



Lean-Excellence Business Management for Manufacturing SMEs focusing on KRI

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Purpose: This paper aims to develop an effective framework for implementing Lean strategies in Small and Medium-sized Enterprises (SMEs) in the Kurdistan Region of Iraq (KRI).

Methodology: Based on the integration of LM tools and techniques with the MBNQA criteria a systematic lean implementation framework for manufacturing SMEs has been proposed. The core values, drivers and tools of the proposed framework were further developed based on case studies in three SMEs in the KRI.

Findings: Proposed framework is able to provide a simple pathway for SMEs to systematically implement Lean techniques in seven functional areas in order to create Lean culture in the organisation. Business performance measurement in terms of profitability, customer satisfaction, employee's satisfaction, competitiveness growth and ergonomic improvement are presented in favour of evaluating Lean outcomes appropriately. It also presents the experience of small firms in implementing lean programmes to show that Lean is valid in SMEs.

Implications: The framework assists improvements for SMEs that either attempt to start lean journey or those that are at more advanced levels towards excellent-lean manufacturing. The framework can also be used as a self-assessment model to determine the degree of lean readiness.

Limitation: The framework concentrates only on the internal issues of the organisation, while external variables such as national culture and external support are excluded.

Originality: To the best knowledge of the author, it is the first framework that integrates Lean techniques with MBNQA criteria to support Lean implementation in SMEs. It is also the first study regarding Lean-excellence in the KRI.

Keywords: LEBM framework, Lean-excellence, Business Management, SMEs, KRI.

1- Introduction

The current global hyper-competition and swift technological changes are forcing many companies to optimise their production processes that enable them to produce

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3 high-quality and low-cost products. This quest has increased the necessities for
4 extensive improvements in manufacturing leadership, customer relationship, process
5 management, strategic thinking, and employees satisfaction (Mason et al., 2015;
6 **Netland, 2016**; Alhuraish *et al.*, 2014; Alaskari *et al.*, 2012). LM thinking is a
7 philosophy that addresses advantages obtained from the mentioned sources. The
8 core idea of LM is to build mutual trust, and unique way of working that ensures
9 highly responsive to customers' demands while constantly cutting cost and
10 eliminating wastes throughout the organisation (Bhamu & Sangwan, 2014; Shah and
11 Ward, 2003).

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18 To generate the best possible values and reduce non-value added activities,
19 manufacturers applied different LM principles, tools and techniques. However, many
20 organisations find it complex and difficult to do that effectively (Baker, 2002). In the
21 context of SMEs, LM initiatives pose further challenges. Lack of adequate finance,
22 leadership deficiencies, shortage in multi-skilled employees, short-term orientation,
23 inappropriate organisational culture and outdated manufacturing technologies come
24 in the forefront of these barriers (**Sahoo and Yadav, 2018**; Antosz and Stadnicka,
25 2017; Jasti and Kodali, 2014; Achanga et al., 2006).

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33 In the KRI, SMEs which account for 95% of the manufacturing sector and employ
34 80% of the industrial labour force play a vital role in the development of the economy
35 (KRG-MOP, 2012). However, KRI-SMEs have currently faced a lot of difficulties
36 caused by imported products from the regional countries, and the collapse of the oil
37 revenue which caused a national economic slowdown. Since 2014, the number of
38 dissolved SMEs has been steadily rising while the remaining firms have been
39 struggling for survival (Shehab et al., 2017). Therefore, developing a holistic
40 framework to improve SMEs productivity is an immediate quest of SMEs managers
41 and researchers in the KRI.

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49 In the literature, various studies have been carried out in proposing frameworks to
50 improve productivity of SMEs by LM, but they are often conceptual, complex in
51 structure, incomplete, have no clear links between outlined elements, cannot engage
52 shop floor workers, and cannot measure the outcomes of LM (Belhadi et al., 2016;
53 Nguyen, 2015; Mostafa et al., 2013; Anvari et al., 2011). Therefore, this paper argues
54 and discusses how MBNQA can be used as an overarching framework for
55 implementing LM initiatives within SMEs to achieve improvements in business
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3 performance. In an attempt to assist KRI-SMEs to implement LM successfully, this
4 research develops a new framework by integrating Lean tools with MBNQA criteria
5 which is believed to be valuable and suitable for them.
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8 To fulfil the aim of this study, three main objectives were developed: (1) to show that
9 integration between Lean techniques and MBNQA criteria is possible and it can
10 provide all requirements of successful Lean adoption in SMEs. (2) to examine the
11 process of Lean implementation in manufacturing SMEs through case studies. (3) to
12 identify a set of critical success factors and comprehensive Lean tools that support
13 SMEs to implement Lean effectively.
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19 The proposed framework is called Lean-Excellence Business Management (LEBM).
20 It was developed after conducting a literature review related to the possibility of a
21 combination of Lean tools with MBNQA criteria to support SMEs development. The
22 core value, drivers and operation tools are reviewed and checked in the light of case
23 studies conducted in three manufacturing SMEs in the KRI. It is assumed that the
24 framework would provide insights and guidelines to SMEs in general and in the KRI,
25 in particular, to implement a Lean approach effectively.
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32 The rest of this paper is organised as follows: First, the review of the literature about
33 the LM application in general and within SMEs in particular, review of LM framework
34 for SMEs and MBNQA model is presented. Next, the integration between LM and
35 MBNQA, and their synergistic benefits are examined. Secondly, the methodology
36 and rationale of the literature review and case studies are discussed. Then, the
37 findings from the case studies and an overview of the development of the framework
38 is provided. Finally, the characteristics and application of the new framework, the
39 main conclusions from this study, and some possible opportunities for further
40 research were suggested.
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48 **2- Literature review**

49 *2.1 Lean Manufacturing application*

50 The implementation of LM like other productivity improvement initiatives needs
51 systematic processes to apply correct Lean tools within different organisational areas
52 in order to achieve excellent business performance. However, the processes are not
53 outright to follow, as each organisation has its own culture and policies that might
54 support or resist the flow of Lean activities (Anvari et al., 2011).
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To avoid costly defeats and support organisations to adopt LM, practitioners and researchers have suggested a list of critical success factors (CSF). CSF are those few organisational areas that need constant attention to go well in order to bring success for the companies.

