sole portable and sustainable strategic arrangement. Resilient teams, individuals, and organizations constantly survive, outmanoeuvre and do better than their least resilient competitors"*. Horne (1997, p28) articulated that organizational *"resilience is the trademark of the 21st century's corporate stardom that replicate the organizations' capability to integrate information with various factors to bend, mould, redefine and adapt themselves in the face of ever shifting conditions."*

3. Research Methodology

Research philosophy serves basis for types and overall designing strategies for research investigations. Since, in this study, researchers are exploring both qualitative and quantitative dimensions related to research problem therefore pragmatism philosophy has been considered because it is appropriate to the research aim (Faizan & Haque, 2016). Here we are dealing with opinion of employees therefore this is more appropriate. The design of research facilitate researcher in selecting appropriate approach to commence research study (Haque & Aston, 2016; Haque, Aston & Kozlovski, 2016; Haque, Aston & Kozlovski, 2018). Researchers followed Urbański et al. (2019) strategy by opting for cross-sectional research design as this study is to be completed within 4 months therefore sample is only considered in one-time interval. Additionally, in this study, it has been confirmed that this investigation by nature is exploratory research as researchers investigate the relationship between research variables therefore mixed research method is undertaken. Since, researchers are exploring the relation between number of characteristics of suppliers and cost and frequency disruption in supply chain process therefore pragmatic approach is more ideal and contributing towards research aim because the relation is established through employees' perspective.

Through preliminary research, researchers have identified different partners involved in the supply chain process at RB. The respondents for present investigation are different departments involve in the supply chain process. Since these partners have a direct relation with the suppliers and their functioning is linked with supplier therefore it can be stated that the frequency of suppliers influences their functioning

capacity. Thus, respondents in present study is taken from departments of RB including; Administration, HR, Marketing, Production, Technical/Engineering, and Finance. Moreover, all three layers; top management, middle management, and lower management are considered as employees working in it are main respondents of the study. As the population for present

study are all employees working in the layers and departments therefore sample is drawn from these different departments and management layers. Researchers opted for non-probability sampling technique due to time constraint. Moreover, the convenient sampling technique is used to reach these respondents.

Convenient sampling technique is used because it is cost effective technique (Imran et al. 2018). Moreover, respondents can be approached at their ease and it enhances the generalization factor therefore it is considered by effectively using networking and connections to reach target audience (Haque et al. 2018; Faizan et al. 2019; Zehra & Faizan, 2018). Furthermore, due to shortage of time and resources, it is most suitable technique for present study. The total population of RB's selected area, that is linked with suppliers directly has been identified through preliminary research is 77 employees working in three different layers. Therefore, researchers set a criterion of targeting as many respondents as could be included in study but mainly more than 60% was decided in order to have majority. 48 is the exact sample that participated in this study. This is exactly 62.3% which reflects that majority of the population was involved in this study. In present study researchers used close-ended semi structured online survey questionnaire to investigate research problem.

Since researchers have opted for pragmatism philosophy and pragmatic research therefore, this instrument is an effective and adequate tool in investigation process as close ended survey questions can be quantified and measured through ordinal scale. Moreover, the online survey questionnaire was emailed to almost 77 respondents via GMAIL email id however only 48 respondents returned it filled. The details of email ids were taken directly from the administrative department of RB by researchers in preliminary research.

The rationale behind selection of this statistical tool is because this method brings independent results by considering a relationship between two distinctive variables in a nominal category (Brysbaert, 2011).

In addition to that, since this study explores the categorical nature of relationship therefore descriptive statistics is more suitable in present study. A question arises that researchers could have used t-test or Chi-square test but correlation and regression is preferred over these two statistical techniques is that the relationship between research variable can be explored in correct manner. On the other hand, the Chi-Square is not used because researchers have not initiated to treat the data in gender aspects as splitting dimensions in rows and columns would have not matters thus descriptive test is run to ensure the quantified relationship is established between research variables.

It is essential for researcher to ensure that all the information shared by participants involved in research must be kept confidential (Waliman, 2001). In this research, this notion is kept during the entire research process. The name and all details shared by respondents are only used for academic purpose. The ethic form was signed and all researchers involved in this research followed this policy during commencement of research investigation. All participants were assured that no piece of information or data shared will be used for any other purpose than academic purpose.

