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Building up Dynamic Capabilities for Sustainable growth under Supply Chain Disruptions

Kanupriya[1]

Abstract

The recent technological advancements, worldwide business networks, market dynamism etc. create threats for Supply chain and produce inertia to organization's survival and growth. The disruptive forces and pressure from stakeholders compel the organization to implement sustainable practices. These sustainable practices need to be oriented towards market dynamism and firms require to build up capabilities in order to sustain sustainability and produce results that are socially and ecologically sustainable. The paper first discusses the linkage between the Sustainable Supply chain practices and Dynamic Capabilities. Secondly a framework is developed for measurement of Dynamic capabilities. The paper identifies five constructs for measurement of dynamic capabilities- Knowledge absorption capacity, Innovation ability, Demand Oriented perception ability, Renovation capacity and Social Network enhancement ability. Finally the impact of Dynamic Capabilities on the performance of the firm in terms of three order sustainability i.e. monetary, ecological and social perspective is discussed. The proposed framework is analyzed through an empirical survey on automobile and automotive industries. Structural Equation Modelling is used for data analysis and interpretation. The research provides an academic framework for linkage of Dynamic capabilities with SSCMP and T- BL performance. It also helps in business practices by providing a blueprint for organizations' adaptation to dynamic conditions and sustainable performance.

Keywords: *Supply Chain Dynamic Capabilities, Sustainable supply chain management practices, Social-Performance, Environmental-Performance, Triple- Bottom Line*

Introduction

The growth of global supply chains in the past two decades have made the supply chain vulnerable to many disruptions which may not only adversely impact the material flow through the chain but the propagation of disruption in the chain could lead to disruption in manufacturing activities as well .(Zegordi& Dawarzani,2012). The disruptions in supply chain seem to have an all-encompassing impact on other inter and intra organizational functions and threaten the growth and survival of the firm. The modern day firms are forced to develop special know how to tackle and

[1] Assistant Professor, IIMT Group of Colleges, Greater Noida, **priya.1714@gmail.com**, https://orcid.org/0009-0009-3419-7036

treat these disruptions. (Revilla & Saenz, 2017). The firms have to strategically plan to have such tactical practices that lead to sustainability. Under rapidly changing business conditions such sustainable supply chain practices cannot remain static in nature. The practices need to be regularly reviewed, reconfigured and readopted to the market dynamism. Thus the firm needs to create capabilities that are dynamic enough to handle the unpredictable volatilities. It is conjoining of sustainable supply chain management practices and dynamic capabilities that firms can face, thrive and grow when challenged with unpredictable disruptions. Unlike conventional firms the present day firms are challenged to fulfill plethora of stakeholders' expectations regarding social and ecological performance along with profit maximization. Nowadays firms can gain competitive advantage only by performing superior in terms of all the three sustainable performance measures i.e. social, ecological and monetary. This paper attempts to develop and empirically validate a scale for measurement of Dynamic Capabilities. It further analyses the effect of these DC's on the company's 3 dimensional performance.

Literature Review

The literature on the subject can be traced down to development of subject of Sustainable-SCM. Sustainable-SCM is a synergetic coupling of sustainable theories and supply chain management. (Joshi et al, 2017). Sustainable – SCM can be understood as the practice of implementing supply chain management with a perspective to improve the sustainability of the firm with respect to all three performance indices like social enhancement, ecological balance and profit maximization. (Cilloet al., 2019). The literature further highlights that the development and implementation of Sustainable-SCM in an environment wrought with dynamism calls for development of higher order organizational capabilities to readjust itself to the changing conditions. Thus the literature further talks about the complexity and abstractness of the development of DC's.

Supply Chain Dynamic Capabilities

The profound impact of supply chain disruptions entail the organization's to take initiative measures to build up competencies that can integrate the resources, assets and systems and reconfigure and readopt them to the volatile market conditions. This ability of the organization to evolve with the pace of environmental changes is commonly referred to as Dynamic Capability. (Zhou and Benton, 2007; Teece, 2014). The DC's can also be defined as regular or routine organization activity to empower itself to perform well in an embracing environment with rapid changes. (Zollo and winter 2002). The literature further indicates that enhancing DC's leads to improved firm's performance. (Teece, 2014)

Research Gap

The review of literature has indicated that due to abstractness of the concept the development and validation of DC's is a less researched subject. Moreover the impact of DC's on cost performance has been extensively studied however the impact of DC's on all 3 pillars of sustainability ie ecological, social and cost performance is again less treaded path. The review also highlights that there are more conceptual papers and less papers on empirical survey. Further, the empirical

surveys are mostly confined to studies in developed economies, there is dearth of such studies conducted in India. Thus this paper tries to fill up the research gap by developing constructs for measurement of DC's, studying the effect of DC on the 3 performance parameters by conducting an empirical survey of automobile manufacturing companies in India.