In the literature, the most common CSF of effective lean adoption have been highlighted are top management and leadership, human resources, strategic planning, customer focus, LM knowledge and process management (Alhuraish *et al.*, 2014; Netland, 2016; Alaskari *et al.*, 2012; Rose *et al.*, 2011). Other researchers highlighted different aspects such as visual management, deep understanding of LM principles (Nugyen, 2015), risk management (Jedynak, 2015), internal competence and appraisal system (Ottar *et al.*, 2011), quality improvement and housekeeping (Upadhye *et al.*, 2010), product design and supplier development (Wong *et al.*, 2009), managing culture change, infrastructure and reward systems (Ahuja and Khmaba, 2008), financial ability and expertise participation (Achanga *et al.*, 2006), personal values, beliefs, and ideologies that affect the behaviours of the workers in an organisation (Wong and Cheah, 2011), situational analysis, LM learned lessons review, LM assessment and LM sustaining (Mostafa *et al.*, 2013). Table 1 summarised the most frequent CSF in the literature.

Top management commitment and total employees' involvement to the LM changes come at the top of those factors that support successful LM implementation. Managers have to communicate strategies, facilitate, model the behaviours of LM and share their vision, understanding and experience with the shop-floor employees to pave the pathway to trust, directly adapt and sustain the improved outcomes (Kumar, 2014). Clear Lean strategies and staff training also highlighted frequently. LM system needs a constant and long-term vision to create incremental improvements to the manufacturing processes. LM transformation does not happen overnight: it is an overall change in all areas of the company, regularly giving and receiving feedback, not just the one-course solution. The journey requires continuous training and education to facilitate the process of the intended change (Crute *et al.*, 2003).

Table 1

2.2 Lean application in SMEs

LM practices in SMEs have a relatively short history (Matt and Rauch, 2013). Some researchers argue that full LM programmes are more likely to be implemented in big businesses rather than SMEs (Ottar *et al.*, 2011; Rose *et al.*, 2011; Shah and Ward, 2003). Achange *et al.* (2006) also believe that SMEs are still not sure about the cost of LM implementation and the tangibility of its outcomes and benefits they may achieve. Most of these companies fear that adopting LM are time and money-consuming.

Hayes (2005) argued that successful adoption of LM projects in SMEs requires previous stability in the organisation and assurance of budget, human resource, training, programmes, strategic planning and reward mechanics. Nguyen (2015) declared that SMEs have to start with the simple and less financially demanding LM tools such as 5S, kaizen and visual control. After that, they can extend to more advanced tools such as kanban and small lot size. He clarified that LM practices mostly depend on human mindset and the workforce behaviours. Thus, the SMEs have to start firstly with raising their employee's awareness of LM nature and requirements.

Mason *et al.* (2015) reviewed 101 papers (until February 2015) regarding different practices of LM in the SMEs and found that all researchers confirmed positive results regarding quality and productivity. They concluded their review as follows:

- LM initiatives in SMEs are closer to the internal process improvement and are not extended to cover the whole supply chain. They are likely JIT production rather than JIT delivery.
- Simple and inexpensive techniques such as Value Stream Mapping (VSM), 5S, Kanban, Standardisation and Total Productivity Maintenance (TPM) are mostly used while other tools such as Accounting Methods, Cellular Manufacturing, Project Management, and Quality Function Deployment (QFD) are applied less.
- LM practices in SMEs often aimed to reduce waste, inventory, time, and cost or to increase product quality, and rarely covered customer relationship and supplier management.
- Factors such as leadership, strategic planning, employee involvement, organisational cultures, employee autonomies, wide communication, training and education, willingness to change are the most CSF for SMEs to perform LM.

- Most of the LM inhibitors are related to the unclear vision toward lean, market demand fluctuation, raw material control, weak customer links, poor production processes, weak quality control system, unaided organisational culture, and lack of funding.

Regarding the implementation of Lean tools and techniques, Matt and Rauch (2013), and Sahoo and Yadav, 2018 stated that even if not all lean techniques are applicable in SMEs, a selection of a suitable method can be recommended as follows:

- First-in-first-out (FIFO)
- 5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke)
- Benchmarking
- Kaizen - Continuous Improvement meetings
- Just in Time delivery
- Pull-principle and Kanban
- Visual Management in Production
- Zero Defect through process-integrated failure control
- Idea Management to utilise the worker's Know-How
- Setup Time Reduction to reduce waste
- Value Stream Mapping
- Efficient and ergonomic workstations
- Poka Yoke and standardisation in product and process
- Cellular Manufacturing and autonomous teams
- Job rotation to avoid monotony
- Low-Cost automation ("keep it smart and simple").

To implement Lean initiatives in small organisations successfully; therefore, a practical framework that covers all Lean pre-requirements, CSF and correct tools are necessary (Balles, 2005; Esfandyari and Osman, 2010).