4. Data Findings and Discussions

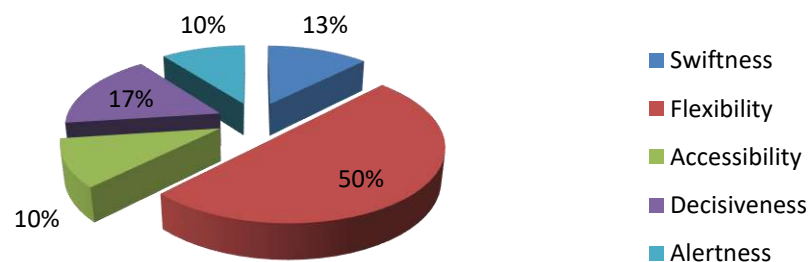
In this research, the total sample size consists of 48 employees. The sample size is selected through inferential statistic' technique. Out of these 48 employees, 69% are male while remaining 31% are female respondents. Moreover, 52% in present study lies between (29-39) age group. This reflects that majority of employees in the organisation are in the middle/mature age bracket. In addition to that, 27% employees are in the age bracket of (18-28). The majority of respondents lie in the middle management with 46%, followed by 31% lower management,

and 23% top management. In addition to that, 36% (large portion of sample size) work in technical/engineering, followed by 23% at production, 13% finance department. All other department contained less than 10% respondents.

	Yes	Somewhat	No
Disturbance in supply chain shows inefficiency of firm in meeting supply and demand in market.	63%	29%	8%
Lean approach in supply chain management has led to disturbance in operations at RB	29%	44%	27%
Cost pressure in the market has forced RB to heavily depend on complex networking in supply chain process.	52%	31%	17%
The supply chain management process is complicated because of high volume of the value of finished-product is delivered through the supplier network structure with various interlinked connections.	77%	13%	10%
The conflicting objectives between partners involved in supply chain process lead to cause disturbance.	61%	31%	8%
The dynamic environment and industry's pace affect the supply network of RB.	44%	35%	21%
Persistence with same procedures is causing supply chain disturbance at RB.	42%	44%	14%
A quickness of RB to respond according to the need of market is creating supply chain disturbance.	62%	23%	15%
Evolving operations as per the need and demand of changing environment is leading cause for supply chain disturbance at RB.	71%	17%	12%
The characteristics of suppliers influence the frequency of supply chain disruption (disturbance) at RB.	81%	6%	13%
The number of suppliers' characteristics affects the supply chain disruption's cost at RB.	79%	6%	15%

Main cause of supply network disturbance for RB	Frequency
External disturbance (Number of suppliers/ market structure/industry's pace)	79%
Internal disturbance (employee/policies/practices)	21%

The major dimension of agility causing disruption in supply chain process at RB.



Dimensions	Swiftness	Flexibility	Accessibility	Decisiveness	Alertness
Frequency	13%	50%	10%	17%	10%

According to the present sample size, 63% confirmed that inefficiency in order to meet the demand and supply in the market is due to discrepancies in supply chain. On the other hand, 15% oppose it while 6% stated that partially the discrepancies in supply chain show inability of firm in meeting demand and supply.

Furthermore, 29% considered lean approach at RB has led to operational discrepancies in supply chain management whereas to some extent lean approach is considered by 44%. Those who opposed this notion formed 27. Moreover, 52% respondents believe that heavily reliance on complex supply chain networking process is due to cost pressure in the market whereas 31% considered that fractionally the cost pressure drives firm dependence on complex supply chain while remaining 17% responded in negative.

The results showed that 77% (large portion of sample size) strongly stated that supply chain process involve interlinked various activities that is required in order to complete production process and further complicates the process itself. Only 10% responded in negative while just 13% confirmed partial relationship. Moreover, 61% positively responded that the cause of disruption is due to conflicting objectives between various partners involved in supply chain process. 31% partially agreed while only 8% disagreed to it. Furthermore, 44% of sample size agreed that rapidly changing environment of industry affect the supply chain process while 35% agreed to it only to some extent. Only 21% responded in negative. In addition to that, majority of participants that is 79% considered external disturbance over internal disturbance as main cause behind discrepancies in supply chain process.