Research Questions

The research tries to investigate two postulates:

1. What is the level of implementation of DC's in the Indian firms?
2. How does the engagement of firms in building DC's influence the ecological, social and environmental performance of the firms?

Theoretical development of Determinants

Supply chain (S-C) dynamic capabilities

According to Beske (2012) Supply chain is a complex system. To ensure sustainable development this complexity calls for certain level of static abilities (Zhang, Yang and Bi, 2011; Diabatet al., 2013). However, with static abilities alone one cannot possibly with stand the challenges of the ever changing environment. The rapidly changing environment, entails the need to adjust these abilities constantly. According to Gimzauskiene et al. (2015) dynamic capabilities of supply chain enable companies to adapt swiftly as well as easily to market trend making them more flexible to efficiently handle the volatility in the market which ultimately helps the firm to gain competitive advantage in the industry. The literature review reflects the growing popularity of Supply chain dynamic capability but due to its abstract nature it is not easy to comprehend (Defee and Fugate, 2010).

Compared to the conventional supply- chain management the SSCMP is relatively more exposed to volatilities and vulnerabilities. As a result, building DCs is critical in order to achieve sustainable performance across TBL. Teece, 2007 has classified DC's as the capacity to sense opportunities and threats, capacity to bag these opportunities and capacity to reconfigure the resources to achieve competiveness. Supply -chain dynamic capability is a conceptual idea comprising of many sub-capabilities. For instance, Chang (2011) classifies the DC into integration and cooperation. Beske (2012; 2014) breaks it down into development of supply chain partner inter-relationship, knowledge evaluation, supply chain reconstruction, co-evolvement, and flexible supply chain control. It is not one particular sub-capability, but rather the combination of all sub-capabilities that brings competitive advantage to the firm (Hall et al., 2012, Beske, 2014).

The major determinants of DC's selected for the purpose of this study are:

Knowledge acquisition and absorptive capacity:

Information symmetry and knowledge sharing amongst the supply chain associates is an important sustainable practice. The firm should strive to gain, gather, assimilate, store, assess and integrate information to acquire knowledge to keep them sustainable and growing in times of adversities. (Blomeet al., 2013).

Demand oriented perception capability

The ability of the firms to perceive the market dynamics and reorient their competencies to seize the market opportunities and threats is a dynamic capability looked forward to be developed by each for sustainable sustenance. (Kaleka and Morgan, 2019).

Innovative capability

The technological advancements, increased customer expectations and changing socio-economic patterns require that the companies should have abilities to develop new or renew their existing products and processes to sustain sustainability. (Teece, 2014).

Renovation capability

The unexpected volatilities of the surrounding business ecosystem require the firms to be agile to restructure and reconfigure their internal and external competencies.

Social network enhancement capability

The social associates of the firm whether people, other organizations, government, supply chain partners and customers all have profound effect on the firm's ability to cope with the changes. (Braziotiset al., 2013). These interrelationships need to be enhanced.

Firm's Performance

Based on the gap highlighted by review of literature the need of hour is to evaluate the performance of the firm on triple aspects of social, environment and money to comprehend its sustainability standing.

Environmental Performance

Environmental performance of a firm is evaluated on the metrics like pollution and emission control, waste management and reduction in use of hazardous products and processes (Esfahbodi et al., 2016).

Social Performance

An organization has corporate social responsibility to not only provide healthy, safe and growing environment to its employees but also wider responsibility towards community benefit. (Maniet al, 2016; Hong et al, 2018).

Economic Performance

The money performance of the company is measured on 3 aspects of operational performance, market performance and financial performance.

Operational Performance measures the productivity efficiency and decrease in energy consumption. (Park and Lee, 2015; Esfahbodi et al., 2016)

Market performance measures the market share, loyalty and flexibility (Lint et al (2015))

Financial performance measures the indices like net profitability, increase in revenue, decrease in cost etc. (Lin et al, 2015)

The above determinants of SSCMP and Dynamic capabilities can be regarded as the building blocks of S-SCM. These determinants cannot be evaluated independently and their true essence is reflected only when examined jointly with the 3 dimensional performance to get a holistic view of firm's sustainability.

Theoretical framework and research hypotheses

The following framework has been proposed to study the association of DC's with the firm's performance on 3 parameters of social, economic and environment.