2.3 Review of the Lean implementation frameworks

According to Sousa and Aspinwall (2010), the framework is a presentation of the structural relationship of variables of a particular system aims to answer "how to" questions and steers the methodology implementation. Regarding Lean framework,

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3 Anvari et al., (2011) claimed that it should guide the transition from existing
4 production processes to one that ultimately follows the best practices of LM
5 philosophy. While Wong and Wong (2011) defined LM framework from the
6 organisational perspective when argued it has to integrate the best practices in
7 different areas of the company to allow practitioners to understand the full
8 requirements of LM transformation.
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13 Al Manei et al., 2017; Bilhadi et al., 2016; Nguyen, 2015; Jasti and Kodali, 2014;
14 Karim & Arif Uz-Zaman, 2013; Wong and Wong, 2011; Rose et al., 2010 have
15 developed different frameworks to guide organisations on how to implement Lean
16 projects. These frameworks often highlighted Lean tools and success factors to be
17 introduced to the organisation. Table 2 presents the review of a number of the
18 frameworks and their shortcomings in the context of SMEs.
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23 **Table 2**

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25 The researchers in Table 2 have criticised the existing framework in the literature
26 because they are complex in structure, and have no clear links between their
27 components (Bilhadi et al.,2016), top-down approach and cannot engage the shop-
28 floor workers (Nguyen, 2015), quite generic and do not specify the sequences of LM
29 implementation (Rolish and Shahadat, 2014). However, they cannot overcome all
30 these weakness and deficiencies in their developed frameworks. The conceptual
31 framework of Mostafa et al. (2013) has a complex structure of 22 steps, which is hard
32 for SMEs to follow and needs highly-skilled workers to implement. A methodology of
33 LM implementation of Halim et al. (2013) which is based on Toyota's eight steps
34 processes is designed for large enterprises (LEs) and is not suitable for SMEs,
35 especially for beginners. The project-based framework of Anvari et al. (2011) limited
36 most of the LM activities to the top managers, and the role of the workers is not clear.
37 This framework needs a lot of effort to sustain the results which is not easy for SMEs
38 to provide.
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50 This research, therefore, argues that an overarching framework like MBNQA can
51 provide a holistic and simple methodology for LM implementation. LM principles and
52 techniques can easily integrate into the criteria of the framework to generate a new
53 framework that can enhance productivity through the improvements in manufacturing
54 processes in SMEs. An overview of the MBNQA model, thus, here is essential.
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60 *2.4 Malcolm Baldrige National Quality Award (MBNQA)*

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3 MBNQA is one of the well-known business-excellence awards which aim to
4 recognise and reward business excellence across all sectors in many countries. It
5 was released in 1987 to improve the quality of the American products to compete in
6 an ever-expanding global market. Initially, the reward covered manufacturing, service
7 and small companies; from 1998, it also covered education and healthcare
8 associations. Since 2006, non-profit organisations have also been eligible to
9 participate in it (MBNQA, 2017a). As a result, more than 2 million companies in 100
10 countries have produced their versions of the award (BPEP, 2013).

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17 This model is systematic and documented best practices that can create an
18 environment for continuous improvement and guide an organisation toward excellent
19 performance at both strategic and short-term extents (Tickle *et al.*, 2016; Sharma and
20 Kodali, 2008). Furthermore, it is a globally accepted model, imitated by 27 national
21 awards around the world (16 of them in Asia). Thus, the model is adaptable to the
22 various types of organisations despite their size, economies and cultures. Figure 1
23 presents the criteria of MBNQA.

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Figure 1

MBNQA model has been adopted as a catalyst to improve competitiveness and
develop the culture of quality rather than just an award of excellent performance. It
consists of seven integrated dimensions which namely are Leadership, Strategy,
Customers, Measurement, Analysis and Knowledge management, Workforce,
Operations, and Results of the business.

It allows managers to appreciate all the factors influencing their organisations, to
prioritise, develop, and improve essential issues to success, and to establish
practices that enhance and sustain the best possible performance (MBNQA, 2017b).

MBNQA is a non-prescriptive qualitative framework; it does not prescribe any specific
methodology or action plan to be followed. Fischer (2010) and Parasat and Jones
(2006) claimed that MBNQA could provide a comprehensive framework that enables
enterprises to eliminate wastes or to streamline their production processes. So, LM
can efficiently address opportunities within all of the MBNQA criteria (DeVries, 2014).

2.5 Integration of Lean tools with MBNQA criteria

To support lean transformations of enterprises, many researchers suggested
integrating LM principles with other advanced methodologies such as Six Sigma,

Balanced Scorecard and Business Excellence models (Okhovat *et al.* 2012; Blazey and Grizzell, 2014). Combination of LM tools with MBNQA frameworks can bring better results in terms of quality (Soare, 2012), problem-solving, improving organisational performance (Motwani, 2003), speed up delivery, reduce cost (Ho, 2010) and cut down processing time (Tatsana-iam and Ngaoprasertwong, 2013). The core idea of this research, therefore, is to combine Lean techniques and MBNQA criteria into a single framework to support a systematic lean implementation within SMEs context.

Although the MBNQA and LM follow different development paths, they have some similarities (Anvari *et al.*, 2011; Dahlgaard and Dahlgaard-Park, 2006) and overlapped objectives (Parast and Jones, 2006). They share common concepts such as continuous improvement (Pettersen, 2009), organisational learning (Bozdogan, 2010), process improvement and customer satisfaction (Andersson *et al.*, 2006) and employee involvement, empowerment and well-being (Grizzell and Blazey, 2006). Table 3 explains the harmony between the MBNQA criteria and LM approach.

Table 3

The MBNQA focuses on the critical factors driving excellent business performance, while LM emphasises on eliminating waste through the improvement of the value-added processes. Thus, both have similar objectives. When LM reduces waste from the production process, it promotes the MBNQA's aim of continuous quality improvement (Bozdogan, 2010).

So, The combination of these two strategic approaches into a single framework will bring further advantages to small businesses and can accelerate their transition toward lean-excellence performance.

