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Production & Manufacturing Research

An Open Access Journal

ISSN: (Print) 2169-3277 (Online) Journal homepage: https://www.tandfonline.com/loi/tpmr20

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To cite this article: Michael Sony (2019) Implementing sustainable operational excellence in organizations: an integrative viewpoint, Production & Manufacturing Research, 7:1, 67-87, DOI: 10.1080/21693277.2019.1581674

To link to this article: https://doi.org/10.1080/21693277.2019.1581674

Published online: 01 Mar 2019.

PRODUCTION & MANUFACTURING RESEARCH
2019, VOL. 7, NO. 1, 67–87
https://doi.org/10.1080/21693277.2019.1581674

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ARTICLE

Implementing sustainable operational excellence in organizations: an integrative viewpoint

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ABSTRACT

Many Organizations are implementing operational excellence initiatives to be competitive in the industry. The initial results are very encouraging but subsequently, it was difficult for many organizations to sustain the initial success. The purpose of this paper is to investigate how to implement a sustainable operational excellence initiative in the organization. The study builds a model for sustainability of operational excellence which considers the social, economic and environmental aspect of operational excellence. In addition, organizational culture and agility are found to contribute a major role in sustainable organizational excellence. This is the first study to propose an integrative model for implementing sustainable operational excellence in organizations. Organizations will be able to implement operational excellence initiatives in a sustainable manner if the model of sustainability is followed. Besides, there are research propositions and future research directions to academic researchers.

ARTICLE HISTORY
Received 5 November 2018
Accepted 8 February 2019

KEYWORDS
Operational excellence; business excellence; sustainability; Lean; Six Sigma; Total quality management

1. Introduction

Operational excellence is the modern buzz-word in the business community. Many organizations are implementing operational excellence initiatives within the organizations. The erstwhile Lean teams are being replaced with operational excellence teams in the modern organizations (Found, Lahy, Williams, Hu, & Mason, 2018). Operational excellence a term which was popularized by the Shingo Institute at Utah State University. The difference between Lean teams and operational excellence teams are that it is envisaged to cover all the improvement methodologies (Found et al., 2018; Suri, 1998). Operational excellence in simple words is organizations making improvements to attain a competitive advantage. Modern day organizations not only maximize the benefits for the organizations, but also the customer and other stakeholder's needs are taken care. Many researchers have devoted considerable attention to develop the models for operational excellence (Bhullar et al., 2014; Carvalho, Sampaio, Rebentisch, Carvalho, & Saraiva, 2017; Found et al., 2018; Mascitelli, Mills, Bierl, & Le, 2017). The previous studies have studied several aspects of Operational excellence (1) Operational excellence and Customer (Morash & Clinton, 1998; Treacy & Wiersema, 2007) (2)

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Operational excellence Theory & Frameworks (Bhullar et al., 2014; Found et al., 2018) (3) Lean Operational excellence (Liker & Franz, 2011; Sarkar, 2007) (4) Operational excellence and Supply Chains (Morash & Clinton, 1998; Tyndall, Gopal, Partsch, & Kamauff, 1998) (5) Operational excellence models (Dahlgaard, Chen, Jang, Banegas, & Dahlgaard-Park, 2013; Miller, Raymer, Cook, & Barker, 2013; Talwar, 2011) (6) Tools & Techniques of Operational excellence (Basu, 2004a, 2004b) (7) cases in operational excellence (Oakland, 2007, 2014) (8) critiquing of self-assessment models (Williams, Bertsch, Van der Wiele, Van Iwaarden, & Dale, 2006) (9) Measuring systems on operation excellence (Jarrar & Schiuma, 2007; Schiuma, 2009) etc.

Though there has been previous research in this area, the operational excellence initiatives also encompass several unexplored dimensions that needs a research attention. The first issue is that most research on operational excellence has been practice-led (Found et al., 2018). Though there are many models of operational excellence, but there is a requirement of one best model of operational excellence (Carvalho et al., 2017). The second issue is the sustainability of gains of operational excellence programs. The initial gains of operational excellence programs are high and later, the results are difficult to maintain. Besides, most of the operational excellence programs only asses the impact of only on one economic dimension, and other dimensions are neglected. Furthermore, many of the specific improvement projects find itself no closer to the desired results due to this they are prematurely aborted (Casey, 2010). There are also reports that many firms who have bagged quality awards such as Malcolm Baldridge Quality awards have later lost significant money (Dar-El, 2013). Even firms which have bagged reputed awards such as Shingo prizes have been bankrupt. Thus from an investment perspective, such prize winners isn't a positive indicator (Meyer & William, 2007). Though some firms deploying operational excellence have obtained results, but these initiatives are not always enough to ensure competitiveness over time. Many organizations that were branded as excellent have found themselves in difficult situations, sometimes even getting to the point of filing bankruptcy (Carvalho et al., 2017). The mixed results of the success of operational excellence programs appear to be important and worthy of investigation especially in the context of implementing a sustainable operational excellence program which will sustainable. In addition, organizations need a model which will guide them to the sustainability of the operational excellence initiatives. The modern-day organization to be sustainable has to perform on economic, environmental and social dimensions (Gimenez, Sierra, & Rodon, 2012). There is very little research done on developing a sustainable operational excellence model which will offer some insights for the company on how to be sustainable with operational excellence initiatives. This is achieved by reviewing the existing literature on operational excellence and by developing a model for sustainability of operational excellence initiatives in the organization. The research question guiding this study is *how to implement a sustainable operational excellence initiative in the organization?* The unique contribution of this paper is this paper is to develop a research led, sustainable operational excellence model.

