

'Unfreezing' Lean Six Sigma in The Food Industry: An Exploratory Study of Readiness Factors

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Abstract

Lean Six Sigma (LSS) is a structured continuous improvement technique widely used to boost company performance and market reputation due to its ability to minimize variability and increase process quality, which ultimately maximizes bottom-line savings. However, it is observed that LSS in the food sector is still far behind other manufacturing and service sectors, although the LSS has widely used for the last two decades. This paper aims to fill the literature gap by highlighting the criteria of LSS in the food manufacturing setting during the unfreezing stage and critical success factors (CSFs) during the change stage based on Lewin's Change Model. The semi-structured interviews were conducted with twelve quality professionals from the food industry, which engaged in quality management activities. The results showed six readiness constructs in the food manufacturing sector with 29 nodes listed and 17 CSFs out of 31 success factors for the LSS implementation. The result of this study extends the body of knowledge under the change model in LSS and facilitates LSS practitioners in the food industry to strategize to prepare the company prior to the investment to the adoption of LSS.

Keywords

Lean Six Sigma, readiness, critical success factors, Lewin's change model and food manufacturing industry

1. Introduction

The rapid and transformative technology developments in the twenty-first century have forced the industry to reshape the industrial food landscape, as there is an inclined segmentation of the market that forces it to boost its competitiveness. Food companies are well known for their heterogeneous forms of industry, and the industry is obliged to comply with strict food law legislation and rigid consumer demands (Lim et al. 2016). However, the food industry is containing high perishability of products that affected process variability and food composition, resulting in high process inconsistency while the most pressing concern is the quality of food products (Yang, 1999; Gauri, 2003; Pable et al., 2010; Lim et al., 2016).

Various industries such as manufacturing, retail, and public sectors, took an active effort in introducing several Continuous Improvement (CI) programs with sustaining and expanding competitive advantages in all sizes of companies and markets (Albliwi et al., 2014; Drohomerecki et al., 2014; Costa et al., 2018). Many of the CI programs such as Lean, Six Sigma, LSS, Total Quality Management, Business Process Management and many more have been implemented in the business as their master plan to achieve a balance between quality and execution (Antony, 2014). Since 2000, the LSS hybrid development strategy has been widely applied to improve organizational process efficiency, increase productivity and reduce business costs (Sreedharan et al., 2019).

Nonetheless, the implementation rate of LSS in the food industry was reported to be slow compared to other sectors, and one of the reasons is that the food industry is perceived as a conservative industry (Lim et al. 2016; Costa et al., 2020). According to the theory of organizational change, determination of readiness helps to minimize perceived challenges such as resistance to change faced by the food industry (Armenakis, 1993; Smith, 2005). Besides, although there is the existence of studies addressing the 'unfreezing' stage of change management in Lean, Six Sigma and LSS, the number is small, and it indicates that the research topic is still at an infancy stage. Therefore, the need to conduct a readiness study of LSS implementation in the food industry should not be abandoned as it is connected to the LSS implementation success factors in the 'change' phase (Antony, 2014). This paper aims to examine the underlying

readiness factors of LSS in the food industry and the key factors contributing to the successful adoption of LSS. The following research questions were addressed to ascertain this goal:

RQ1: What are the critical factors contributing to the success of LSS adoption in the food manufacturing sector?

RQ2: What factors influence LSS preparedness in the food manufacturing sector?

2. Literature Review

2.1 LSS in the Food Manufacturing Sector

Lean and Six Sigma first merged in the US-based General Electric group in 1986, but the term LSS was widely used in the literature in the 2000s (Salah et al., 2010; Snee, 2010; Antony et al., 2012; Laureani and Antony, 2012; Albilwi et al., 2014). LSS is one of the holistic continuous improvement approaches that involve "closing the gap," diagnosing the area of waste and minimizing process variation (Fletcher, 2018). The food industry has not been exempted from adopting LSS initiatives because it offers widespread wealth benefits and the potential to solve the problem horizontally through the Lean approach, using Six Sigma vertically (Dora and Gellynck, 2015; Costa et al., 2020). Many case studies performed in the food industry arena had shown the efficacy of LSS methods and techniques. Besseris (2014) conducted a study using multi-factorial LSS in croissant production to enhance the efficiency of the food filling processes. Dora and Gellynck (2015) carried out the case study in which LSS methods and techniques promote the reduction of gingerbread overfilling and rework processes in the confectionery industry. Sibanda and Ramanathan (2019) applied the LSS techniques to resolve the high defects and variations during chocolate production processes.