3- Methodology

Literature review presented in the previous sections confirmed the applicability and advantages that can be achieved from the integration of Lean tools and MBNQA model, but the framework has to be tailored to the specification and limitations of SMEs. For this reason, the conceptual framework is derived from the literature reviewed and validated through the case studies that have been conducted in three manufacturing SMEs in the KRI. Figure 2 shows the methodology undertaken in this research.

Figure 2

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3 Case studies allow researchers to discover intangible factors that can entirely explain
4 how the system functions and draw more clear portraits of complex issues which are
5 always not available for other research methods (Stake, 2006). It often follows a wide
6 range of open-ended techniques in data collection and analysis such as structured
7 and unstructured interviews, observation, documentation analysis (Saunders *et al.*,
8 2009). Thus, the method is valid for this study. Moreover, researchers such as
9 Bilhadi *et al.*, 2016; Karim and Arif uz-Zaman, 2013; Wong and Wong, 2011 and
10 Aken *et al.*, 2010 also followed the case study method to develop frameworks that
11 assist SMEs in implementing Lean approach.

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13 The selected companies for the case studies used different lean tools such as 5S,
14 Work Teams, Total Productivity Maintenance (TPM), Quality Assurance (QA), 5
15 Whys, Quick customer feedback, Cross Employees Training and Reward and
16 Motivation activities. They effectively manage waste, time, inventory, raw material
17 and workforce efforts in their companies. They also employ modest technologies in
18 their production and control processes. They are well-known, successful, competitive
19 and leading companies in their industrial market in the KRI, and employ highly skilled
20 workers. So they can be taken as lean models in the region. Details of participant
21 companies are presented in Table 4.

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Table 4

To offer a good range of information, the researcher asked selected persons of the participating companies to get involved in a semi-structured interview which aimed to explore the working environment and managerial style deeply. They were previously motivated to understand the aim of the study, to feel free to provide any responses and comments they preferred and to prepare well for the interview date to ascertain the accuracy of the provided information.

The case studies focused on several aspects which namely are: Core values and ethical principles that motivate them to commit to their production requirements, the MBNQA criteria in their working environment, application of Lean tools and techniques, and their main production problems.

4- Findings of the case studies

In this section, a summary of the participant's responses is presented in order to meet the cognitive objectives of the present study. Note that a (✓) indicates that the

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3 element was applied by the company while (X) means that it was not.

4 5 **4.1 Core values and principles considered in KRI-SMEs**

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7 As to the core values and ethical principles, the enterprises in which the case studies
8 were conducted all depended on values such as customer focus, valuing people and
9 continuous improvement to run their LM activities. While other principles such as
10 management by the fact, transparency and flexibility are more applicable to company
11 C than companies A and B. Table 5 shows the core values adopted by KRI-SMEs.
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17 **Table 5**

18 19 **4.2 LM drivers (MBNQA criteria) applied to KRI-SMEs**

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21 Table 6 presents Lean drivers or MBNQA criteria that were considered in the focused
22 companies in order to implement effective Lean within their environment. As can be
23 seen, managerial areas of the customer relationship, continuous improvement,
24 human resource development and internal process management are emphasised by
25 all companies. Each company applied its available LM techniques in those areas in
26 order to generate the best performance. Effective lean leadership, long-term planning
27 and measuring business performance were absent within companies A and B, while
28 Company C which has more resources, skills and experience applied lean
29 techniques within these managerial sources.
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39 **Table 6**

40 41 **4.3 CSF and Lean tools implemented in KRI-SMEs**

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43 This part of the case studies aimed to identify CSF that lead LM implementation and
44 to describe Lean tools and techniques implemented by KRI-SMEs. Table 7
45 summarises the participant's opinions in this regard.
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49 It is clear that all case companies considered top management commitment, long-
50 term vision, reward and motivation, total employees involvement, and supplier
51 relationship to support the implementation of LM in their companies. It is also worth
52 mentioning that all participants were not satisfied with lean strategies, deep
53 understanding of the LM approach and employees empowerment in their companies.
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57 Product Customisation, 5S, Total Productivity Maintenance, and Automation were the
58 common Lean techniques applied to KRI-SMEs while Visualising Stream Chain has
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not been applied in any of the case companies. Company C applied Statistical Process Control, PDCA cycle and customer data to eliminate non-value added activities within its production processes.

Table 7

4.4 Problems facing KRI-SMEs in implementing LM initiatives

Implementing LM techniques in KRI-SMEs is proceeding slowly, as they face difficulties in various managerial areas. Table 8 shows the common problems that KRI-SMEs have in adopting LM techniques. Language barriers, unfavourable organisational culture, low qualified workers, poor banking system and strong market competition were the main difficulties that faced the case companies. However, there is evidence in favour of LM use to improve quality, reduce wastes and delivery time, and increase productivity.

Table 8

5- Development of LEBM framework

Responses and general practices obtained from the case companies were generalised and were combined with a literature review to build a framework. The framework consists of core values as foundation and pre-preparation for Lean implementation, seven key drivers for Lean performance improvement, five Lean tools under each factor to adopt Lean activities within that area, and five indicators to evaluate the business performance and guide the organisation to the excellent Lean levels. For validation of the framework, the participated companies made inputs and necessary modifications.

Figure 3 shows the LEBM framework developed with a focus on SMEs conditions. In order to keep it manageable and straightforward, clear elements are created.

Figure 3

Generally, the framework is a strategic result-based approach that can help managers to systematically implement specific actions in all managerial areas across the company to transfer their plants from the traditional to Lean-excellent producers. The framework consists of four levels:

- **Core values:** Values and ethical principles that motivate identification and

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commitment to the framework requirements. These values must be understood before implementing Lean as they are the foundations of Lean thinking and acting for all members of the organisation.