2. Integrative literature review

The integrative literature review was chosen as the objective was to synthesize various streams of the literature on operational excellence and sustainability. An integrative review is a form of research that generates new knowledge (Torraco, 2005). Our goal is to add to the knowledge of operational excellence by completing a broad sweep of the literature which is focused on the field of operational excellence and sustainability. In order to conduct the literature review, we use guidelines given for literature review by Torraco (2005). The literature review is conducted with the aim to answer the following research questions.

1. *How to implement a sustainable operational excellence initiative within the company?*
2. *How should future research proceed given our research findings?*

2.1. Data sources

Step one was the broad scope of literature using electronic databases. A methodological review process was undertaken. The first step was intended to search electronic databases. The search criteria employed for this research was *operational excellence, operational excellence models, operational excellence criticisms, operational excellence model's criticism, operational excellence success rate, operational excellence fad, sustainability, sustainable operational excellence, sustainable operational excellence models*. The scope was restricted to last 30 years, i.e.1988 to 2018. The databases which were included in the study include was Academic Source Premier, Google Scholar, Business Source Premier, Emerald, IEEE Xplore Digital Library, JSTOR, ProQuest Dissertations and Theses, Science Direct, Taylor & Francis and World Public Library. Though some authors have concluded that conference proceedings should be excluded (Scott-Findlay & Estabrooks, 2006), however conference proceedings and other grey literature offer some insights in merging research (Flick, 2015; Sony & Naik, 2019) area such as operational excellence. Hence, conference proceedings and other grey literature by reputed publishers were included.

2.2. Inclusion and exclusion

The screening process for the literature review followed a goal of finding articles which were focused on operational excellence and sustainability. Editorial, opinion, theoretical and qualitative and quantitative studies were included in this review. The screening criteria were that articles had to be published in English between 1988 and May 2018 and other criteria were that it should be focused specifically on operational excellence within the organization. The articles were excluded if they did not focus on operational excellence or if the research design was poor or argument which was presented was not clear. Also, articles from predatory journals were excluded using Bealls list (Beall, 2012; Berger & Cirasella, 2015).

2.3. Screening

This research used a 3-step process to obtain the final collection of articles. The first step was a broad search of the literature review to find abstracts that met the inclusion criteria. The titles and abstracts were printed. It helped in removing the duplicates. The

remaining abstracts were screened using the inclusion/exclusion criteria which were earlier described. The full articles were then read to meet the inclusion/exclusion criteria. The reference list of articles was read to further improve the search criteria. The screening process is elucidated in Figure 1.

2.4. Data analysis

There is no well-set standard for analysing the integrative review data (Burke & Hutchins, 2007; Conn et al., 2003; Smith, Profetto-McGrath, & Cummings, 2009; Whittemore, 2005). As the primary goal of this research was to decide how to implement sustainable operational excellence literature. This was intended to be carried out by determining the patterns, directions, similarities, and differences within the sample. To bring in methodological approach a framework was used (Smith et al., 2009; Whittemore, 2005). The methodology adopted was

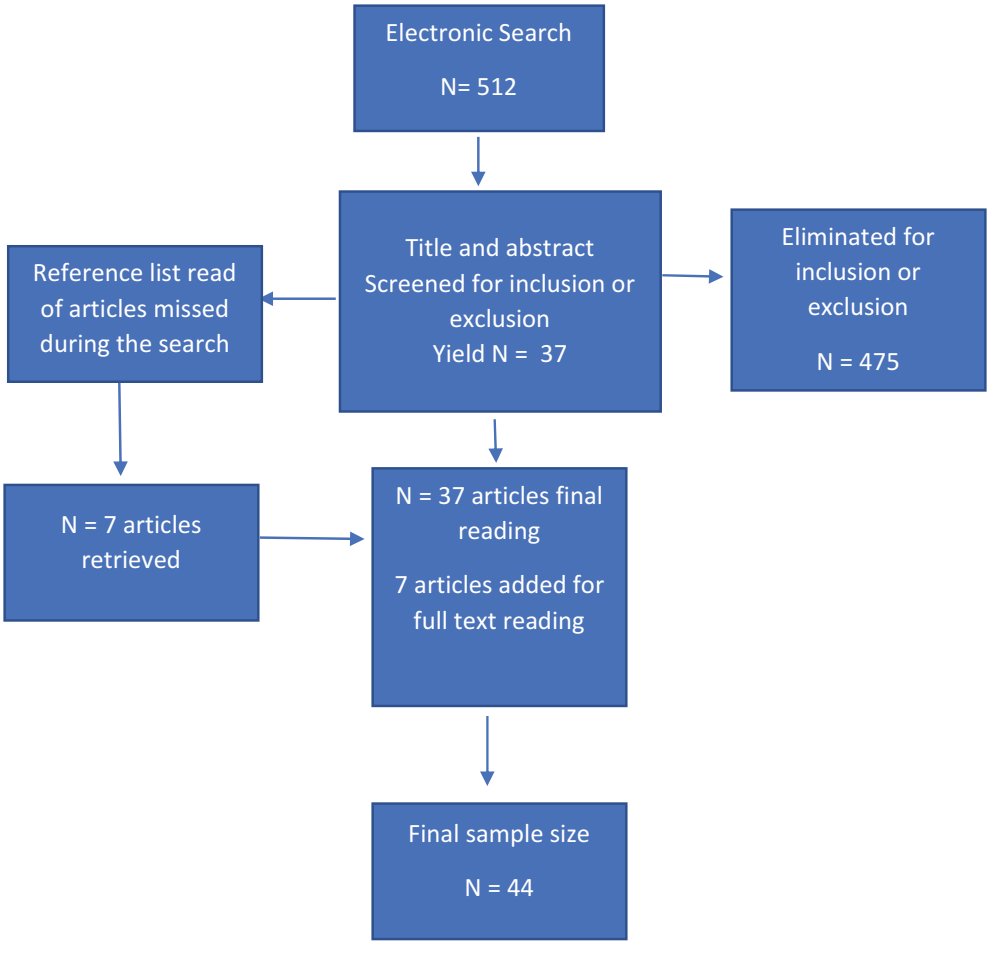

Figure 1. Literature review search strategy.