Through this survey, we attempted to explore which dimension(s) cause supply chain disturbance and to what extent. In doing so, we found that persistence, agility, and adaptability are all three dimensions are contributing factors however, 71% considered adaptability, 62% find agility while persistence is considered by 44% as significant contributor to supply chain discrepancies. Moreover, flexibility among all dimensions of agility is most prominent as 50% stated it. Furthermore, this study found that majority 81% strongly believe that supply chain frequency disruption is due to the number of characteristics of suppliers. In addition to that, supply chain cost is affected by the frequency of suppliers' characteristics as 79% confirmed it. Therefore, analysis showed that there is a relationship between the number of suppliers and cost and frequency of supply chain process.

Statistical Data Analysis

a. Listwise deletion based on all variables in the procedure.

Correlations

		D	Adaptability	Persistence	Agility
D	Pearson Correlation	1	.303*	.164	.355*
	Sig. (2-tailed)		.036	.266	.013
	Sum of Squares and Cross-products	13.917	6.042	2.958	6.167
	Covariance	.296	.129	.063	.131
	N	48	48	48	48
Adaptability	Pearson Correlation	.303*	1	-.193	.379**
	Sig. (2-tailed)	.036		.190	.008
	Sum of Squares and Cross-products	6.042	28.479	-4.979	9.417

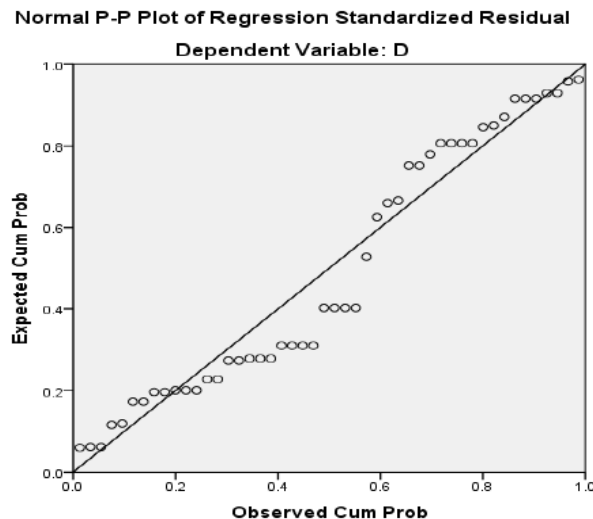
Adaptability	Covariance	.129	.606	-.106	.200
	N	48	48	48	48
	Pearson Correlation	.164	-.193	1	.203
	Sig. (2-tailed)	.266	.190		.166
Persistence	Sum of Squares and Cross-products	2.958	-4.979	23.479	4.583
	Covariance	.063	-.106	.500	.098
	N	48	48	48	48
	Pearson Correlation	.355*	.379**	.203	1
Agility	Sig. (2-tailed)	.013	.008	.166	
	Sum of Squares and Cross-products	6.167	9.417	4.583	21.667
	Covariance	.131	.200	.098	.461
	N	48	48	48	48

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

In this test there was special criterion used to ensure that no question is left unfilled therefore all 48 questionnaires has been completed. To measure the reliability of the respondents Alpha Cornbach's test was run and the 0.678 is a derived value which reflects that the respondents are reliable. Furthermore, mean for adaptability (1.77), persistence (1.73) whereas agility (1.58). Moreover, standard deviation for adaptability is (0.778), persistence (0.707), and agility (0.679). In addition to that, descriptive statistics revealed that correlations between independent variables (Adaptability, Persistence, and Agility) and dependent variables (frequency of suppliers and cost) of supply chain process are established. At one-tail test, the values include; adaptability ($0.303 > 0.005$), agility ($0.355 > 0.05$), and persistence ($0.164 > 0.005$) therefore, in relation to number of frequency of suppliers and cost of supply chain process at RB. In addition to that, the regression test showed that in ANOVA test, derived value is $0.29 > 0.05$ thus the relationship between variable is positive.

The coefficients for variables showed that Adaptability is $B=0.174 > 0.05$, Persistence $B=0.127 > 0.05$, and Agility $B=0.182 > 0.005$. Thus, indicating there is strong relationship between research variables. Adaptability effects on dependent variable (cost & frequency) by 17.4 %, persistence effects on dependent variable (cost & frequency) 12.7% & agility affects dependent variable (cost & frequency) by 18.2%. Interestingly, 42.8 % is overall strength of association between dependent & independent variable as shown in model summary R value. Adjusted R sq shows the value after the removal of errors, it tell us that how much our independent variables (resilience) are effecting or having an impact on our dependent variable (cost & frequency) which depicts an overall value of 12.8%, whereas R square is value of impact of independent variable (resilience) on independent variable (cost & frequency) with certain errors in data which is currently at 18.3% with reference to above interpretations of values we can say that overall strength of association between variables is strong as we already have considered only few factors of resilience and that is the main reason behind the drop down in the values of adjusted R square.