- **Drivers:** Critical success factors that cover all managerial areas across the organisation and are the determinant for excellent performance. Drivers of the system can be classified into two basic elements; first, a social element which covers leaders, customers and the workforce. Second, a technical element that includes strategies, manufacturing processes and organisational learning.
- **Processes:** Lean techniques that seek improvement opportunities through drivers. Time, money and efforts need to be invested in educating and training the members of the organisation to select and apply the right techniques at the right time in order to generate the expected outcomes from the driver's area.
- **Results:** Expected development output of lean-excellence through the effective application of the lean tools from drivers.

As continuous improvement is core conjoint principle between LM and MBNQA and strongly recommended by both approaches (Mahmud and Hilmi, 2014; Okay and Semiz, 2013; Al Amin, 2013), it takes a central role in the LEBM model. It must, therefore, be seen as a systematic driver of all other activities in the organisation.

The LEBM aims to increase the understanding of SMEs on how to comprehensively evaluate their current situation, find gaps and identify the correct lean tools to overcome their process problems. It can play three important roles for manufacturing SMEs, as follows:

- Strengthen organisational competitiveness
- Promote organisational performance, capabilities and results
- Serve as a working tool for better understanding, leading and implementing the organisation's aspiration to learn.

The LEBM model shows the approach for deployment of lean practices. Lean leadership directly or indirectly affect all system constructs by managing lean projects, lean strategic planning, organisational learning and human resource development infrastructure. They should always practice lean principles, simplify the problems, and play good lean role models so that the employees understand what

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3 actually Lean means in real life and also to emulate their managers to deal with the
4 manufacturing processes. Moreover, they have to value feedback from the
5 customers and employees. A fair reward system and effective suggestion scheme
6 are also needed to motivate them to provide more ideas for better improvements.
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10 Process management, continuous improvement and customer relationship
11 management are key drivers for LM practices. Understanding the current situation,
12 identifying errors, problems and defects accurately, visualising the manufacturing
13 process will reveal the weaknesses and create more development opportunities.
14 Nevertheless, collecting reliable information, conducting in-depth analysis,
15 communicating and sharing experiences will guide correct decisions which eliminate
16 errors and wastes throughout the company.
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22 Business performance evaluates the progress in terms of customer satisfaction,
23 profitability increases, employee satisfaction, competitiveness growth and
24 ergonomics improvement. These indicators are not as equally important as they
25 depend on the characteristics of the enterprise. It must also be obvious to the
26 company that reaching excellence lean performance is an endless journey and
27 continuous improvement is a movement without a destination. Thus, teamwork, trust,
28 tolerance, total employees involvement, and collective responsibility are significant
29 across all phases of lean transformation.
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36 Overall, the framework fulfils requirements for excellent organisational performance
37 which in the end, creates, bolsters and delivers the optimised value for the
38 stakeholders. In addition, benchmarking the outcomes achieved, showing quick
39 advantages, and celebrating bright results obtained will raise the confidence of the
40 employees to Lean approach, decrease their resistance to changes happening and,
41 then, accelerate the transformation processes.
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48 **6- Characteristics of LEBM**

49 LEBM framework is easy to understand, well-structured and consists of strongly
50 interlinked components. It can give visible results in a short time. This model is
51 characterised by the following advantages that make it unique and suitable for
52 manufacturing SMEs in developing countries:
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- 57 • It is an incremental improvement framework that follows KAIZEN philosophy,
58 which poses that big results come from many small changes accumulated over
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3 time (Kazien Institute, 2015). Starting with basic lean in small firms and improving
4 its application could improve the way of thinking and work for the whole
5 organisation.
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- 8 • The framework will enhance the internal communication in both vertical and
9 horizontal levels by which the staff relationship will enhance, and Lean
10 knowledge will distribute across different departments of the organisation
11 (Wilkinson, Dundon and Grugulis, 2007).
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- 14 • The framework cultivates fact-based thinking to SMEs and results in better
15 understanding, commitments and control of the external and internal environment
16 of the business which assures long-term survival.
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- 19 • The framework is easy to understand; it consists of eight logical and connected
20 steps that gradually guide the enterprise to overall improvements. The model is
21 rather generic, long-term oriented and adaptable to various conditions
22 considering the resource, time and limitations of SMEs.
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29 **7- Applications of LEBM framework**

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31 The framework of this study would prove highly relevant and useful to establish a
32 successful implementation of the lean approach to increasing organisational
33 effectiveness and efficiency of the small businesses. It can provide advantages in
34 many cases.
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- 38 • The framework originally developed to assist small manufacturing organisations
39 in increasing awareness and closing the gaps in lean implementation in the
40 journey towards the excellent world-class levels.
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- 43 • The framework can be used as a self-assessment model to determine the degree
44 of readiness for Lean approach adoption.
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- 47 • Application of the framework can develop a culture of lean thinking through the
48 continuous evaluation of the performance in the different managerial areas of the
49 organisation. Thus, with the iteration of the framework, a further step towards
50 excellent performance can be taken.
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- 53 • The framework considered the limitation of SMEs, but a wide range of its criteria
54 such as in leadership; strategic planning, process management, human resource
55 and knowledge management make it applicable for the large organisations as
56 well.
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- Based on the flexibility of criteria of LEBM, with slight changes, the framework can be applied to other sectors such as health, education, banking, tourism, telecommunication and public sector's organisations.

8- Conclusion

Since reaching excellent performance in developing economies is a far end and strategic objective for SMEs, the quest needs a deep understanding of advanced management approaches and full commitment to the comprehensive methodologies. It is believed that with a combination of Lean techniques into the criteria of MBNQA model outstanding levels of performance can be attained in both manufacturing and excellence extends. It is noticeable that the effective implementation of the two methodologies in an integrated manner will generate improvements in all seven areas of the organisation which results in actual changes in the attitudes of doing business to the long extent. It is worth to mention that, in general, the expected improvements by LEBM framework will take time; reaching excellent performance cannot happen overnight. However, deep understanding, full commitment and direct involvement of the top managers, supported with across training, education and empowerment of the workforce will facilitate the change procedures and maximise the LEBM framework outcomes.