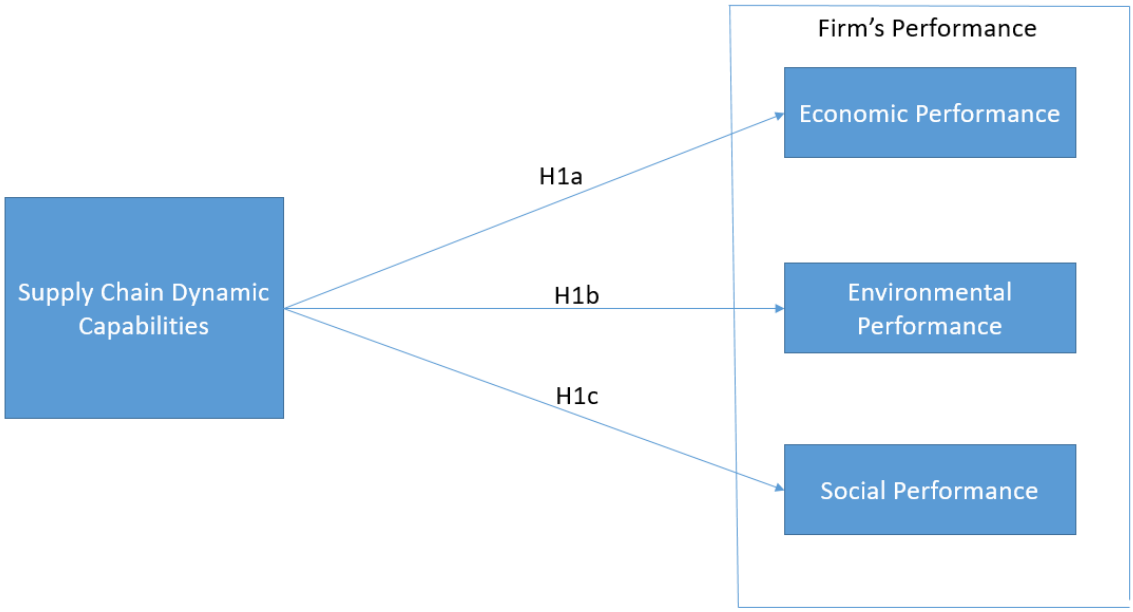

Figure 1: Conceptual Framework

Hypotheses

S-C dynamic capabilities and Firms' performance

H1 Firms overall performance is positively influenced by S-C Dynamic Capabilities

H1a Firms profit performance is positively influenced by S-C Dynamic Capabilities

H1b Firms ecological performance is positively influenced by S-C Dynamic Capabilities

H1c Firms people performance is positively influenced by S-C Dynamic Capabilities

Research Methodology

The major objective involved in carrying out this research is to comprehend the present level of SSCMP and DC in the firm and also investigate how SSCMP and DC's influence different dimensions of SSCMP of a firm.

Questionnaire

The above proposed model is validated through a survey conducted in automobile industry. A questionnaire based on the above discussed elements of SC dynamic capabilities and Firms triple aspect performance was designed for the purpose. The questionnaire had 3 components. The first part collected respondents' demographic information. The second part asked questions on firm's present level of DC's implementation. The third part enquired responses on the firm's performance. The questionnaire was based on 5 point Likert scale. (1= strongly disagree to 5= strongly agree)

The questionnaire so designed was first validated by experts. The experts' feedback was sought on the content and structure of the survey instrument. On the basis of their recommendations minor changes were incorporated to enhance the respondents' clarity and understanding of each question.

Sampling

Purposive sampling method was utilized to collect data from targeted automobile and automotive industry. The respondents were senior SCM professionals selected purposefully to obtain more reliable inputs. Data was collected through both offline and online method.

Research method

The study utilizes Structural Equation Modeling to measure and analyze the proposed relationship structure. Smart PLS version 3.0 has been used for the SEM analysis.

Data Analysis and Interpretation

The data was collected by administering the questionnaire to supply chain managers of automobile industries. A total of 186 effective responses were obtained. The data was analyzed further for reliability, validity and hypothesis testing.

Demographic profile

The collected data represented the following distribution of the respondents in terms of their organizational position is: 17 CEO/VP/Director (9.14%); 84 GM/DGM/AGM (45.16%); 83 Senior Manager/ Manager SCM (44.62%). Further the responses were categorized in terms of the organization size determined by annual turnover and number of employees as shown in Table 1.