2.2 Gearing to 'unfreeze' LSS in the food industry

Jacobson (1957) pioneered the study readiness to technological adoption, in which he established that the term is semantically contrary to the resistance to change. Al-Balushi et al. (2014) associated readiness for a practice that promotes organizational transformation by nullifying potential success inhibitors or providing the knowledge and skills needed to bring about change success. Based on Lewin's theory of change model, it is appropriate to explore the factors contributing to *unfreezing* and *freezing* phases to drive any kind of change (Weiner, 2009). Unfreezing refers to accepting the need to make the change and prepare the people ready for the change (Weiner, 2009). Several studies have identified the importance of readiness outside of the implementation process and encourage the longevity of the LSS system (Radnor, 2011). Implementation of LSS in the food industry requires high capital costs and long-term commitments, so the company should strategically prepare to prevent underspending on CI activities (Drohomeretski et al., 2014; Costa et al., 2020). Furthermore, the understudied LSS issues in the food industry such as resistance to change, high turnover and complacency of current process performance.

3. Research Methodology

3.1 Data Collection

This study implemented a qualitative approach due to the research questions' exploratory nature, which Bamford et al. (2008), Mc. Adam et al. (2008) and Krueger et al. (2014) claimed that traditional quantitative method limits a deep understanding of the dynamics of change and new management practices such as quality management. Due to the unexplored analysis of LSS readiness in the food manufacturing sector, a semi-structured qualitative interview is used instead of a quantitative approach, which has been widely used up to now, in the readiness research of other industrial settings (Sreedharan et al., 2019).

Mixed purpose sampling is used to achieve the target sample in which respondents were chosen from the background of quality practitioner's viewpoint involving food practitioners with experience and previous participation in CI projects (Patton, 2002). This empirical investigation centered on twelve semi-structured interviews with food industry practitioners who had the experience of either Lean or Six Sigma or LSS. The interview protocol was designed to eliminate bias and direct the interview sessions, and as recommended by Dikko (2016), the pilot study was conducted with three respondents. The interview was conducted as an inductive approach, retaining a versatile, adaptive approach, because each interviewee seems plausible.

The interviews were conducted face-to-face due to the respondents' time constraints and availability issues, aside from four Skype virtual video interviews. The interviews were conducted in English and ranged between 60 minutes and 180 minutes. The interviews were conducted with the respondents' permissions, and detailed notes were taken. Rich

information was gathered from the respondents until data saturation was achieved, referring to the consistency stage of the data collected and stopping the interview when no new information was obtained (Bogdan and Biklen, 2007). This result found that the emerging data at respondent ten is saturated. Still, a further two interview sessions were performed by the researcher to confirm that there was no new emerging data.

3.2 Data Analysis

After the sessions, the interviews were transcribed verbatim promptly, and the data were analyzed using the abductive approach by combining inductive thematic analysis with deductive pattern clarification (Miles and Hubberman, 1994). QSR NVivo 12 software system was used to add precision to qualitative research through the recorded interview. Miles and Hubberman (1994) proposed the approach used to evaluate the respondents' exploratory comments for recognizing emerging themes. Transcripts of the respondents have been read many times, and the coding process has been performed to obtain useful insights relevant to the research topic. The coded data content was thematically analyzed to create new ideas as the basis for the theory's readiness for change to evolve. The established codes were chosen and grouped into the categories, often known as themes. The assessment's philosophical and theoretical underpinnings are considered. The condensed data analysis and explanation were carried out in order to check the inferences previously made logically and to clarify the data better. In this study, Guba (1981)'s four principles were considered to ensure the credibility, transferability, reliability, and confirmability of the results:

- 1) **Credibility:** The interviewees were given a chance to review and validate the transcribed interview.
- 2) **Transferability:** The researcher used the maximum variety technique to choose the respondents from various sectors in the food industry by considering their experience of Lean or Six Sigma or LSS, the number of years they had worked in the food industry and the types of companies they served at (Merriam and Tisssdell, 2015).
- 3) **Dependability:** Two other researchers' codes were contrasted with build codes with an 80% correlation of adequate intercoder comparison.
- 4) **Confirmability:** the data were produced through quotes and continuous analysis of the research process to avoid the risk of bias in the analysis.