The contextual LEBM model proposed can easily be applied to manufacturing SMEs to promote organisational performance. It can also be used to verify the degree of maturity of the company, determine its readiness towards Lean application and highlight opportunities for further improvements within the covered areas by the framework. So far, it is valuable to adopt the framework in different circumstances to explore the efficient results by doing experiments in real life and justify the reliability and validity of the framework. Real life case studies also can be conducted to provide a deep understanding of Lean application and its barriers within small businesses in developing countries. The empirical studies can be extended to cover moderator variables such as national culture, working conditions, personal value of the employees, supplier relationship management to examine their impacts on the lean adoption and business performance at the same time.

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LEBM drivers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Long-term vision	x		x		x		x	x	x				x		x				x	x	10
Reward and motivation	x					x		x	x	x	x			x			x	x		x	10
Top management commitment	x	x	x		x	x	x	x	x	x	x	x		x	x	x	x	x			16
Management involvement	x		x		x		x	x					x						x	x	8
Leading process simplification				x				x	x		x									x	5
Customer data collection	x				x		x	x		x			x	x					x		8
Quick feedback responsiveness	x				x																3
Customer involvement		x				x	x	x		x			x	x		x		x			9
Clear lean strategies	x		x		x	x	x	x	x			x	x	x	x			x	x	x	14
Use of right Lean tools	x							x	x			x							x		5
Manufacturing planning	x													x	x			x		x	6
Delegated responsibilities	x								x									x			4
Improvement suggestion system	x																x				2
Influence over suppliers	x	x			x		x		x	x						x		x			9
Automation				x														x			3
Training and educating	x	x			x	x	x		x	x	x	x	x	x			x	x	x	x	15
Total employees involvement	x	x	x		x	x			x	x	x		x	x		x	x	x		x	15
Workforce empowerment	x	x		x			x				x	x					x	x			8
Teamwork	x				x			x		x							x		x	x	7
Deep understanding	x		x			x						x		x	x			x	x		7
Communication and knowledge sharing	x		x		x	x	x				x		x	x			x	x		x	11
Financial resource allocation	x		x		x	x	x		x			x	x	x		x		x	x	x	13

1: Zargun and Al-Ashaab, 2014; 2: Rose et al., 2014; 3: Al-Manei et al., 2017; Pearce et al., 2018; 5: Alkhoraifet et al., 2018; 6: Minh et al., 2015; 7: Knol, et al., 2018; 8: Alhuraish et al. 2014; 9: Alaskari et al., 2012; 10: Mamat et I, 2015; 11: Marodin and Sauriin, 2013; 12 Sahoo and Yadav, 2018; 13: Martínez-Jurado and Moyano-Fuentes, 2014; 14: Sieckmann, 2018; 15 Reigado and Bento, 2015; 16: Nidhin, 2014; 17: Costa, et al., 2018; 18: Chelangat, 2016; 19: Bilhadi et al., 2018; 20: Netland, 2016.

Table 1 Critical success factors of LM implementation

Author	Description	Methodology	Comments
Belhadi et al., 2016	An integrated framework encompasses three phases with 16 steps where each phase contained different tools and CSF to support Lean strategies implementation in SMEs.	Literature review and multiple case studies	No performance indicators described
Nguyen, 2015	A management model wheel includes three main elements (5S, Kaizen and visual control) with a focus on deep understanding of Lean benefits to support Vietnamese SMEs for better Lean implementation.	Two rounds of a survey and follow-up interviews	Sequences for implementing Lean are not specified. Lack of performance measurements Hard for beginners to start up with the model
Roslin and Shahadat, 2014	A conceptual model of three elements to aid Lean adoption in Malaysia automotive parts manufacturing industry.	Literature review	Lack of adoption sequences description The relevant internal stakeholders are not specified
Mostafa et al., 2013	A conceptual project-based framework of four phases including conceptual phase, implementation design phase, implementation and evaluation phase, and the lean transformation phase. A number of Lean tools and practices are assigned to each phase.	Literature review	Complex structure with 22 steps which is hard for SMEs to follow Needs highly-skilled practitioners Lack of total employees involvement
Karim & Arif Uz-Zaman, 2013	A systematic Lean implementation methodology base on the five principles of Womack and Jones (1996) aimed at the application of LM tools in the production processes and developing continuous improvement techniques within the organisation.	Literature review and a single case study	Highly-skilled employees required Complex structure compared to SMEs limited resources
Halim et al., 2013	A methodology of Lean implementation based on Toyota's 8-steps processes with methods and Lean tools assigned to each step aimed at optimising the effectiveness of Lean practices in the organisation.	Case study	Needs specialist practitioners Designed for large companies with huge resources Not suitable for beginners companies with LM initiative
Anvari et al., 2011	A project-based framework with five steps to provide a dynamic approach to Lean transmission in different industries and a high variability environment	Literature review	Most activities are limited to the top managers Needs a lot of effort to sustain the results
Wong and	A framework covers LM principles,	Multiple	Applied to the high matured

Wong, 2011	LM pre-request, LM activities and LM tools to generate continuous improvements in 14 different production areas in Malaysian Electrical and Electronic industry.	case studies	organisation No clear links between the improvement areas
Uddin 2011	A conceptual framework based on different aspects of the strengths and weaknesses of SMEs and LEs aimed at supporting effective Lean adoption	Literature review	Not clear instruction for adoption phases No consideration for the preparation phase No clear links between the elements of the framework
Wanitwattanakosol and Sopadang, 2011	A conceptual framework for Lean transformation in SMEs with high-variety and low-volume environment including two phases with three interrelated components in the first phase	Literature review	Lack of total employees involvement Lack of implementation instructions for internal stakeholders
Rose et al., 2010	A conceptual framework for LM implementation in SMEs comprised of top management commitment, lean practices, external support and process evaluation.	Literature review	Lack of implementation methodology description No clear links between the elements of the framework No internal stakeholders of the Lean tools in each practice are specified
Aken et al., 2010	A framework to assist the design, management and sustain of short-term Kaizen events in the organisation which it can be applied within any lean transformation initiative.	Literature review and multiple case studies	Needs highly-skilled managers No Lean tools and CSF described Team-based event Not suitable for SMEs Cannot be extended easily