Table 1: Demographic profile of Respondents

Characteristics	Categories	Frequency	Percentage
Industry	Automobile and automotive	186	100.00
Annual Turnover	<100 Cr	7	3.76
	100 Cr to < 500 Cr	20	10.75
	500 Cr to < 1000 Cr	44	23.66
	1000 Cr to < 5000 Cr	64	34.41
	>5000 Cr	51	27.42
Manpower	<100	4	2.15
	101-500	19	10.22
	501-1000	46	24.73
	1001-5000	93	50.00
	>5000	24	12.90
Age	Less than 3 years	3	1.60
	3-10 years	29	15.59
	10-20 years	69	37.10

	10-20 years	85	45.70
Organization Level	Senior Manager/ Manager	83	44.62
	GM/DGM/ AGM	84	45.16
	CEO/MD/Director/President /VP	17	9.14
	Consultant	2	1.08

Reliability

The study used Cronbach alpha and Composite reliability test to determine the reliability of the survey instrument. As is evident from the table below all the items are reliable as they fall under the threshold limit of >0.7.Thus the reliability of the instrument is confirmed.

Table 2: Reliability, Composite reliability, Average Variance Extracted (AVE)

Variable	Sub Variable	Items	Cronbach	CR	AVE
S-C Dynamic Capabilities	Knowledge acquisition capability	3	.689	.705	.518
	Innovation Capability	3	.719	.785	.637
	Demand Oriented perception Capability	3	.723	.847	.627
	Renovation Capability	4	.845	.748	.652
	Social network enhancement ability	3	.625	.787	.584
Economic Performance	Operation	4	.885	.899	.502
	Market	3			
	Finance	6			
Environmental Performance	Pollution Control	3	.843	.882	.569
	Resource Utilization	3			
Social Performance	Enterprise Perspective	4	.825	.861	.515
	Employee Perspective	3			

Validity

The instrument was next checked for validity through the discriminant validity (DV) test. DV measures the degree of distinctness of each construct. To check the validity the correlations were examined which should be less than 0.9. From the results as depicted in Table 3 the validity of the instrument is confirmed.

Table 3: Discriminant Validity

	Knowledge_acquisition	Econ Perf	EnvPerfor	SocPerf	Demand_or	Innovation	Renovation	Social Network
Knowlede_aq								
EconPerf	0.789							
EnvPerfor	0.697	0.834						
SocPerf	0.682	0.721	0.847					
Demand_or	0.676	0.742	0.803	0.864				
Innovation	0.743	0.738	0.712	0.752	0.764			
Renovation	0.722	0.761	0.745	0.778	0.746	0.852		
Social Network	0.692	0.730	0.696	0.597	0.592	0.846	0.861	

SEM and Hypothesis testing

After confirmation of reliability and validity of our instrument and the research model, the next step was to test the proposed hypothesis using SEM tool.

Table 4: Path coefficients

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
DC ->EconPerf	0.492	0.485	0.146	3.003	0
DC ->EnvPerf	0.522	0.428	0.141	3.32	0.001

DC ->SocPerf	0.415	0.431	0.139	3.05	0.002

As the above table 4 shows that for all the three hypothesis the p –values fall in the acceptable range, hence the hypothesis that DC's influence the economic, social and environmental performance, positively is accepted.

Conclusion

The literature review has pointed out that firms implementing Sustainable practices are also simultaneously developing their dynamic competencies to sustain sustainabity. The empirical results also show similar observation. It is observed that most of the studied firms are focusing on developing their DC's. It is observed that the most developed Dynamic Capability is knowledge acquisition and absorption capability. The firms are associating with their partners and developing system for real time knowledge sharing, assimilation and integration. This information symmetry helps the firms to prepare well in hand about any uncertain events that may cause significant adverse impact.

The study also reveals that DC's have positive impact on the firms social, ecological and financial performance.

The dynamic capacities of innovation, renovation, knowledge assimilation etc have developed competencies in the firms to orient themselves to market demands, opportunities and threats. This orientation has resulted in better market capture, reduced costs, increased efficiency and improved economic performance.

The DC's have also developed competencies of firms to comply with the required environmental norms and also to develop suitable policies to redesign the systems, equipment, and methods etc. which are more environment friendly and help create sustainable environment actions.

Similarly the social actions of the firms to actively contribute in community development and upliftment has resulted in positive influence on firm's social performance. The ability of the firms to reorient their employee policies and to make them more conducive have resulted in better working ambience, more employee benefits and reduced employee turnover.

Implications and Limitations of Research

The study has academic concoction that it contributes to the body of literature for theoretical construction of factors to measure Dynamic Capabilities which need to be developed as firm's competency. Secondly it is an empirical study in developing nation which is a scarce study in the field. The study also contributes practically that it helps managers to assess their current competencies and can chart their future course of action.

The study is limited to only one sector with a small sample size. It can serve as a future foundation for studies with different sectors and larger sample size to have more significant implications.

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