(1) The retained articles were read three times to determine the quality of the writing, to reduce and compare data within the articles and to analyse and synthesize themes and patterns within the literature sample.
(2) The quality of each group of articles (theoretical/editorial/opinion/research based) was assessed by evaluating the focus and reasoning of authors in relation to operational excellence and sustainability of organization performance.
(3) Quality of the theoretical articles was determined by the description of operational excellence and also mention of operational excellence with respect to sustainability.
(4) The scholarship determination was guided by the ability to communicate ideas effectively and clearly in an unbiased way (Kitson, 2006).
(5) In addition, the research articles' quality was based on design, sample characteristics, measurement, statistical analysis and relevance to knowledge development (Smith et al., 2009).

The data from the final group of articles were reduced to a controllable complete form as follows. The Editorial/opinion and theoretical articles were summarized in writing. After that, they were then synthesized and coded by theme to reduce data and establish patterns and themes in a comprehensive and systematic manner. As regards to the empirically based articles, they were read, coded, summarized and synthesized to determine types of research studies completed to date. The theoretical, opinion and editorial articles were read for themes and ideas and were then categorized and synthesized to determine patterns among the group. The entire sample was then critically analysed to gain an understanding of the state of overall knowledge in relation to sustainable operational excellence.

2.5. Search results

The preliminary search located around 512 articles. Using the inclusion and exclusion criteria 475 articles were eliminated. This resulted in a yield of 37. Seven articles were added after references of 44 articles were reviewed. This resulted in final yield of 44 articles. The search process is summarized in Figure 1.

3. Critical evaluation of existing operational excellence models

For an organization to succeed in the long run, it has to indulge in a multitude of activities such as operational excellence, product leadership, customer relationship management, etc. (Found et al., 2018). Operational excellence is defined as strategy organizations use to deliver quality, price, ease of purchase and service in such a manner that no other organization in the industry or sector can match (Treacy & Wiersema, 2007). Business or operational excellence can be achieved through 4P's. The P's are excellent people who establish excellent partnerships with suppliers, customers and society in order to achieve excellent processes which are key business and management processes to produce excellent products, which are able to delight the customers (Dahlgaard & Dahlgaard, 1999). Figure 2 depicts the 4P model. Organizational excellence can be driven by the leadership through the 4P's, in order to attain the organizational excellence.

Figure 2. Organizational excellence through 4P (Dahlgaard & Dahlgaard, 1999).

The 4P model has been created to remove conflicts by creating an integration between soft or intangible aspects and hard or tangible aspects, subjective and objective aspects, rational and irrational, individual and organizational aspects of some operational excellence models. There is no other model which implements all other aspects in totality like the 4P model (Dahlgaard et al., 2013). The 4P model prescribes the recommended structure or strategy to achieve operational excellence. The second model in Figure 3 is a variation of the 4P model. Figure 2 model uses a pyramid style much like Likers pyramid model for understanding Toyota Production System (TPS). Figure 3 model is an enabler-result model. The first three are management enabler and fourth is the process component. Thus, 4P model should be regarded as an excellent model which may fit to a specific company's context at a specific time (Dahlgaard et al., 2013).

In the last four decades, many methodologies have been implemented by the organizations to produce better products, services or processes and all these were given a word operational excellence. Some of the most popular methodologies were Lean, Six Sigma, Continuous Improvement & Total Quality Management (Banuelas Coronado & Antony, 2002; Park, Hartley, & Wilson, 2001; Sony & Naik, 2011, 2012). Lean focussed on systematically eliminating waste which occurs in the system. The eight wastes of lean were defects, over-processing, waiting, inventory, motions, transportation, overproduction, unutilized talent. Primarily production system was the focus of the lean in the organizations, however, as a philosophy, it could be applied in all elements in the above operational excellence conceptualization. Six Sigma is a business management strategy and a data-driven methodology with the primary aim to reduce variation within a process that can result in defects or errors (Trakulsunti & Antony, 2018). It is a project driven approach that is used in an organization to improve the organization's product, services, and processes. As a business strategy for attaining business excellence, it focuses on improving customer needs, productivity, improving business systems and financial performance. Since the mid-1980's many organizations have benefited from the application of Six Sigma (Sony, 2019, 2019a; Sony & Naik, 2011, 2012). Six Sigma was used primarily for product, service or process improvement in the organizations. Continuous Improvement or Kaizen is a set of strategies used in the workplace to implement positive, ongoing changes in the workplace. The