Table 2 Frameworks for LM implementation within SMEs

Concept	MBNQA	Lean
Origin	The evolution of quality in the USA	The quality revolution in Japan and Toyota
Theory	Focus on customers through Continuous improvement	Focus on the customer through waste elimination.
Process view	Improve and uniform processes	Improve the flow of processes
Approach	Teamwork and group commitment.	Respect for people, training and change management.
Methodology	Plan, Do, Control, Act	Defining customer value, Value stream, Analysis, Flow, Pull, Perfection.
Tools	Analytical and statistical based tools	Analytical based tools.
Focus	Excellence performance	Efficiency improvement.
Primary effects	Increase customer satisfaction	Reduce lead time, cost and waste
Secondary effects	Achieves customer loyalty and improves performance	Reduces inventory, increases productivity and customer satisfaction
Criticism	No tangible improvements, resource-demanding, the unclear notion	Flexibility reduction which causes congestion in the supply chain.
Financial Returns	By reducing wastes and production cost	Through better performance and a higher level of competitiveness.
Time required	A long-term view and commitment	Long-term culture and attitudes change

Table 3 The harmony between MBNQA and LM thinking

(Source: Anderson et al., 2006)

General Information	Company A	Company B	Company C
The main type of industry	Tile	Plastic	Food and drink
Age of the company	23	9	12
Number of full-time employees	10	19	45
Ownership	Private	Partnership	Part of a bigger group
Quality system of the company	Conformity of Iraqi standardisation and quality control	Conformity of Iraqi standardisation and quality control	ISO 9000-2008
The value of the company	\$2,000,000	\$3,500,000	\$15,000,000
Annual turnover	\$800,000	\$1,800,000	\$2,500,000
Area occupied	4,600 m ²	25,000 m ²	52, 500 m ²
Company size	Small	Small	Medium
Production technology followed	Italy	Italy, German, UK	Turkey, Italy and Germany

Table 4 Details of the companies which participated in the study

No.	Core values and concepts	Company A	Company B	Company C
1	A systems perspective	×	✓	×
2	Visionary leadership	×	✓	✓
3	Customer-focused	✓	✓	✓
4	Valuing people	✓	✓	✓
5	Organisational learning	✓	×	✓
6	Continuous improvement	✓	✓	✓
7	Managing for innovation	×	×	×
8	Management by fact	×	×	✓
9	Ethics and transparency	×	×	✓
10	Challenges and flexibility	×	✓	✓

Table 5 Core values of LM implementation within KRI-SMEs

No.	Lean drivers	Company A	Company B	Company C
1	Lean Leadership	×	×	✓
2	Customer relationship	✓	✓	✓
3	Strategic Planning	×	×	✓
4	Continuous improvement	✓	✓	✓
5	Human resource development	✓	✓	✓
6	Organisational learning	×	✓	✓
7	Process management	✓	✓	✓
8	Business results	×	×	✓

Table 6 Drivers of LM implementation in KRI-SMEs

No.	LEBM drivers	Company A	Company B	Company C
Critical Success Factors of Lean implementation in KRI-SMEs				
1	Top management commitment	✓	✓	✓
2	Management involvement	✓	✓	✗
3	Clear lean strategies	✗	✗	✗
4	Use of right Lean tools	✗	✗	✓
5	Delegated responsibilities	✗	✓	✓
6	Long-term vision	✓	✓	✓
7	Reward and motivation	✓	✓	✓
8	Training and educating	✗	✓	✓
9	Total employees involvement	✓	✓	✓
10	Workforce empowerment	✗	✗	✗
11	Team-working	✓	✗	✗
12	Deep understanding	✗	✗	✗
13	Financial resource allocation	✗	✗	✓
14	Customer involvement	✓	✓	✓
15	Communication and knowledge sharing	✗	✗	✓
16	Leading process simplification	✗	✗	✓
17	Quick feedback responsiveness	✗	✗	✓
18	Manufacturing planning	✗	✗	✓
19	Improvement suggestion system	✗	✗	✓
20	Influence over suppliers	✓	✓	✓
Lean tools implemented in KRI-SMEs				
1	Customer data collection	✗	✗	✓
2	Wide-market products	✓	✓	✓
3	PDCA cycle	✗	✗	✓
4	Root cause analysis	✗	✓	✓
5	Visualise stream chain	✗	✗	✗
6	Cellular manufacturing	✗	✓	✓
7	5S	✓	✓	✓
8	Total productivity maintenance	✓	✓	✓
9	Automation	✓	✓	✓
10	Statistical process control	✗	✗	✓

Table 7 CSF and Lean tools adopted in KRI-SMEs

Problems	Company A	Company B	Company C
Language barriers	✓	✓	✓
Technology development	✗	✓	✗
Company size	✓	✗	✗
Organisational culture	✓	✓	✓
Low qualified workers	✓	✓	✓
Lack of management commitment	✗	✗	✓
Lack of time	✓	✓	✗
Lack of skills	✓	✓	✗
Lack of government support	✓	✓	✗
Change resistance	✗	✗	✓
Lack of financial resources	✓	✓	✗
Lack of infrastructure services	✓	✓	✗
Work-related stress	✓	✓	✗
Lack of awareness	✓	✓	✓
Poor banking system	✓	✓	✓
Market competition	✓	✓	✓
Legislation	✓	✓	✗

