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Examining the Impact of Leadership Styles on Lean Six Sigma Implementation

دراسة تأثير أنماط القيادة على تطبيق إدارة (Lean Six Sigma)

Abstract

Purpose –Leadership has for a long time been a topic that attracts the attention of both academics and practitioners. In spite of the extensive literature on leadership and very little literature on leadership in Lean Six Sigma, there is almost a complete absence to explain what leadership style is needed for successful implementation of Lean Six Sigma. This research aims to address this issue by examining the impact of leadership styles on Lean Six Sigma (LSS) implementation.

Design/methodology/approach

– This research employs the concept of systematic literature review to identify journal articles, survey reports, master theses, doctoral theses and paradigmatic books dealing with leadership styles and LSS implementation. This research was conducted using quantitative research methods. Specifically, a questionnaire was distributed at the total population of productivity and quality institute database, for 82 Egyptian organizations (51 manufacturing and 31 service) that have ISO 9001 and ISO 14000 certificates; believing that those organizations have the potential to apply LSS.

ملخص البحث

الغرض - كانت القيادة لفترة طويلة موضوعا يجذب انتباه كل من الأكاديميين والممارسين. على الرغم من الأدبيات الواسعة حول القيادة والقليل جدا من الأدبيات حول القيادة في (Lean Six Sigma)، هناك تقريبا غياب كامل لشرح ما هو أسلوب القيادة اللازمة للتنفيذ الناجح (Lean Six Sigma). لذلك يهدف هذا البحث إلى معالجة هذه المسألة من خلال دراسة تأثير أساليب القيادة على تطبيق (Lean Six Sigma).

المنهجية - يستخدم هذا البحث مفهوم مراجعة الأدبيات المنهجية لتحديد المقالات الصحفية، تقارير المسح، أطروحات الماجستير، أطروحات الدكتوراه والكتب النموذجية التي تتناول أساليب القيادة وتنفيذ (Lean Six Sigma). وقد أجري هذا البحث باستخدام طرق البحث الكمية. وعلى وجه التحديد، تم توزيع استبيان على مجموع قاعدة بيانات معهد الإنتاجية و الجودة، ل 82 منظمة مصرية (51 تصنيع و 31 خدمة) التي لديها شهادات إيزو 9001 و إيزو 14000. معتقدين أن هذه المنظمات لديها القدرة على تطبيق (Lean Six Sigma).

النتائج - هناك فرق كبير بين أساليب القيادة في المجال الخدمي والصناعي كالتحفيز الفكري - القيادة التحويلية؛ النظرة الفردية - القيادة التحويلية؛ وقيادة المعاملات. في حين لا يوجد فرق ذو دلالة بين تطبيق (Lean Six Sigma) والمجال. على العكس هناك تأثير كبير على تطبيق (Lean Six Sigma) مع أساليب القيادة التالية: التأثير المثالي - القيادة التحويلية؛ النظرة الفردية - القيادة التحويلية، القيادة الأوتوقراطية.

القيود / الآثار المترتبة على البحث - هذا البحث ذو صلة بمعظم مؤسسات التصنيع والخدمات؛ ومع ذلك، فإن البحث معتمد فقط في مصر، لذلك هناك حاجة إلى مزيد من البحوث لتأكيد النتائج لمجموعة أكبر من الصناعات والخدمات. أيضا، يمكن أن يكون هذا البحث منبرا لممارسي (Lean Six Sigma) لاتخاذ الإجراءات المناسبة للتغلب على حواجز التنفيذ.

الأصالة / القيمة - ركزت هذه الدراسة على استكشاف كيف أن أساليب القيادة يمكن أن تؤثر على تنفيذ (Lean Six Sigma).

Findings – There is significant difference between leadership styles: intellectual stimulation transformational leadership, individualized consideration transformational leadership, and transactional leadership at service and manufacturing industries. While there is no significance difference between lean six sigma implementation and industry type. The Idealized influence transformational leadership, Individualized consideration transformational leadership, and Autocratic leadership have significant impact on Lean Six Sigma implementation.

Research limitations/implications – This research is relevant to most manufacturing and service organizations; however, the research adopted only in Egypt, so additional research is needed to confirm the findings for a larger range of manufacturing and service organizations. Also, this research can be a platform for LSS practitioners to take appropriate action to overcome barriers for successful LSS implementation.