Table 1. Profile of the respondents

Respondent code	Type of company (Commodities)	Years of experience in the food industry	Position
R1	Oils and fats	9 years	Operational Excellence Manager/LSS Black Belt
R2	Dairy products	14 years	Production Manager/Six Sigma Green Belt and Lean Black Belt
R3	Dairy products	7 years	Process Engineer/LSS Green Belt
R4	Oil and fats	9 years	Assistant Manager Quality
R5	Beverages	7 years	Production Engineer
R6	Bakeries	2 years	Quality Assurance Executive
R7	Oil and fats	1 year	Continuous Improvement Manager/LSS Black Belt
R8	Dairy products	15 years	Operation Manager/LSS Black Belt

R9	Beverages	2 years	Quality Assurance Executive/Certified Quality Engineer
R10	Confectionary	13 years	Value Stream Manager
R11	Oil and fats	9 years	Supply Chain Manager
R12	Meat and poultry	10 years	Quality Assurance Manager/Six Sigma Green Belt

4. Results

4.1 Determination of critical success factors (CSFs) of LSS in the food industry

The findings revealed 31 success factors of LSS implementation in the food manufacturing sector. Through Pareto analysis, the frequency of reported coded listed by the respondents was analyzed. Sreedharan et al. (2018) suggested that Pareto analysis helps to classify success factors into "vital few" and "trivial many," which narrow down the factors to accentuate the desired goals. Figure 1.0 shows that 17 CSFs lead to 81.58% of success by more than 80 %. Training program shadowed by top management support and commitment, financial resource, employee involvement and communication structure is the top five main success factors. The following paragraph revealed the inter-relative coded based on the top five CSFs.

The training program had been the most commonly mentioned by the respondents in leading to the successful adoption of LSS in the food manufacturing industry. Three distinct factors arose from the training: coaching and mentoring, LSS awareness and understanding level of LSS.

"There will be coaching and mentoring sessions in our LSS training program as our company has internal trainers to train our employees in the Green Belt or Black Belt program." (R1)

"It is a necessity to conduct LSS basic training to create awareness for the employees." (R5)

"I would say continuous training for the employees is critical to increasing their understanding of the function and benefits of each LSS tools." (R12)

The support and commitment from top management on LSS projects was one of the most vital factors after the training program. The respondent R12 mentioned that the requirement of LSS project approval highly depends on the top management vision.

"If there is any change in management, there is a need to have massive support from the top by ensuring they are acknowledged and understand the benefits of current initiatives...I would say management is supportive when they are willing to invest in LSS projects." (R7)

"I believe that top management support influenced when they have awareness and understand the benefits of current LSS initiatives." (R10)

Another influential consideration is the availability of financial resources in the food industry to carry out LSS ventures. This factor was addressed further by the respondents when there was also mention of emerging factors. Respondents stated that their company does allocate budget for rewarding the employees and investment in cost-saving projects. Another respondent responded on this issue:

"I would say the organization's importance in having a good financial capability for investing in system, training, employment of trainers, and software." (R2)

"LSS projects demand investment from the management, especially for staff training and maintaining the program." (R6)

Another significant contributor factor listed was employee involvement in the food manufacturing industry towards the successful LSS project. Respondent R1 mentioned that his company involving their employee by empowering them through hands-on training to give the best exposure in the workplace. Besides, respondent R7 believed that through the involvement of employee lead to the creating on awareness and increasing their understanding of LSS

concept and benefits. Respondent R11 revealed that his company allows the shop floor employee in the decision-making process, which belief to motivate and develop trust among employees and management.

Communication structure was identified as one of the prevalent success factors that play significant roles in ensuring the successful implementation of LSS in the food industry. Respondent R1 believed that effective communication is essential, especially in convincing the top management. As he stated that top management roles in communicating the LSS strategic thinking to all departments. Besides, it was to ensure the awareness of employees on LSS initiatives. Other respondents stated that:

"The acquire in having basic briefing to the shop floor to deliver the format procedure of the LSS projects and ensuring that they know how these projects will impact them." (R8)

"It is more on how we can communicate well with all departments and how we can convince our top management about the projects that we have done... Frequent communication when there is an on-going project to update the results and activities." (R11)