The findings showed that large number of participants (63%) confirmed that supply chain is a complex process which means present study is aligned with the work of Dutta (2011). Moreover, the study has similar findings with Dutta (2011) as both studies have evident that supply chain discrepancies is driven from inefficiency in meeting demand and supply in operating market. In addition to that, results showed 44% agreed to some extent that lean approach at RB is contributing factor for disturbance thus partially these findings are similar to the work of Dutta (2011) to some extent. However, the findings of Dutta (2011) is opposed by this study as results showed 52% agreed that cost pressure has urge RB to rely heavily on complex networking whereas Dutta's finding stated networks are not complex in nature that adds to cost pressure because the volatile market is main factor to develop cost pressure.

Furthermore, the work of Williams et al (2002) is supported in the light of present findings that network of suppliers is complicated and linked different stakeholders in the process as there is demand for producing huge volume of finished goods which is indicating complex supply chain management process because in our study 77% agreed to it. In addition to that, the argument of Christopher (1998) that mutual coordination in complex network is required because various activities are interlinked. Moreover, Simchi-Levi et al (2000) notion that the disturbance in supply chain process is largely credited to conflicting objects of different partners involved in supply chain process as 61% (majority) of sample size agreed to it. Moreover, Villa (2002) notion is not fully explored by present findings as there is no concrete evidence that conflicting objectives is main cause for excessive cost to business.

The notion of Saad and Gindy (1998) is explored by considering the internal and external sources for supply chain discrepancies. In this study, we found that external disturbance is 79% while only 21% stated internal disturbance. Therefore, the work of Chapman et al (2002) and Lee (2004) is partially confirmed that internal sources causes disturbance in supply chain whereas the work of O'Donnell et al (2006); Loughman et al (2000) and McCullen and Towill (2002) is supported by present study to large extent that external sources contribute towards supply chain disturbance. Moreover, this study is aligned with the work of Carpenter et al (2001) that mainly three types of resilience are linked with supply chain discrepancies. Interestingly, the finding of this study opposes the work of Dover and Harmer (1992) that resilience is only due to adaptability factor. Conversely, findings are aligned with the previous study of McDonald (2006) is confirmed that business resilience includes adaptability to certain extent.

Moreover, persistence as one of dimensions of resilience from literature was evaluated and results showed that 42% confirmed while 44% agreed to some extent that persistence is a major dimension of supply chain discrepancies. Therefore, this study confirms that persistence is

reason for disturbance in supply chain activities at RB therefore work of Lee (2002); Christopher and Lee (2005); and Allen et al (2006).

Furthermore, agility is another attribute that has been confirmed through present findings as 62% positively responded while 23% partially agreed that agility is cause for disruption in supply chain process. This means that previous empirical studies of Allen and Dutta (2006) and CLSCM (2003) are supported by present findings. However, agility is key dimension that helps business in success which is evident in present study therefore Rai et al (2006) is supported through present study. To explore the concept of Gilgor et al (2013) we considered all antecedents of agility and this study showed that agility's all dimensions are significant in supply chain disruption. In present study, 50% considered flexibility, 17% decisiveness, 13% swiftness whereas 10% each alertness and accessibility respectively which means agility's all dimensions are important. Adaptability is the third dimension of resilience that has been explored in present study. The results showed 71% of sample agreed which means that out of all dimensions of business resilience, adaptability is most significant one. Thus, Higgins et al (2013) is supported while Lee (2004) is opposed through this study. In addition to that, Alcantara (2014) is supported that adaptability is used by firm to meet the changes and situations in the dynamic environment.

The study showed that, both frequency of supply chain and cost have been affected by the number of characteristics of suppliers. The results showed that 81% agreed that number of suppliers' characteristics affect the supply chain disruption whereas 79% agreed that cost of supply chain disruption is due to change in the number of suppliers' characteristics. Therefore, this study supports the work of Alcantara (2014).