Originality/value – This study focused on exploring how leadership styles can impact a LSS implementation.

Keywords –Critical success factors, Leadership, Leadership Styles, Lean Six Sigma, Lean, Six Sigma

Paper type – Research paper

1. Introduction

Recently, Lean and Six Sigma have become the most widely held business strategies for deploying Continuous Improvement (CI) in manufacturing and service sectors. CI is the core goal for any organization to achieve quality and

operational excellence and to enhance performance (Thomas *et al.*, 2009; Assarlind *et al.*, 2012; Albliwi *et al.*, 2015). With common roots in American industry and the quality revolution in the Japanese export industry, Lean Manufacturing and Six Sigma developed as distinct concepts until the late 1990s and early 2000s (Dahlgard and Dahlgard-Park, 2006). Lately, the probable benefits of merging the two concepts have been perceived by several authors (Laureani and Antony, 2012; Gershon and Rajashekhariah, 2011; Assarlind and Aaboen, 2014). The general idea is outlined by Laureani and Antony (2012) by stating that “*Lean Six Sigma uses tools from both tool boxes to get the best from the two methodologies, increasing speed while also increasing accuracy*”. Assarlind and Aaboen (2014) added that Lean speed enables Six Sigma quality and Six Sigma quality enables Lean speed.

LSS was defined by Snee (2010) as “*a business strategy and methodology that increases process performance resulting in enhanced customer satisfaction and improved bottom line results.*” LSS methodology aims to increase organization competency, decrease production costs (Lee and Wei, 2009; Chen and Lyu, 2009) and improve quality (Laureani and Antony, 2012). Accordingly, LSS and the level of LSS deployment gain an obvious growth in the industrial world, particularly in large organisations in developed countries such as the USA and the UK; as well as some SMEs in developing countries such as China and India (Albliwi *et al.*, 2014). Though, some organizations did not yield success from LSS implementation due to the gaps that need to be

addressed in LSS literature such as the identification of leadership styles. Leadership considers as one of the most significant critical success factors (CSFs) for the implementation of Lean Six Sigma (Fornari and Maszle, 2004; Kumar *et al.*, 2006; Carleysmith *et al.*, 2009), and its relatively smaller coverage in the LSS literature leaves the field open to further research on which leadership styles have impact on LSS implementation (Laureani and Antony, 2012; Albliwi *et al.*, 2015).

Over the last four decades, organisations and researchers have been obsessed with leadership, and tried to analyse it into a universal set of measures (Men and Stacks, 2013; Saeed *et al.*, 2014; Appelbaum *et al.*, 2015; Pantouvakis and Patsiouras, 2016). The studies examined how leadership affects organizational performance, how various leadership styles impact organizational culture, employee effectiveness, performance, retention, and motivation (Shaw and Newton, 2014; Siddique *et al.*, 2011; Yang and Islam, 2012; Alonderiene and Majauskaite, 2016).

Many authors (Shah *et al.*, 2008; Byrne *et al.*, 2007; Kumar *et al.*, 2006; Furterer and Elshennawy, 2005) agree that LSS is a methodology that demands dynamic decisions, total participation of all employees, total confidence in the process toward the target and loyalty to the process. In this respect, active leadership is critical since it is the one that does not hesitate to take the subversive decisions and inspire the employees in order to be more efficient, consistent, committed and satisfied, in order to meet the principles of LSS (Antony *et al.*, 2003). Byrne *et al.* (2007) argue that leaders must be

driven by a vision based on market demands and in their own abilities. They also added the fact that leadership should aim to a constant innovation and to be committed to operational change that leads to success. According to other authors, leadership helps in changing the attitude of the personnel, empowerment readiness and improvement of production processes and in business efficiency but also, focus on customers in order to achieve innovation and economic performance (Byrne *et al.*, 2007; Tsiroanis and Psychogios, 2016).

Hence, the purpose of this research is to examine the impact of leadership styles on Lean Six Sigma implementation. This research is further organized as follows. The subsequent sections discuss the literature review and describe the research methodology, barriers to LSS implementation which is followed by methodology, results, discussion, and conclusions.

