

Sustainable Supply Chain Maturity Model: A Proposed Framework For Developing Countries

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Abstract

Sustainability is institutionalized in many organizations which have their core business activities around supply chains (SC). The operationalization of sustainability in SC context brings its own set of complexities to gauge its performance sophistication levels and strategic actions to keep the progress on track. The purpose of this paper is to present and conceptualize the knowledge and information by reviewing the literature of sustainable supply chain management (SSCM) maturity models. These conceptualizations are then transformed into a maturity model proposition. The literature review presented, explains maturity models (MMs) developed especially with inclusion of TBL (Triple Bottom Line) concentration. While SSCM maturity model research has evolved more theoretically, it is studied here that methodologically opportunities yet exist for valid, practical, and easy to implement SSCM maturity model framework. Addressing the gap identified, a “6Cs framework” is proposed in this study with six levels of sustainable SC maturity. The paper intends to present a framework easy to be adopted by management of an organization viz in a developing country, which either has just started to realize the significance of sustainability for their business or they are in mid-flight of their SC operations geared for sustainability processes implementation.

Keywords: SSCM, Maturity Model, 6Cs Framework, Pakistan.

Introduction

The popularity and acceptance of Maturity Model (MM) gained momentum in 1990s after the advent and development of Capability Maturity Model (CMM). Albeit, MM’s ubiquity, there is still lacking a clear definition of the term (Wendler, 2012). Maturity Model identifies the phases of capability of a maturity of an object or element (e.g. individual, an object or social interaction prevalence) in comparison with stated functional areas of a business such as processes, resources, and human capital (Kohlegger et al.,

2009). MM is a collection of cross-functional activities highlighting the level of correspondence between the attitudes of adhocism to optimum sophistication in carrying out the activities in organizational functional areas (Bititci et al., 2015).

Beside the above conceptual elaborations of MM, there is still a plethora of battery of maturity models in various organizational areas such as process management, product development, risk management, human resource management, supply chain management

(Wendler, 2012), software engineering (Kohlegger et al., 2009) and corporate sustainability (Amini & Bienstock, 2014). Every single area above, has a multitude of MMs dealing in its respective maturity elements and it further confuses the comprehension of an MM empirically sound to be adopted in a general context for an organization. Literature analysis on the topic of MMs is more important than ever to be tackled to mitigate this confusion.

There has been a growing concern over business sustainability and its focus on environmental, social, and economic priorities viz. triple bottom line (TBL) or three focal business dimensions as people, planet, and profit. These days the business survival is critically dependent or contingent upon sustainability (Ahi & Searcy, 2015). Stakeholders' pressure and demand put a burden on organizations to institutionalize the system for sustainability performance measurement which is deemed by them as a central or core competency for survival in today's world (Meixell & Luoma, 2015). Multifarious strategies are adopted to tackle the nuances of sustainability (Baumgartner & Ebner, 2010) and vis-à-vis organizations with degrees of sophistication implement mechanisms to promote sustainability as an integral element of their supply chains (SC). This integrated framework of sustainability and supply chain is one of pivotal element of sustainable development (Tonelli et al., 2013). Carter and Easton (2011) advocated that sustainability integration in SC fosters the environment for a better use of resources in achieving organizational commitments and to the same tune Beske and Seuring (2014) emphasized the fact that in order for a SC to be plausibly sustainable, it must be geared around this concept of apposite utilization of resources as an ongoing management practice.

The integration of supply chain management (SCM) with sustainability exhibit new set of challenges which complicates SC flows and resource management within an

organization. The operationalization context of sustainability demands a complex but higher and sophisticated level of decision making actions (Reefke et al., 2014). Cuenca et al. (2013) defined MMs as an effective tool for sustainable supply chain management (SSCM) as it inherently explains the stages through which a system progresses forward from inception to maturity. Sustainability concerns within the SC framework in an organization needs to be constantly monitored for two reasons viz. to apprise stakeholders on performance progression, and improvements therein achieved and made. An MM encompassing sustainability SC bears a significant importance for decision makers as it helps them to gauge efforts delineated for sustainability and its maintenance within the domain of SC in an organization. Moreover, MMs help in identifying the organization's status and position on level of maturity achievement on SC sustainability dimensions. Several studies (Klimko, 2001; McCormack et al., 2008; Neuhauser, 2004; Röglinger et al., 2012) have highlighted MM as a simple, adaptable, and easy instrument that can be used to evaluate improvements in performance, and a benchmarking tool that may be institutionalized for comparisons among industry standards and practices being conducted in companies. The main objective of this study is to present and review previous researches and various MMs based on different methodologies within the SC sustainability context. It is beneficial for the firm to analyze past research and models prior development of new ones (Wendler, 2012). This study intends to contribute to Pakistan context SC sustainability framework literature by highlighting the different maturity models available, albeit operationalized in developed economies, and suggests a framework that may be adapted in different economic sectors of Pakistan.