5. Conclusion and Recommendations

The characteristics of suppliers influencing frequency and cost of supply chain discrepancies at RB have been identified. The main characteristic for discrepancies in supply chain is 'resilience'. In addition to that, we found that resilience identified in available literature includes; persistence, agility, and adaptability respectively is evident at RB. Moreover, all three types of resilience are found to have an impact on the supply chain process to large extent. Each of resilience's attribute has contributed to disruption but in sequential order adaptability (71%), agility (62%), and persistence (42%) respectively therefore it is clear that adaptability is main cause for discrepancies while least is caused by persistence. Furthermore, different dimensions of agility are explored to investigate high contributing and low contributing dimension of agility. The results showed that flexibility (50%) is main cause of agility creating discrepancies in supply chain process. It is followed by decisiveness (17%) and swiftness (13%) whereas accessibility and alertness is 10% thus this showed that flexibility is one factor that produces agility leading to create disruption in supply chain process.

The relationship between suppliers' characteristics and cost and frequency of supply chain disruption is evident in present study as results showed that majority of respondents confirmed that there is a relationship between them. In addition to that, the statistical test showed that agility (1.58), persistence (1.73), and adaptability (1.77) is derived mean value with agility (0.355), persistence (0.164), and adaptability (0.303) on 95% confidence interval which means that all derived values are greater than 0.05 therefore this establishes that there is strong linkage of all these variables in creating supply chain discrepancies. In addition to that, 89% considered that characteristics of suppliers' frequency are contributing factor in creating supply chain whereas 71% agreed that cost is affected by suppliers' frequency characteristics. The ANOVA test showed that the characteristics of suppliers have 0.29 which is greater than 0.05 therefore we do not reject null hypothesis.

The recommendations are given to the management of RB that can improve working efficiency of supply chain. These recommendations are as following:

The research findings revealed that persistence is low in comparison to adaptability and agility as a characteristic of supplier affecting the supply chain disruption therefore organisation must focus on ways to overcome agility and adaptability, especially adaptability that has been major cause for disruption. In order to overcome, organisation must improve by means of developing a plan to continuously monitor the shifts in demand and supply in the market. This scanning programme will be beneficial in keeping a track of supply chain activities in order to cope up with adaptability issues. In addition to that, it will be effective in maintaining the inventory control management in correct manner. Moreover, the scanning programme will be effective in dealing with flexibility issues as evident flexibility is prime factor for disruption thus it will help firm in measuring the flex time to deal with supply chain discrepancies.

Moreover, there is need of enhancing the communication between various stakeholders because it will be effective in reducing cost and waste. The communication network should be developed through web-matrix as it will enhance the coordination and communication between departments. At same time, it will be effective in maintaining a proper check and balance to ensure no resource is over utilize or underutilize.

Research Limitations & Future Implications

There are different types of research limitations that incurred and therefore it limits the present findings only to the RB case study. One of the most visible constraints is time. Time is the key factor in the present study therefore researchers have opted for cross-sectional study design. Moreover, due to shortage of time, the sample size and research instrument (online survey questionnaire) are altered thus the research was not done in-depth. In addition to that, researcher opted for convenience sampling technique because of the time constraint. Though this sampling technique offer high generalization but credibility and validity is not very high. Another constraint linked in this research is lack of sufficient funds. The researchers are students with part time jobs or internship therefore not affective modes of data analysis tools (MINITAB 17) could not be purchased. Instead researchers used MS Office for Data interpretation. Researchers have used SPSS but only to limited extent, Graphical representation in Ms Excel is decided as the analysis is presented through percentages and SPSS are used to present numerical representations of collected responses.

The future researchers should consider longitudinal research design as it would bring more concrete results. In addition to that, researchers in future should also include interviews with the top management as it will be more effective to have management's perspective in it. Moreover, the researchers should consider comparative study by comparing the two different case studies to explore the research variables in more depth. Furthermore, researchers should also include the use of more sophisticated analysis tool to ensure there is more accurate findings and relationship is established through statistical tools.

The researchers should also focus on modifying the sampling tool and technique. For this purpose, researchers should use probability sampling as all respondents will have equal chance for selection. In addition to that, stratified sampling technique should be considered by future researchers as it will help in exploring the research variables through large spread geographic area. Different suppliers should be approached and their views and experiences should be included to have more precise findings.

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