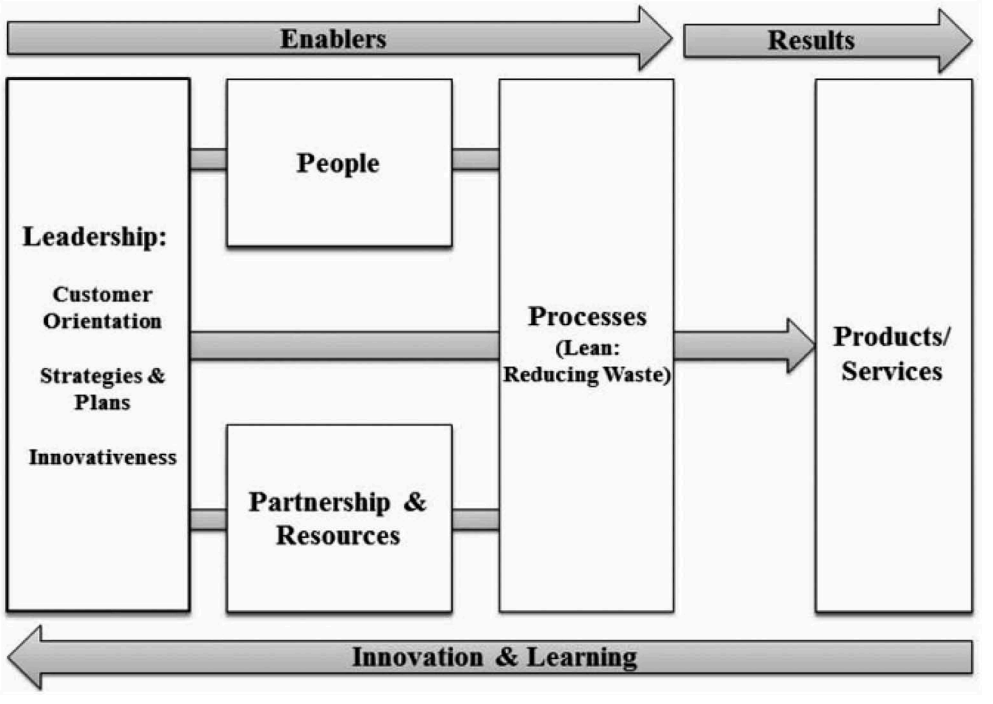

Figure 3. 4P organization excellence model (Dahlgaard & Dahlgaard, 1999).

underlying principle behind continuous improvement or Kaizen is good process produce good results. Teamwork is very important for the success. There is also an assumption that any process can be improved if the methodology is followed. It teaches that when small improvement is made over time, it will result in a large change. The word *continuous* is very important. It is the continuous relentless efforts in improvement that will create a lasting change. These were also applied in most industries on various processes. Total Quality Management (TQM) brought in organizational wide efforts to instil a culture in which the organization continuously improves its ability to produce product, service, and processes. TQM was a very widely used tool in the 1980s and 1990s. However, the impact of it diminished in the late 1990s due to Lean and Six Sigma.

In the last decade, there has been a shift towards operational excellence in major organizations. All Management terms and concepts have a life cycle. Lean took from JIT and JIT started waning. These management terms follow a S curve. operational excellence was first coined by Shingo Institute as a qualifying criterion for the Shingo Prize. Shingo contribution was the recognition of interrelationship between principles, system, and tools. Lean had primarily focussed only on tools. The five principles of operational excellence developed by Found et al. (2018) are

(1) Stay focussed on results and behaviours;
(2) Behaviours that flow from the principles that govern results;
(3) Principles that underlie the culture that supports the results long term;

(4) Creating principle-based cultures requires the alignment of the management systems;
(5) The tools of Lean, SS, TQM, JIT, etc., should be used strategically, appropriately and cautiously to drive ideal behaviour and excellent results.

Operational excellence is becoming the new buzz word for the modern day organizations (Quinn, 2018). The Lean and Six Sigma teams are being replaced by operational excellence teams. The operational excellence is also suffering from the same criticisms are Lean. It is theoretical, poorly defined and lacks a complete framework. The operational excellence is practice led and lacks a theoretical base (Found et al., 2018). There is no one model or method which has identified all the necessary elements for implementing and sustaining operational excellence. There are many models of operational excellence. operational excellence models are used by the company for appraisal and identifying the areas to work on so that business can attain new heights. Many multinational companies have come up with their own models of operational excellence. Some of them have been very successful. One of the most popular once is of Rolls Royce framework (Howells, 2000). This model shows the journey of improvement to operational excellence. Industry and Government leaders have also come with models. The most prominent Malcolm Baldridge National Quality Awards, Japans Deming Prize, European Quality Award and so on. In addition, various countries have their own quality awards *Rajiv Gandhi National Quality Award for India, Singapore Quality Award Business Excellence Framework for Singapore* and so on. Academicians have also proposed many frameworks. One of the most prominent ones is Global Supply Chain Framework (Closs & Mollenkopf, 2004). It consists of eight key business processes. The prominent among them are (1) customer relationship management (2) customer service management (3) demand management (4) order fulfilment (5) manufacturing flow management (6) supplier relationship management, (7) product development and (8) commercialization, returns management across various functions and firms upstream and downstream in the supply chain (Lambert, Cooper, & Pagh, 1998). The companies striving for operational excellence for continuous improvement should have the model. The four levels of the framework are (1) Supply Chain Management (2) SCM Partnering (3) SCM Collaboration and (4) Continuous Supply Chain Collaboration. There are other notable frameworks of operational excellence. These models are devised at directing, equipping/providing, implementing and anchoring. The other models include Capability Maturity Model Integration (CMMI) framework, the Shingo Model, Lean Advancement initiative and Enterprise Self-Assessment tool (Bhullar et al., 2014).