Literature Review

Maturity Models

De Bruin et al. (2005, para. 1) stated “maturity models have been designed to assess the maturity (i.e., competency, capability, the level of sophistication) of a selected domain based on a more or less comprehensive set of criteria”. Mentzer et al. (2001) provided the concept of SC as a structure where all the actors are involved in actions revolving around upstream and downstream flows of information, financial resources, products, and services from top (supplier) to bottom (end user or an ultimate customer). With these prevalent concepts and precepts, the imperative of maturity analysis of sustainability in SC context for individual organizations has now gained momentum and significance more than ever as it may facilitate the in-depth study of sustainability in SC in an economic sector. The SC process is one such area where meeting the challenges of management of critical resources, and flow of capital and information are main functions of a SC firm along with streamlining the business activities according to TBL as per the derived demand of stakeholders and as a requirement for long-term business survival. The foundation premise of any maturity model is assessing yielded results with respect to levels of goals achievement. In another vein maturity models could well be construed as preparedness and readiness stages of a firm to meet challenges and to capitalize business opportunities. There has been a vast variety of maturity models in literature discussed in several business contexts; from process management maturity to construction (Meng et al., 2011) to attractiveness in supply chain for customers maturity model (Kovacs et al., 2008) and IT management and knowledge management. Few other frameworks (Azevedo et al., 2016; Kurnia et al., 2014; Reefke et al., 2014) also have been conceptualized and focused on assessment of SC sustainability levels vis-à-vis strategies to maintain and propel its progress.

Within the extant literature MMs have been proposed and discussed either as a generic schema meant to be applied to overall processes of an SC firm or a specifically focused perspective highlighting a single process emphasis. Within the context of MM, the SC sustainability literature highlights two MM approaches and applications: a single environmental dimension focus or a TBL dimensions approach. The existent literature also discussed each approach’s application classified over SC functions such as SC networks, SC processes (e.g. information management, knowledge management etc.), and on competency and sophistication level of SC firms.

The following review discusses the TBL approach only with its application categorization of SC functional levels. The write-up below is presented by SC functional levels hierarchy e.g. Sustainable SC network, process, and overall firm.

Network Perspective

Reefke et al. (2014) introduced a multi-layered sustainable SC maturity model built on the concept of establishing a long-term but sophisticated sustainable SC strategy orientation, spanned over six maturity levels. Each maturity level is summarized with respective definition, goals and requirements to achieve progression towards the next maturity level. Albeit, the suggested SSCM (sustainable supply chain model) does not highlight any focal dimensions for evaluation, the elucidation of levels carries characteristics of sustainable SC in all of the maturity levels discussed therein. Later Reefke and Sundaram (2018) enhanced their model by suggesting mechanisms to bridge the connection between SC vision, strategy, and execution and goals to institutionalize sustainability. Their model reflects an applied scenario of Delphi technique employed for exploration and further propositions of SSCM factors supporting decision functionalities for transformation and

implementation of sustainable SC. The effort and endeavor by Reefke and Sundaram (2018) undertaken in their study is to manifest a validation mechanism specifically focusing transformation and SSCM maturity models under continuous development. Okongwu et al. (2013) developed maturity model leaning towards continuous improvement in TBL following European Foundation for Quality management (EFQM) competency guidelines. The maturity model is designed for broadening the knowledge comprehension of SC sustainability maturity levels that a firm goes through with a focus on continuous improvement in SC sustainability activities undertaken by a firm. Kurnia et al. (2014) devised a maturity model to present the six different sustainable SC capabilities utilized in institutionalizing SSCM. In their proposed MM, each capability is shown as having four progressive SSCM implementation maturity levels within four classifications of firms (unaware firms, unprepared firms, committed firms, and advanced firms) with varying degrees of SSCM capabilities. Srari et al. (2013) conceptualized an MM embodying a holistic view of the sustainable supply chain network and TBL practices. This MM has a different design perspective emphasizing TBL supportive network maturity levels rather than individual organization's maturity levels of sustainable SC implementation practices.