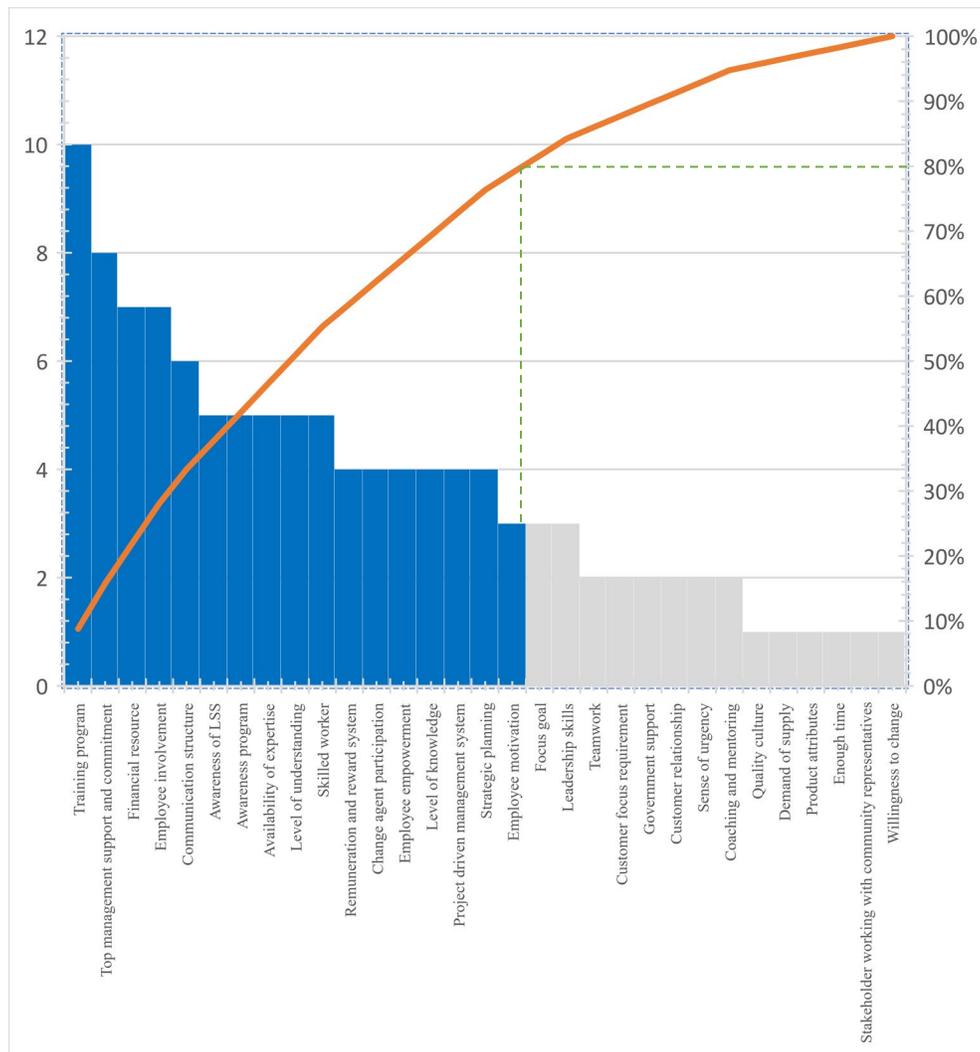


Figure 1. Pareto chart of critical success factors of LSS implementation in the food manufacturing industry.

The pareto chart also revealed that the managerial factors strongest influence the success factors of LSS in the food industry. However, the success factors mentioned does not limited to the managerial but also on other categories as

well like operational and external factors. The change process is influence in any form of factors that could lead to the successful of LSS implementation in the food industry. Some of the excerpts being mentioned from the respondents:

"The government should provide support by giving rewards towards the successful of LSS projects through competition or maybe subsidize for some LSS training." (R10)

"We need to have structured process flow for this LSS project, and the problems are handle based on the employee expertise level." (R8)

"The LSS implementation process are depending on the type of the production line. For example, biscuit production is fully automated production line and the company actually can adapt and adopt the process that have similar production processes." (R1, R3)

"LSS concept is driven by building up the trust from the customer. Thus, the project should be customized to ensure in meeting up the customer requirements." (R1, R5)

4.2 Exploring of readiness factors of LSS in the food manufacturing industry

Through the interview sessions in this study, LSS practitioners in the food industry gathered a vast amount of information about the effect of LSS readiness factors. The interview was able to produce 29 nodes of readiness variables, and the results from the interviews include insights and reflections on LSS experience in the food industry from industry practitioners and experts. The 29 nodes were categorized under six constructs, which are management commitment and leadership, organizational culture readiness, process management, project management, employee involvement and external factors.