Figure 4 shows the Shingo model. It is conceptualized using concepts of Lean Management approach. The founder of the model is Dr. Shigeo Shingo. The model consists of four dimensions. The dimensions are Cultural enablers, Continuous process improvement, enterprise alignment, and results. There are 10 guiding principles. Respect every individual, lead with humility, seek with perfection, embrace scientific thinking, focus on process, assure quality at the source, flow & pull value, think systematically, create constancy of purpose and create value for customer. These 10 principles are supported by 19 supporting principles that cover five typical business and management processes including supply, management, customer relations, product & service

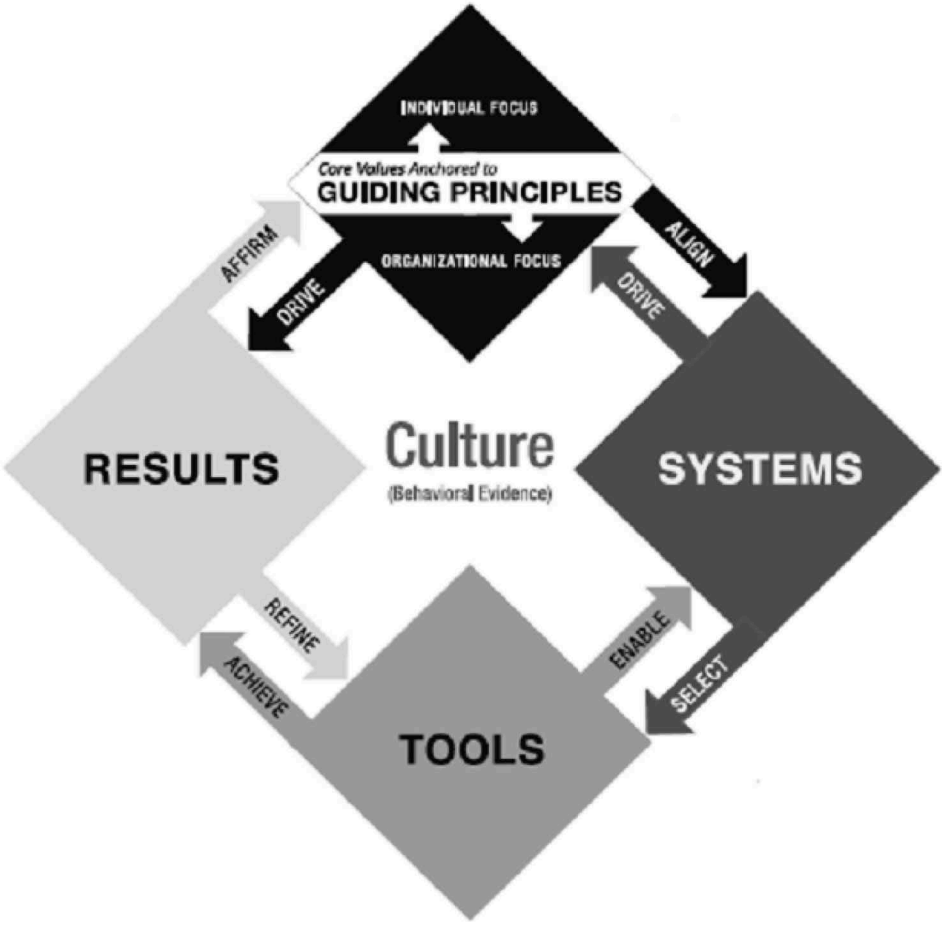

Figure 4. The diamond: The Shingo transformational (Shigeo & Shingo, 2012).

development and operations (Bhullar et al., 2014). This transformation process is supported by an assessment that determines the degree to which the organization is aligned with the principles of operational excellence. An important criterion of the model is that it is done by external examiners from the Shingo Institute. They evaluate results as well as organizational behaviour for the five typical processes and provides a gap analysis that can be used to focus on improvement activities. The criticism of the Shingo prize is that it does not add any perceived value to the customer. A company like Delphi who was Shingo Prize winner has gone into bankruptcy (Meyer, 2008). Thus, there is no guarantee that a Shingo prize-winning organization will prosper in future.

The CMMI framework provides direction for improving the processes that are associated with the business objectives of an organization or appraising process maturity of an organization. They further address 22 processes which are grouped into 4 sets. These sets are Project Management, Process Management, Engineering, and Support. It entails a staged representation involving of five maturity levels. The maturity levels are initial, managed, defined, quantitatively managed, and

optimizing. The staged representation symbolizes the overall state of an organization's processes for a set of process areas. Maturity levels are decided by fulfilling certain criteria in designated groups of process areas. It also has continuous representation consisting of four capability levels (Bhullar et al., 2014). The levels are incomplete, performed, managed, and defined. The continuous representation typifies the state of processes compared to individual process areas, which is more suitable for organizations which wish to focus on process areas. Capability levels are measured by the achievement of the specific and generic goals associated with each process are. The standard method prescribed for the process needs a lead appraiser authorized by the CMMI Institute and a team which looks at two key types of evidence to assess the organization (Bhullar et al., 2014). The process consists of three broad phases: Planning and preparation for appraisal, the conducting of the appraisal which must be completed within 90 days and the reporting of results which are valid for 3 years (Chrissis, Konrad, & Shrum, 2003). The results indicate a maturity level profile or an achievement vs target level bar chart as part of a capability level profile. The criticism of the model is that it has not been popular. Some reasons for it being not popular is that it is not taught in detail in academic institutions. The other criticism is that the processes are too heavy and bulky. The CMMI defining documents are cumbersome and difficult to understand (Meyer, 2013).