Table 8 Barriers of LM implementation within KRI-SMEs

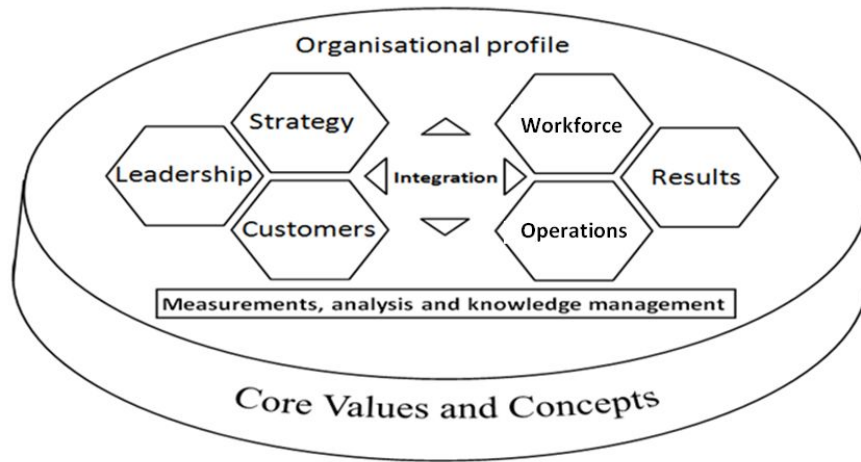


Figure 1 MBNQA model for performance excellence (**Source:** nist.gov)

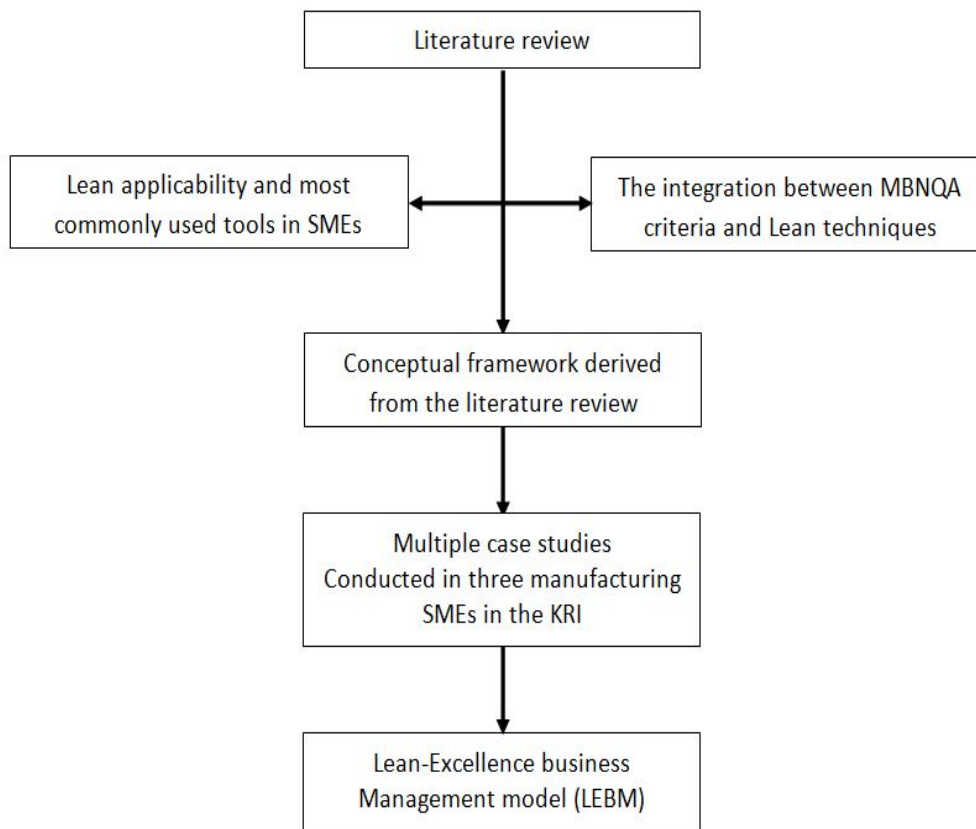


Figure 2 Research methodology

Core values	Visionary leadership improvement		Customer orientation	Learning and development		Continuous		
Drivers	Lean leadership	Customer Relationship	Strategic Planning	Continuous Improvement	Process Management	Human Resource Development	Organisational learning	
Processes	LLE1: Long-term thinking LLE2: Reward and motivation LLE3: Full commitment LLE4: Attending Gemba LLE5: Leading simplification	CR1: Customer data collection CR2: Wide-market products at competitive prices CR3: Quick feedback responsiveness CR4: Customer involvement CR5: Corrective action implementation	SP1: Clear lean strategies SP2: Identification of relevant lean elements SP3: Lean elements priorities SP4: Action plan development SP5: Delegated responsibilities	CI1: PDCA cycle CI2: Root cause analysis CI3: Improvement suggestion system CI4: Visualise stream chain CI5: Total employees responsibility	PM1: Cellular manufacturing PM2: 5S PM3: Total productivity maintenance PM4: Automation PM5: Statistical process control	HRD1: Role design HRD2: Cross-functional training HRD3: Total employees involvement HRD4: Workforce empowerment HRD5: Team-working	OL1: Systematic creation of knowledge OL2: Knowledge acquisition OL3: Knowledge sharing OL4: Knowledge application OL5: Determine and prioritise resource needs	
Results	BP1 Customer satisfaction improvement		BP2 Profitability increases	BP3 Employee satisfaction		BP4 Competitiveness growth		BP5 Ergonomics

Figure 3 LEBM Framework