Figure 2.0 shows that management commitment and leadership have the most nodes, which reflecting the critical role of the factor and most respondents pointing out that both have a significant impact on strategic LSS innovations. The majority of the respondents have highlighted the need for top management to construct a clear organizational route and to set appropriate LSS execution goals. Respondent R7 said top management should commit to effective communication when introducing the LSS initiative to ensure that everyone understands the implementation reasoning and is consistent with what the organization needs for LSS deployments. Respondents indicated that, through communication, top management has the most significant influence in creating a sense of urgency for change. Respondent R7 noted that top management should have a predictable rhythm that could inspire the industry to adopt LSS. Respondent R3, R10 and R11 summarized qualities of leadership that represent the company's willingness to adopt the program, such as convincing workers to embrace the LSS:

"Buy-in at shop floor level would be difficult without leadership and coaching capabilities." (R10)

The respondents concluded that support from top management could be viewed by their shared perception of how and why the introduction of the LSS process would impact the company. Financial aid is the most significant support from top management, as it influences certain readiness factors like investment in training, software, machinery and employment of external experts for consultation. This research identified two new factors for readiness, where the respondents stated the importance of appointing LSS champion and awareness from top management to ensure that they realized the need for LSS implementation and fully grasp the reason for introducing LSS, as stated in the interview session.

Organizational culture readiness is one of the second primary influential constructs claimed by the respondents. Respondents R3 and R8 indicated the need to consider the essence of current process output in addition to realize the importance of appointing consultants and developing an effective strategy in achieving process excellence. The respondents indicated that the availability of consultants is critical in introducing the LSS program, where the consultant is providing training and coaching the team members. The respondents believed that developing an internal expert in an organization was by training the internal personnel by the external consultant. Respondents stated the importance of implementing a reward and recognition system to boost motivation among employees. Besides, some respondents recommended to invest and update on machinery and software. The respondents even stressed that the food company's top management must formulate a strategy to change the employees' attitude towards embracing new strategies for LSS quality enhancement, using an approach that is considered acceptable to the culture of the company.

"The LSS project timelines should be built in a fair, functional and workable timeframe." (R2)

"The need for a proper manual as a guide for LSS introduction." (R8, R10)

Process management's fundamental principle is to build customer trust and increase emphasis on customer needs in processing the products. Respondent R5 said the company's strategic planning should be based on consumer needs as consumers are attentive to the cost and value of goods. Under project management categories, the respondents stressed the importance of LSS awareness and claimed that awareness-building could be achieved by implementing quality organizational activities. Another critical issue is the recruitment of CI project teams, as this is the workforce associated with projects to improve quality. Some respondents believed that different programs needed to tackle particular approaches. LSS implementation cannot be the solution to all problems.

"Choosing the right project is the project that will have a vital effect on business." (R12)

The involvement of skilled employees in the quality management project is a crucial indicator of readiness at the LSS stage. The respondents assumed that finding the right train candidate would add extrinsic value to the company as depicted by respondent R8 stated the selection of the right people could bring value to the costly black belt training process. Respondent R6, R7, R9 and R11 said employee level of awareness would be an advantage in reducing employee resistance to change during the LSS initiation process. They reported that when they understand the idea of LSS deployment, the employee agrees on the initiative. Respondents R2 and R4 claimed that knowledge of LSS should be given to employees of an organization, where R5 claimed that LSS education could be delivered as early as tertiary education. Respondent R1 listed support from the government contributed to LSS implementation readiness. He further discussed that government help, such as carrying out the company's LSS promotional campaigns and introducing the business to the Lean movement through information sharing sessions and industrial visits.