2. Literature review

Recently, Lean and Six Sigma have become the most widely held business strategies for deploying continuous improvement (CI) in manufacturing and service sectors. CI is the core goal for any organization to achieve quality and operational excellence and to enhance performance (Thomas *et al.*, 2009; Assarlind *et al.*, 2012; Albliwi *et al.*, 2015). Hence, the advantages of applying Lean and Six Sigma in parallel are noted in both the manufacturing and the service sector (Albliwi *et al.*, 2014) since it aids to attain performance faster than the implementation of each approach in isolation (Antony *et al.*, 2012).

Womack *et al.* (1990) defined Lean as a “dynamic process of change, driv-

en by a set of principles and best practices aimed at continuous improvement". To sum up, lean thinking provides a way to do more and more with less and less; less human effort, less human equipment, less time, and less space – and at the same time trying to provide customers with precisely what they want (Womack and Jones, 1996; Laureani and Antony, 2012).

The root of Lean lies on Toyota Production System which established shortly after the Second World War in 1940s in Japan by Taiichi Ohno (Womack *et al.*, 1990; Womack and Jones, 2003; Maleyeff *et al.*, 2012). Lean focussed on elimination of non-value added activities and waste (or "Muda") in industry (Womack and Jones, 2003; Näslund, 2008).

The seven wastes are: *motion, over-production, over processing, lead time, rework, inventory and defects* (Chakravorty and Shah, 2012; Lee and Wei, 2009; Bhuiyan *et al.*, 2006; Vinodh *et al.*, 2011). In addition, two more types of waste have appeared in literature recently as stated by Vinodh *et al.* (2012): underutilization of people's creativity and environmental waste. Moreover, Lean emphasis on reduction of total cycle time (Drohomeretski *et al.*, 2013; Lee and Wei, 2009) and reduction of lead time (Hu *et al.*, 2008; Chen *et al.*, 2010). There are many tools and techniques for improvement like *the Kanban system, 5S, Cause and Effect analysis, Value Stream Mapping and many others* (Drohomeretski *et al.*, 2013; Chen and Lyu, 2009; Thomas *et al.*, 2009). However, Lean still contains some challenges that face organizations such as the fundamental shift required

in an organization's culture (Albliwi *et al.*, 2015; Bhasin, 2013).

On the other hand, Six Sigma is defined as: *a business strategy that seeks to identify and eliminate causes of errors or defects or failures in business processes by focusing on outputs that are critical to customers* (Snee, 1999). Also, Antony (2008) defined it as "a well-established approach that seeks to identify and eliminate defects, mistakes or failures in business processes or systems by focusing on those process performance characteristics that are of critical importance to customers". Six Sigma aims to reduce statistically the variation in any process (Näslund, 2008; Chakravorty and Shah, 2012), reduce costs and make savings, increase customer satisfaction (Näslund, 2008; Shah *et al.*, 2008; Manville *et al.*, 2012; Drohomeretski *et al.*, 2013), improve product quality, measure defects and reduce it to 3.4 parts per million opportunities in an organization (Chen and Lyu, 2009; Lee and Wei, 2009). Though, the high cost of Six Sigma training is a barrier for many organizations to deploy this methodology. Other disadvantages are the time it appears to take to both implement Six Sigma and for the results to become visible (Pepper and Spedding, 2010; Timans *et al.*, 2012; Albliwi *et al.*, 2015).

Lean thinking may be used to recognise areas of improvement and set standards (Pepper and Spedding, 2010) that ensure faster, cheaper and more visible results compared to Six Sigma (Gershon and Rajashekharaiyah, 2011). Whereas, Six Sigma methodology may be used for investigating deviations from assumed standards (Pepper and Spedding, 2010). Therefore, Gershon

and Rajashekharaiyah (2011) recommend that initial LSS projects may be used as first steps toward a Six Sigma structure that would have a lasting impact on improvement efforts.