Process Perspective

Robinson et al. (2006) suggested a five-step "STEPS" maturity model in construction industry context revolving around the operational strategy of knowledge management. Different knowledge management maturity levels are being reflected by these five steps. This MM design manifests and advocates that corporate sustainability practices can only be beneficial by harnessing intangible assets and soft features of knowledge such as intellectual capital, firm's goodwill, competence in technology etc. Another

MM emphasizing the organization's process is proposed by Standing and Jackson (2007). The model's main focus is geared towards Information Systems (IS) process (which bears a weighted economic rationale in its very existence against environmental and social dimensions' efficacies) and its integration with sustainability as it helps any firm to identify with its level of sustainability performance comparative to industry while establishing progress targets and action plans to achieve them. The single dimension focus of sustainability is construed as a lacking feature of this MM for its comprehensive adoption.

Firm Perspective

Edgeman and Eskildsen (2014) devised a Sustainable Enterprise Excellence (SEE) maturity assessment model drawing on sustainability and enterprise excellence convergence while connecting the sustainability practices of 3E (equity, ecology, and economy) and ardently skewed perspective towards profit dimension of TBL. The model suggests six "compass" elements encompassing enterprise excellence issues from strategy to governance to human capital but lacks the distinct guidelines to operationalize these areas for increase in performance progress. Golinska and Kuebler (2014) proposed their MM with re-manufacturing sustainability perspective. The intended utility of their model is towards organizations who have employed TBL mechanism for sustainable re-manufacturing.

The literature reviewed reveal a lacunae of a comprehensive MM with an approach towards its ease of adaptation. Another aspect is the non-existence of MMs in an Asian SC context for developing economies. The same shortcoming is intended to be addressed in this study.