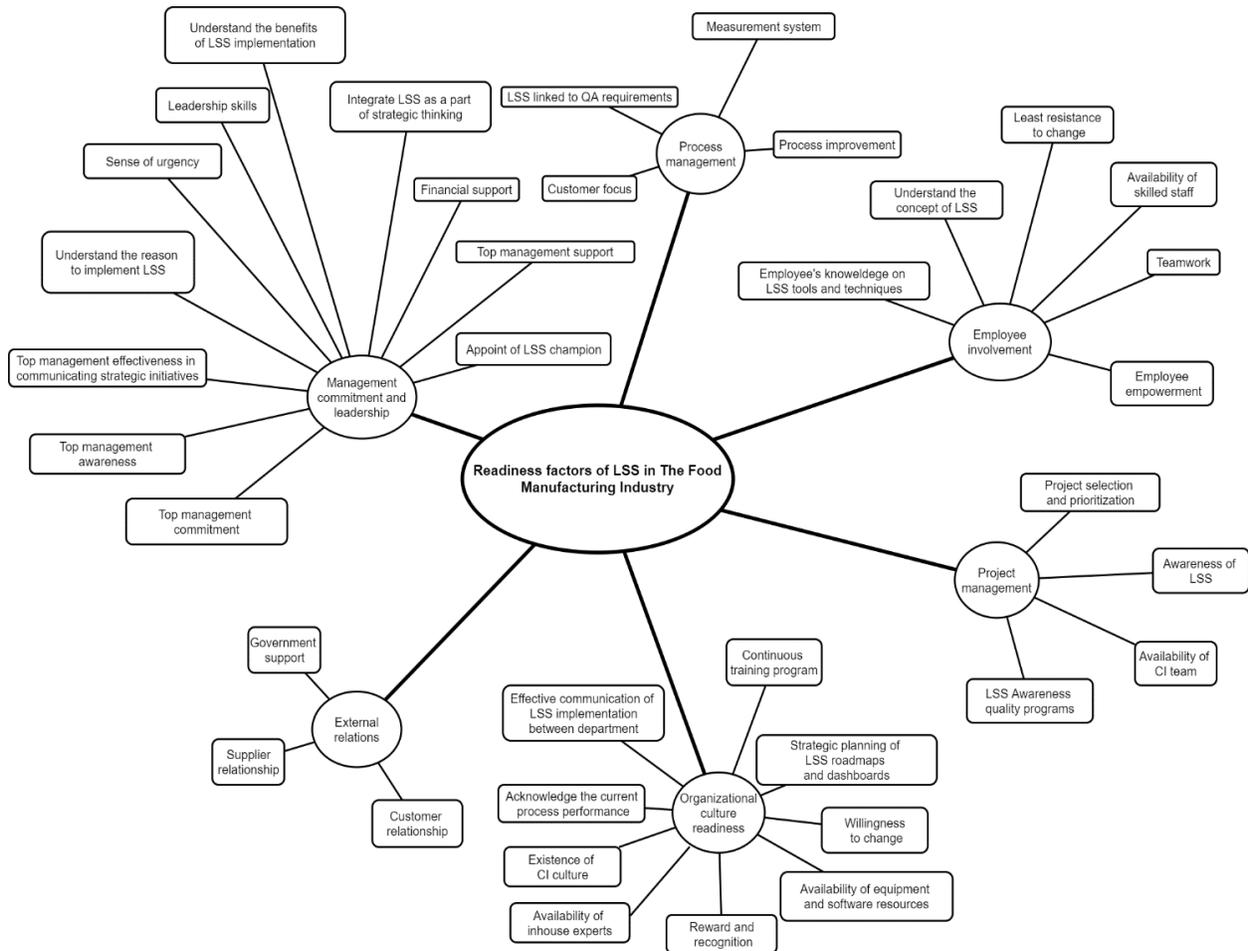


Figure 2. LSS readiness factors in the food industry

5. Discussions

The determination of CSFs in the results depicted reflected the change phase, as recommended by Lewin's change model (Lewin, 1947). Determining the key elements that drive the successful implementation of LSS adoption in the food manufacturing sector is essential, as Rockart (1979) noted that management should consider different industry may be affected by various factors (Alazmi and Zairi, 2003). The CSFs should be carefully evaluated by the top management in the food manufacturing industry because there are important aspects for management to control to achieve the organizational objectives (Brotherton and Shaw, 1996). The Pareto analysis revealed the top five core factors that contributed towards the success of LSS adoption in the food manufacturing industry, which is training programs followed by top management support and commitment, financial resources, employee involvement and communication structure.