Actually, all types of waste cannot be removed from the process by implementing Six Sigma in isolation, similarly the process cannot be managed statistically and remove variation from the process by implementing Lean management in isolation (Corbett, 2011). Consequently, merging them can overcome their weaknesses when they have been implemented in isolation (Bhuiyan *et al.*, 2006; Albliwi *et al.*, 2015). And their integration can attain greater performance faster than the implementation of each approach in isolation (Salah *et al.*, 2010; Timans *et al.*, 2012; Laureani and Antony, 2012; Albliwi *et al.*, 2015). Hence, Lean and Six Sigma are completing each other (Hu *et al.*, 2008; Shahin and Alinavaz, 2008). In short, manufacturing and service industries succeed to get the best out of shareholder value by improving quality, speed, customer satisfaction, and costs through merging tools and principles from both Lean and Six Sigma (Laureani and Antony, 2012).

Albliwi *et al.* (2015) stated that the top ten benefits of LSS are: (1) *increased profits and financial savings*; (2) *increased customer satisfaction*; (3) *reduced cost*; (4) *reduced cycle time*; (5) *improved key performance metrics*; (6) *reduced defects*; (7) *reduction in machine breakdown time*; (8) *reduced inventory*; (9) *improved quality*; and (10) *increased production capacity*. Albliwi *et al.* (2015) added that there are other benefits such as *identifying different types of waste, development in*

employee morale toward creative thinking and reduction in workplace accidents as a result of housekeeping procedures also appeared in a number of cases.

However, there are some hindering factors for LSS implementation in the manufacturing sector: statistical methods problems (Thomas *et al.*, 2009; Chakravorty and Shah, 2012); time-consuming (Richard, 2008; Pepper and Spedding, 2010; Smith, 2003; Bossert, 2013); internal resistance (Timans *et al.*, 2012; Antony *et al.*, 2003), Lack of resources (Timans *et al.*, 2012; Thomas *et al.*, 2008; Richard, 2008); changing business focus (Timans *et al.*, 2012); lack of leadership (Timans *et al.*, 2012; Antony *et al.*, 2003); poor selection of projects (Timans *et al.*, 2012); lack of tangible results (Timans *et al.*, 2012); lack of training or coaching (Breyfogle, 2008; Thomas *et al.*, 2008); unmanaged expectations (Timans *et al.*, 2012; Thomas *et al.*, 2008; Richard, 2008); competing projects (Timans *et al.*, 2012); poor employee relationships (Timans *et al.*, 2012); national regulations (Malyeff *et al.*, 2012); employee attitude toward a new business strategy (Vinodh *et al.*, 2012; Kumar *et al.*, 2006; Antony *et al.*, 2003); convincing top management (Vinodh *et al.*, 2012; Kumar *et al.*, 2006); poor of awareness to LSS benefits (Kumar *et al.*, 2006; Thomas *et al.*, 2008; Snee, 2010); poor organizational structure (Thomas *et al.*, 2008); lack of skills required for successful deployment (Thomas *et al.*, 2008; Franchetti and Yanik, 2011).

On the other hand, Albliwi *et al.* (2014) presented 34 CFFs that lead to LSS deployment failures as follows:

Table(1): Critical failure factors of LSS deployment

Factors
1. Lack of top management attitude, commitment and involvement
2. Lack of training and education
3. Poor project selection and prioritisation
4. Lack of resources (financial, technical, human, etc.)
5. Weak link between the CI projects and the strategic objectives of the organisation
6. Resistance of culture change
7. Poor communication
8. Lack of leadership skills and visionary and supportive leadership
9. Lack of consideration of the human factors
10. Lack of awareness of the benefits of Lean/Six Sigma
11. Wrong selection of Lean/Six Sigma tools
12. Narrow view of LSS as a set of tools, techniques and practices
13. Lack of understanding of the different types of customers/VOC
14. Lack of employee engagement and participation/lack of team autonomy
15. Lack of process thinking and process ownership
16. Poor organisation capabilities
17. High implementation cost
18. Lack of experience in Lean/Six Sigma project implementation
19. Lack of awareness of the need for Lean/Six Sigma
20. Ineffective project management
21. Poor selection of candidates for belts training
22. Lack of clear vision and a future plan
23. Lack of an effective model or roadmap to guide the implementation
24. Poor execution
25. Threat of redundancy
26. Time consuming
27. Lack of estimation of implementation cost
28. Weak infrastructure
29. Replicating another organisation's Lean/Six Sigma strategy
30. Lack of a performance measurement system
31. Lack of understanding of how to get started
32. Lack of application of statistical theory
33. Weak linking to suppliers
34. Misalignment between the project aim, the main goals of the company and the customer demand

Source:Albliwi *et al.* (2014)

Therefore, to guarantee success it is essential to identify the critical success factors (CSFs) for any CI initiative, because it helps organisations to emphasis their efforts on these factors (Ferguson, 2007; Lane, 2008; Arnheiter and Maleyeff, 2005; Tsironis and Psychogios, 2016; Laureani and Antony, 2012).