The Good to Great Diagnostic tool is another framework to identify those companies that have made a substantial and sustainable increase in Organizational performance. The assessment includes 10 key inputs. These are the concepts that need to be implemented. There are also three key outputs to measure. The tool is broadly applicable. It examines quality leadership and commitment to core values. This is done with a willingness to approach other ideas with flexibility and honesty (Perkins, Nightingale, Valerdi, & Rifkin, 2010).

The Malcolm Baldridge prize is funded by the US Department of Commerce. It recognizes organizations with performance excellence with excellent quality of products and services. This program is managed by the National Institute of Standards and Technology. The program has scoring guidelines and self-assessment tools. It consists of a range of organizational performance indicators which can be used for transformation. It consists of mapping the key processes. This is followed by answering qualitative questions which are framed to study organizational strategies and practices. These questions have a well-defined rubric. The scores of total questions can be added to the maximum 1000 points. It provides a thorough quality and performance driven assessment that can be performed internally (Perkins et al., 2010). The criticism of the Malcolm Baldrige National Quality Award emphasizes processes rather than results. There is a relationship between the Baldrige Award and the acceptable quality levels (AQL) of government military specifications or the casual view of quality in ISO (International standardization Organization) 9000. There is also a criticism that customers nominate Baldrige candidates. There is also a contention that the Baldrige criteria may tempt managers to disassociate themselves from quality initiatives (Crosby & Reimann, 1991).

3.1. Sustainable operational excellence

The sustainable operations management is defined as a set of skills and leverages that allow an organization to structure its business processes to achieve sustainable performance (Kleindorfer, Singhal, & Van Wassenhove, 2005). A widely accepted definition of sustainability is the development that meets the needs of present without compromising the ability of future generations to meet their needs (World Commission on Environment and Development [WCED], B.C. 1987). It is widely accepted that WCED definition integrates the Social, economic and environment aspects. Economic sustainability is well-understood concept. At a plant level, it could be operationalized as production and manufacturing costs (Cruz & Wakolbinger, 2008). Environmental sustainability is waste reduction, reducing pollution, improving the efficiency of processes, energy efficiency, emission reductions, etc.. Social sustainability shifts focus to both internal and external. Social sustainability provides 'equitable opportunities, encourage diversity, promote connectedness within and outside the community, ensure the quality of life and provide democratic processes and accountable governance structures' (Elkington, 1994). The triple bottom suggests a firm will be sustainable if it performs on social, environmental and economic dimensions (Gimenez et al., 2012). Therefore, all OPEX initiatives to be sustainable the impact should be studied on economic, environmental and social dimensions.

4. The theoretical framework for sustainable operational excellence

The proposed theoretical framework for sustainable operational excellence is given in Figure 5 and detail description is elucidated below.

4.1. Social sustainability of operational excellence

Operational excellence not only has an impact within the organization but also external to the organization (Bhullar et al., 2014). In other words, stakeholder like society can play a major part in operational excellence initiatives. Social sustainability is about identifying the positive and negative impact of operational excellence programs on the society. The society with respect to an organization will consist of people within and external to the organization (Elkington, 1994). The relationship of the company with the stakeholders is thus a critical aspect for the success of operational excellence (Hubbard, 2009). It also depends upon how well the company engages the stakeholders both internal and external. The operational excellence programs directly or indirectly affect what happens to employees, workers in the value chain, customers and local communities. Therefore, it is important to manage these direct or indirect impacts of operational excellence proactively. Businesses license to operate sustainably depends on social sustainability, as such the operational excellence strategies should also be viable in the social or community context (Dyllick, 2001). A lack of social development can derail business growth and destabilize the sustainability of operational excellence programs. If the operational excellence initiatives can help in social growth, it can result into unlocking new markets, holding the existing markets, maintaining existing collaborations and attracting the new ones (Willard, 2012). Also, such an initiative can be a source of new innovations in products and services. The productivity

Figure 5. Sustainable model of operational excellence.

in operational excellence should not be seen from the reductionist perspective of improving the organization itself. Such myopia will create a downfall for the organization. Rather a holistic approach towards operational excellence will consider employees, society, technical and other soft aspects like engagement, work-life balance, etc.. Sustainable operational excellence should take these factors in addition to other social-oriented factors like human rights. Such an orientation will improve the basic human rights of workers and other stakeholders which in turn may improve sustainability. Hence, operational excellence programs should improve the lives of the people they affect. It includes efforts like creating some decent jobs, creating good products and services, inclusive value chain and so on.

Proposition 1: Operational excellence program can be sustainable in the organizations in the long run, if the program has a constituent element of the social aspect of sustainability for its internal and external stakeholders.

4.2. Economic sustainability of operational excellence

Businesses exist for profit. If there is no profit, then the operation of the business will not be a success for a long time (Collis, 1991). The operational excellence models should ensure partly financial profitability of the business. At present, the studies on economic profitability and the implementation of operational excellence models are mixed (Roca-