This study highlights the importance of employee training in the successful implementation of Lean, Six Sigma and LSS projects in the food industry arena (Dora et al., 2015; Moya et al., 2016). This finding is in line with Sreedharan et al. (2018), which suggested that the organization should tailor its own continuous improvement training program since training had become the second most common factor to be mentioned from past LSS studies in the food industries (Knowles et al., 2004; Upadhye et al., 2010; Hung and Sung, 2011; Dora et al., 2015; Moya et al., 2016; Costa et al., 2018). This finding further supported Sibanda's case study (2018), where the author stated that related staff to the targeted process would undergo the improvement method training to ensure the effectiveness of the chocolate production. Top management plays an essential role in the LSS change stage. The roles of top executives in LSS implementation are ensuring the availability of the necessary resources and no obstructions during deployments of LSS projects (Snee, 2010; Martinez-Jurado and Moyano-Fuentes, 2012; Albilwi et al., 2014) and without significant support from top management risk to the fatal deployment of LSS quickly.

Financial support plays a crucial role in supplying the budget for the investment of LSS ventures in the food industry (Dora et al., 2013). The results explained the reasonably good connection between the top management support and commitment, financial resources, training, reward and recognition, and investment in critical resources (trainers, machines, and software). The availability of financial resources, however, is seen as a factor strongly linked to support and commitment from top management. Employee involvement is vital because, as Costa et al. (2018) stated in their reviewed paper, it had become the top five critical success factors in the food sector. This is definitely true of the case study conducted by Powell et al. (2017), in which the participation of all employees from the different departments with the core LSS project team is key to the success of LSS adoption in the dairy industry.

The previous study stated the need for effective vertical and horizontal coordination between all departments at various levels and regular interactions concerning the success of LSS projects (Jeyaraman and Teo, 2010; Upadhye et al., 2010; Antony, 2012; Salonitis and Tsinopoulos, 2016; Powell et al., 2017). Bjorkman (2010) highlights that successful internal communication is essential for an organization in which tasks are needed to inspire, influence and otherwise change employee behaviors. Zorn et al. (2010) reported a leader's role in providing the information required to the shop floors to ensure a clear understanding of the process or initiative.

The managerial factors contributed the most in the CSFs compared with the other categories. This was due to the human-related factors affects the change process of LSS implementation in the food industry (Costa et al., 2018). However, the operational and external forces should not be neglected as there are also the contributors towards the LSS successful adoption. Figure 3 depicted the position of determined CSFs factors based on Lewin's change model. The determination of CSFs attracts the practitioners to invest in the LSS initiative.

However, determining readiness during unfreezing stages would help the food industry to be fully prepared for LSS initiatives. Antony (2014) stated that considering the willingness to change is one of the success factors. Drohomerski et al. (2014) and Costa et al. (2020) reported that implementing LSS in the food industry needs high capital costs and long-term commitments, so the business should be positioned strategically to prevent underspending on CI activities.

Management support and leadership was one of the critically affected constructs. Management commitment and resources are essential if there are to be continuous and steady improvement attempts (Antony, 2014). The top management has the authority to incorporate LSS as the strategic strategy to enhance quality and business performance for the organization. Top management support referring to action is taken and policies decreed by top managers to aid and facilitate the adoption of the LSS by the company (Lim et al., 2016). The top management should build a real sense of urgency when proposing the improvement initiative on the requirement of enhancing and doing things that

contribute to the performance of the organization by involvement in LSS projects (Kotter 2008; Snee, 2010). Leadership impacts societal preparation for transition and allows for meaningful change (Tushman and Nadler, 1986).

The interview revealed that readiness for organizational culture is a critical factor in assessing the readiness of a company to introduce LSS in the food industry. Employees in the organization should have a quality-driven culture, and earlier research suggested that the fundamental goal of the performance is a change in culture by a company (Cross, 2009; Lagrosen et al., 2011; Gurumurthy et al., 2013). Lagrosen et al. (2011) stated that continuous training helped to develop professional workers and provided the employee with LSS knowledge of methods and techniques.

The results showed that the organization is supposed to align the LSS initiative with customer focus and set the business target. This is to ensure that the LSS projects are linked to the needs of the customer to ramp up the "customer voice" while taking into account the characteristics of the food sector itself and it has become crucial for the business to survive to create operational efficiencies to deliver successful customer production (Sreedharan et al., 2019). System performance can be improved by identifying root-cause problems, providing solutions to changes and avoiding reoccurrence (Lee et al., 2011). Besides, companies are prepared for LSS when a competent measuring system is available in the process (Lagrosen et al., 2011).