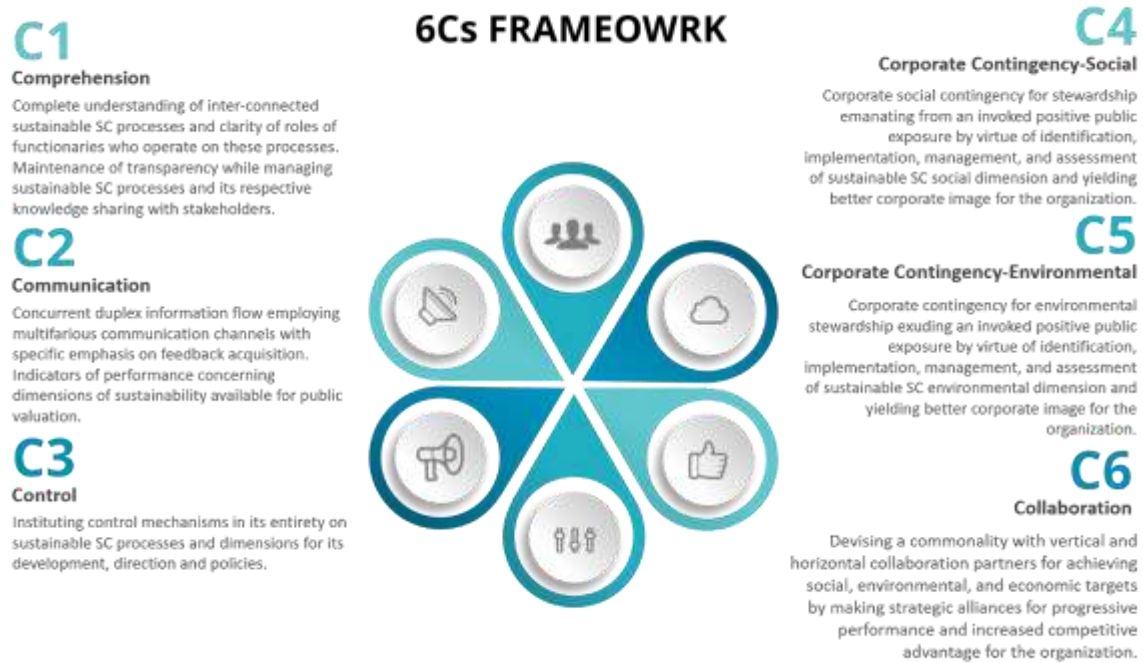
Methodology

Sustainable supply chain management necessitates an elaborative comprehension and research yielding propositions of models all-encompassing interconnected dimensions of sustainability (Seuring, 2013) with strategic SC schema assisting functional decisions in an organization (Wang et al., 2011). Business firms involved in supply chains are incrementally comprehending the significance of TBL but its application and transformation of the sustainability knowledge (e.g. features, characteristics and dimensions) still remains an issue for a firm's management. Supply chain is a dynamically living structure which is susceptible to changes and extraneous factors affecting its functionalities in any organization. For the very reason, it is now imperative for managers to concentrate, adopt or adapt new SC assessment methodologies especially when sustainable development is integral to SC functions and future business decisions and directions are contingent upon it. Authors in this study have attempted to **propose a devised** SSCM maturity model to provide a framework assistance to organizations so that they can assess their own

level of readiness, preparedness, and sophistication in processes based on sustainable SC development goals and objectives. The proposed model of the study also aims to help managers to identify the sustainable SC implementation lacunae and strategies to plug them, respectively.

The proposed model of the study has been inspired by the initial work of Reefke et al. (2010) and the sustainability elements and features are operationalized following a prescriptive approach for model design and implementation. The model presented here contains six sustainability elements, named as "6Cs framework" (Figure 1) distributed over six maturity levels (Figure 2). The "6Cs framework" include comprehension, control, corporate contingency-social, corporate contingency-environmental, collaboration, and communication. The six levels of maturity presented in the model are based on gradual progression in a vertical continuum from non-existent to ad hoc to pre-takeoff to takeoff to soaring to optimized status of sustainability adaptation and application.

Figure 1 Six Cs framework as SSCM elements in conjunction with six proposed maturity levels



Source: Authors’ own work

Figure 2 Six proposed maturity levels for gauging operationalized SSCM sophistication.

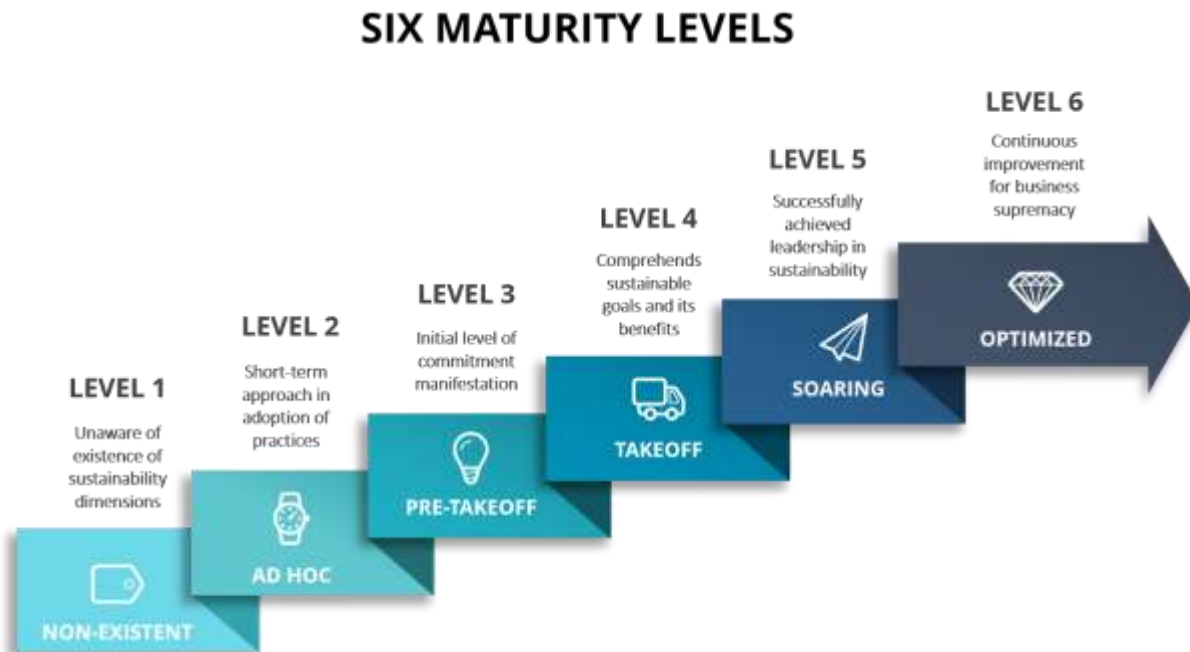


Figure 2 Six proposed maturity levels for gauging operationalized SSCM sophistication.