Puig & Escrig-Tena, 2017). For any operational excellence program to succeed in the long run, the economic viability of the business should be ensured. It is recommended that operational excellence models' impact should be studied on the economic bottom line. Some areas where operational excellence impact could be studied on economic performance, market presence, indirect economic measures, procurement practices, anti-competitive behaviour, etc. Such a multidimensional economic assessment of operational excellence impacts will lead to economic sustainability. The operational excellence initiatives in modern manufacturing techniques such as cyber-manufacturing and its economic impact are in the emerging phase. The modern manufacturing system is different from a conventional manufacturing system. It offers an information-transparent environment that will help to facilitate asset management, provide reconfigurability, and maintain productivity (Lee, Bagheri, & Kao, 2015; Sony, 2018). In cyber manufacturing system the physical components are fully integrated and seamlessly networked with computational processes, forming an on-demand, intelligent, and communicative manufacturing resource and capability repository with optimal and sustainable manufacturing solutions (Song & Moon, 2017). Therefore, the economic impact of operational excellence measures using cyber manufacturing will have to be carefully examined. The performance analysis of cyber manufacturing systems using five simulation studies has depicted a significant improvement in enhanced functionality and cooperative performance leading to economic benefits (Song & Moon, 2016). In addition, the economic sustainability of operational excellence model should also balance the other two pillars, i.e., social and environmental. The profits of operational excellence should not be at the cost of society and the environment. The operational excellence models should not engage in any temporary solutions for immense profit by sacrificing the other two goals. The motto of operational excellence should be profit by balancing social and environmental aspects. To cite an example, the operational excellence might suggest that the option of a fossil fuel-based solution be the best solution to earn an economic profit for the organization. But for an operational excellence program to sustainable, this fossil fuel solution must be weighed with respect to social and environmental aspect and then the best solution has to be discovered.

Proposition 2: Operational excellence will be sustainable in organizations if it makes an economic impact, however, this economic impact should not be at the cost of social and environmental sustainability

4.3. Environmental sustainability of operational excellence

Operational excellence involves a host of business decision which is primarily decisions which concern the products and services which the organizations manufacturers. These manufacturing process of products and services involves various tasks and activities. These activities or tasks will have an impact on the environment. Thus, for operational excellence to be sustainable, the actions and decisions taken should take into account to protect the natural world (Chinander, 2001; Corbett & Klassen, 2006). In other words, there should be an ecological assessment of operational excellence decisions. The emphases here is on preserving the capability of the environment that support the

human and other forms of life (Angell & Klassen, 1999). All operational excellence decisions can have a major impact on the environment. The decisions of operational excellence even though it is very profitable for the company, if it causes a negative impact on the environment, it should be discarded. All processes should be environmentally compliable, else, in the long run, it will not be sustainable. Many companies across the world have struggled to cope up with these challenges. Sometimes the capital budgeting processes fail to account for sustainability initiatives. There are also times when financial teams whose goals don't align with those of the sustainability teams. The biggest challenge is sometimes the uncertainty about how to implement the metrics that properly consider the environmental costs. Some companies now allocate a fund to reduce take for instance greenhouse capital projects. The operational excellence models should take this impact into account else it will result in failure (Perera, 2013).

Proposition 3: Operational excellence programs in the organizations should take into account the environmental aspects of sustainability in its implementation for its long-term sustainability.

4.4. Multi-dimensional impact of operational excellence initiatives

There are no studies which study the multidimensional impact of operational excellence initiatives on all three dimensions. Nevertheless, there have been very few studies on Lean Management which studied the impact on all three dimensions (Resta, Dotti, Gaiardelli, & Boffelli, 2016). Till today, there have been three studies on Lean Management (LM) which have studied the impact of Lean on all three dimensions (Cherrafi et al., 2017; Hartini & Ciptomulyono, 2015; Martínez-Jurado & Moyano-Fuentes, 2014). These three literature reviews have independently analysed the impact of LM of these three dimensions. In terms of operational excellence, there is no study which has studied the multidimensional impact of operational excellence initiatives on these three pillars. The operational excellence initiatives to be sustainable in the long run, it should be equally viable between all the three pillars. The trade-offs of one over the other should be discouraged.

Proposition 4: Sustainable operational excellence initiative should not indulge in trade-offs between social, economic and environmental impacts.

4.5. Organizational culture

Organization culture is defined as a complex set of shared values, belief, assumptions, and symbols that are reflected in the norms and behaviours of the organizations. It is important to manage organizational culture as it impacts the people's perception of all aspects of work. There are many definitions of organizational culture and however what it clearly present as a set of guiding principles that will influence every behaviour, action and working relation (Carvalho et al., 2017). Organizational culture is one of the most important critical success factors for the implementation of quality management. It is observed that many

organizations are failing to implement the quality management program, and the main reason for this failure is not proper usage of tools, but not having an appropriate organizational culture to adopt and use the quality tools. Organizational culture is something which cannot be implemented overnight, but it takes a lot of time to implement the culture within the organization. It is not an easy and straightforward process. But something where one encounters a large amount of resistance (Johnson, 1992). But, organizational culture can be improved through a well-thought strategic plan by taking into consideration the organizational environment (Denison, 1996). The organization culture should be seen in line with organization strategy and its environment. The effort to change the culture should not be in isolation but should be studied as a combination of both organizational strategy and environment. The operational excellence initiatives to be successful, the organizations should instil a culture towards it in both the organization strategy and environment. For an operational excellence program to be sustainable, the organization culture should imbibe the three important conceptual viewpoints of social, economic and environmental aspects. Thus, the organizational culture should over arch these three concepts. The organizational culture towards sustainable principles can be oriented by incorporating these three concepts in the vision and mission. It should become an everyday part of the strategy. Subsequently, organizations can diffuse these principles in the organizational environment or climate. Thereby, changing the organizational culture in the long run.

Proposition 5: An organization which has a culture of sensitivity towards Social, Economic and Environmental aspect while implementing operational excellence models will be sustainable in the long run.