The findings showed that good project management has contributed to the LSS initiative's preparedness. Proper project selection is believed to be aimed at giving the company full financial benefits and gaining technical, organizational perspectives (Lagrosen et al., 2011; Jeyaraman et al., 2012; Mishra, 2018). Project management consists of evaluating the level of awareness of Six Sigma, which can make the firm ready and vulnerable to implementation (Lagrosen et al., 2011). The project of awareness-raising events is believed to raise the degree of awareness of the LSS initiative.

Employee involvement and responsibilities within the company demonstrated the preparedness of LSS activities. Employees with ample knowledge of LSS methods and procedures, and recognizing the principle of LSS, are assumed to minimize resistance to change. Working as a team decreases the resistance to change that supports the concept of earlier literature reported that the management should appoint members and prepare the team to solve the problems associated with improvement (Keliji et al., 2018). The organization should empower its employee toward problem-solving activity by assigning them which would create respect and trust between manager and employee

The results only suggested the government's role in the "unfreeze" stage for the LSS. This node was not listed in previous readiness studies of LSS, however, stated as one of the critical contributors as reflected in Cox et al. (2007). Lean adoption in red meat industries where the government serves as a policymaker and strategizes successful adoption strategies. The organizations should, however, develop cooperation and transparency towards their outside actors by referring to all activities with their suppliers and customers (Moya et al., 2019). Figure 3 positions the readiness factors in the unfreezing phases.

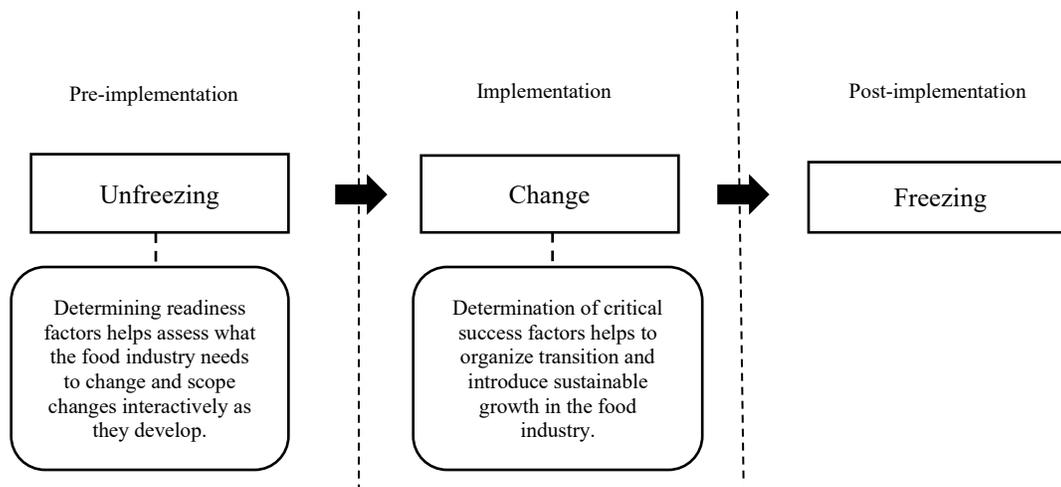


Figure 3. Positioning of readiness factors and critical success factors in the unfreezing and change phases based on Lewin's change model.

6. Conclusions

This study aims to identify factors leading to the preparedness of LSS deployment in the food industry while determining the CSFs of the LSS in reflects the ability to recognize six LSS readiness factors and understand the critical elements that arise in the unfreezing and change phases of LSS implementation. The study has identified 17 CSFs with training to LSS was found to be the most critical factor. While, in the food industry, LSS initiative preparedness impact from management support and leadership, organizational culture readiness, process management, project management, employee involvement, and external relations. Management support and leadership were found particularly important in the food industry as the resistance to change is the most common issue with new technology introduced to the food industry.

However, it is recommended that the grounded hypothesis be tested as it can help establish generalized constructs because this work includes only a small number of participants and therefore faces generalizability limitations. The study concluded with a discussion of defined readiness factors that could be a medium for possible practical application of the LSS self-assessment readiness scale for practitioners in the food industry and an agenda for future research that aims to deepen understanding of readiness function in LSS implementation.

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