Source: Authors' own work

6Cs Framework

Following is the explanation of proposed six “Cs” that is intended to be used in conjunction with six proposed maturity levels.

Comprehension

Complete understanding of inter-connected sustainable SC processes and clarity of roles of functionaries who operate on these processes. Maintenance of transparency while managing sustainable SC processes and its respective knowledge sharing with stakeholders.

Communication

Concurrent duplex information flow employing multifarious communication channels with specific emphasis on feedback acquisition. Indicators of performance concerning dimensions of sustainability available for public valuation.

Control

Instituting control mechanisms in its entirety on sustainable SC processes and dimensions for its development, direction and policies.

Corporate Contingency-Social

Corporate social contingency for stewardship emanating from an invoked positive public exposure by virtue of identification, implementation, management, and assessment of sustainable SC social dimension and yielding better corporate image for the organization.

Corporate Contingency-Environmental

Corporate contingency for environmental stewardship exuding an invoked positive public exposure by virtue of identification, implementation, management, and assessment of sustainable SC environmental dimension and

yielding better corporate image for the organization.

Collaboration

Devising a commonality with vertical and horizontal collaboration partners for achieving social, environmental, and economic targets by making strategic alliances for progressive performance and increased competitive advantage for the organization.

Six Maturity Levels

Non-Existent (Level 1)

Unaware of existence of sustainability dimensions.

Ad Hoc (Level 2)

Short-term approach in adoption of sustainability practices

Pre-Takeoff (Level 3)

Initial level of commitment manifestation.

Takeoff (Level 4)

Comprehends sustainable goals and its benefits.

Soaring (Level 5)

Successfully achieved leadership in sustainability.

Optimized (Level 6)

Continuous improvement for business supremacy.

The above “6Cs framework” and six maturity levels have specifically been conceptualized by keeping Pakistan context in perspective as the status of sustainable SC in Pakistan is at its nascent stage of adoption, adaption, and identification of apposite mechanisms to institutionalize sustainability in compliance with

sustainable development goals of the world. Despite at embryonic stage, Pakistan was the first among the countries that exhibited a higher level of commitment by adopting the SDGs 2030 agenda through parliament resolution (Ministry of Planning, Development & Reform, n.d.).

In concordance to above utility advantage of MMs in SC sustainability for Pakistan, the idea behind this study is further fortified when it was observed and studied that very few concerted efforts were made for MM validation mechanism which politely renders to MMs inapplicability for organizations. The study proposes a model framework and additionally the elements mentioned therein are itemized by following an easy to use Likert-scale typology. The prepared document may well be equated as a questionnaire consisting statements covering the “6Cs framework” and sustainable SC implementation sophistication progression levels.

Conclusion

Through a focused literature review examined from studies and researches proposing sustainable SC MMs, several prominent MMs were picked and delineated from the perspectives of sustainable SC network, processes, and aspiring firms for SSCM implementation. The effort was made, albeit crisp and brief, to provide a quick rundown of maturity models for sustainable SC implementation evaluation. The whole synthesis explained throughout was to present the diversified concepts in accordance to maturity models development in sustainable SC scenario. It was also kept in mind to present enough knowledge and information that may prove practical and empirically viable for SC managers in Pakistan.

Limitations and Future Research directions

The undertaken study has certain limitations. The focus remained throughout the study was on sustainable SC maturity models. Even by

concentrating on all three dimensions of sustainability, it was a deliberate act to exclude all those MMs also which only catered for a single dimension of sustainability. Models encompassing all three dimensions were considered to be imperative for provision of knowledge and information to readers. Constructs for assessment of maturity levels can be presented to establish a practical foundation for MM design and development for an organization desiring to assess maturity levels in accordance to its sustainable SC practices.

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