4.6. Organization agility

Organization agility is the competence by which an organization deals with uncertainty in the marketplace and by using rapid response to transform this opportunity into innovative products and services (Carvalho et al., 2017; Panda & Rath, 2017). The two important aspect of organizational agility is rapidness and innovativeness. Rapidness means responding on time. Innovativeness means to concentrate on the quality of the response. Many researchers have also broadly defined organizational capability that will help the organization in sensing and responding to customer needs, competitor actions, Government regulations, etc. (Cai, Huang, Liu, Davison, & Liang, 2013; Panda & Rath, 2017). Such agility will result in long-term performance over time. For a long-term success of operational excellence program, the organization needs to sense the social, economic and environmental needs of stakeholders and transform the sensed needs by responding with appropriate operational excellence solutions innovatively. Thus, organization agility will also be a key factor for the sustainability of operational excellence programs. This capability will act as sensor to the changing needs of stakeholders and appropriate innovative solutions will be a by-product of these characteristics of the organization.

Proposition 6: An organization which can the sense and respond to the social, economic and environmental needs to stakeholders during the implementation of operational excellence programs will be sustainable in the long run.

5. Discussion

The operational excellence models were reviewed with respect to sustainability in terms of social, economic and environmental dimensions. The existing models are mostly practice led and lack a sound theoretical base (Found et al., 2018). There is no one model or method which has identified all the necessary elements for implementing and sustaining operational excellence. The implementation of operational excellence programs has shown initial success, but the results are mixed. It does not guarantee long-term success in terms of sustainability (Carvalho et al., 2017). To attain long-term success the operational excellence models must be integrated with sustainability concepts. The concepts of operational excellence should be (a) Socially, (b) Economically & Environmentally Sustainable. The proposed model of Operational Excellence suggests that organizations while implementing operational excellence programs should categorically study the impact of these measures on social, economic and environmental dimensions. In addition, organizations to capture the exact sustainability of operational excellence programs on the interaction effects of social, economic and environmental impacts will give a clear viewpoint. Organizational culture is one of the most critical factors for the success of quality management programs. The failure of many organizations is not the correct usage of tools or practises but lack of a culture of quality or excellence (Carvalho et al., 2017). For sustainable operational excellence in addition to the culture of quality or excellence, there should be a culture of assessing the socio, economic and environmental thinking in every excellence initiative the organization undertakes. The organization agility is the ability of the organization to detect changes in the business environment and provide solutions to stakeholders by reconfiguring its resources, processes and strategies (Mathiyakalan et al., 2005). The sustainable organizations should be agile in providing solutions to stakeholders by reconfiguration of its resources, processes and strategies by considering the social, economic and environmental dimensions. The organization must generate enough profits to make it financially viable for its long-term success. During the course operation of business, there is a tendency of management to overemphasize of economic impacts and trade-off with social and environmental benefits. However, the organization should keep in mind that the impact on all three dimensions is equally important for the sustainability of the operational excellence initiatives.

5.1. Future research directions

The future work may qualitatively investigate the viewpoints of organizational heads on this framework. A qualitative study is significant as it will help to capture the lived-in experiences of the Organization heads. Such a study will also help to unearth the factors which may hinder the implementation of this framework. It will also allow to study the critical success and failure factors for implementing the proposed model. There is also a need for live case studies as the implementation of this framework involves the study of many variables. Therefore, case studies using this framework will help to analyse the model. Besides, longitudinal studies also will help to study the impact of operational excellence initiatives on the social, economic and environmental aspects. In this regard, it is intended to conduct case studies in both developed countries like the US, the UK and developing

countries like India, Namibia, etc.. Such a study will help to unearth the operational excellence measures and its sustainability in both developed and developing countries. Furthermore, the future work may also quantitatively venture out to test the model empirically. The mediating and moderating factors may be travelled in the relationship between operational excellence and sustainability. This will further help to enrich our understanding of operational excellence activities and sustainability. The theory based on developing the proposed model is rooted in operational excellence, quality management, organizational culture, agility and sustainability literature. It is further intended to study it further so that organizations can implement sustainable operational excellence programs, by considering the practical implementation difficulties for the organization. Organization culture cannot be changed overnight, it should be developed continuously (Johnson, 1992). Future studies should explore various strategies to imbibe the culture of sustainability in the organization in a continuous manner. The organizational agility enablers can be classified as management and technology ones. The management ones are TQM, total productive maintenance, Kaizen, Kanban, supply chain management, etc.. The technology ones are computer-aided design, computer-aided manufacturing, rapid prototyping, reverse engineering, information technology, virtual enterprise, etc. (Vinodh, Sundararaj, & Devadasan, 2010). It would be interesting to classify these organizational agility enablers in terms of the impact it can have on the relationships between operational excellence initiatives and sustainability.

6. Conclusions and limitations

The last decade has seen an increased awareness towards implementing various operational excellence models for business success. However, there have been mixed results on the sustainability of the success of operational excellence measures. The paper through an integrative literature review proposes to integrate the sustainability concepts with operational excellence models for achieving long-term success to manufacture world-class products and services. The model proposes to study the impact of operational excellence measures on three dimensions of sustainability. The three dimensions social, economic and environmental were chosen based on the three pillars of triple bottom line approach. The organizations can use this developed framework for evaluating the success of operational excellence measures. The usage of this framework will ensure that operational excellence initiatives are a success in the long run. The integrative review is limited by the databases accessed, the search criteria, limited access to some of the journals, inclusion and exclusion criteria and finally the time constraints. It is pertinent that given our findings the future research in operational excellence and sustainable performance should focus on the research directions elucidated in the paper.

Acknowledgments

The author vehemently thanks the anonymous reviewers and the editor for constructive suggestions which was very useful for revising the paper.

Disclosure statement

No potential conflict of interest was reported by the author.

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