Näslund (2013) mentioned four preliminary issues from the review of CSF:

1. The CSF's are similar for all the change methods, with only slight variations.
2. The CSF's seem to be relatively constant over time.

3. The CSF's tend to relate more to how an organization approaches the change effort versus change method.
4. The CSF's are often emphasis on the issues of management support and organizational culture.

Moreover, Lertwattanapongchai and Swierczek (2014) summarize the CSF's which have been identified in the literature as follows:

1. Strategic direction and planning
2. Customer focus
3. Top management support
4. Leadership champion
5. Organizational infrastructure
6. Organizational culture
7. Communication
8. Recognition and rewards
9. Commitment executive employee
10. Project management and implementation
11. Change management
12. Team emphasis
13. Employee engagement
14. Training
15. IT support
16. Accountability
17. Monitoring
18. Result/bottom line

Leadership is one of the most CSFs that hold a decisive role for its success (Antony *et al.*, 2003; Samble *et al.*, 2011; Lertwattanapongchai and Swierczek, 2014; Tsironis and Psychogios, 2016) as well. Due to multidimensional nature of leadership, it is difficult to provide a universal definition, which would include all the aspects of leadership (Alonderiene and Majauskaite, 2016).

The development of leadership theories took a long way. It started with the Great Man theory in the beginning of twentieth century focussing on unique

leadership traits (Alonderiene and Majauskaite, 2016). The leadership trait theory was later criticized and more leadership approaches have emerged (Beyer, 2012).

Beyer (2012) lists 50 different leadership approaches that can be found in the recent academic literature. However, she notices, that "*the recent concepts appear to be more of a blending of ideas and concepts interrelated between and building upon each other rather than singular theoretical frameworks*".

In Egypt, both transactional and autocratic leadership styles exist in the business environment (EL-Zayaty, 2016). Leaders of business organizations tend to avoid uncertainty although they exhibit high collectivism. The existence of high power distance in organizations created organizational hierarchies and made it more vulnerable for leaders to follow the autocratic management style with an aggressive and forceful nature (Hofstede Center, 2014). In turn, this may create individuals who are risk averse and who resist innovation and creativity (Jobs & Gilfoil, 2012). Autocratic leadership dominates the leadership styles in the Egyptian context and hinder the process of decentralized decision-making leaving employees feeling excluded, demotivated, and unable to achieve to their maximum potential (Hopen 2010; Sakiru *et al.*, 2013).

Unlike the transactional leaders who seize power and seek authority to manage their employees, transformational and charismatic leaders inspire and motivate their employees to achieve positive job performance. It is increasingly crucial for leaders to understand the values, attitudes and behaviours of their employees. Effective leadership re-

quires inspiring and motivating the workforce to achieve positive job performance (Shanker *et al.*, 2012; Hofstede Center, 2014, Greenberg, 2016). Although the transactional and autocratic leadership styles do exist in business organizations, transformational leadership is the ideal leadership style need to be adopted within the Egyptian

business organizations (El-Zayaty, 2016).

Therefore, the three leadership styles that are going to be investigated in this research are transformational, autocratic and transactional leadership. However, there are other leadership styles that should be considered to present a complete picture of the practice of leadership (Table 2).

Table (2): Leadership styles

Leadership Style	Characteristics	Weaknesses	Strengths
Transformational Leadership	Common where leaders want followers to achieve high levels of motivation and morality.	Might not be as effective in non-Western nations	Has proven very effective when implemented properly
Servant Leadership	Leaders prioritize the well-being of followers and try to serve the needs of followers before their own.	Can take a great deal of time to fully produce results	Can increase follower satisfaction, sets a strong example for followers
Laissez-Faire Leaders	Are largely hands off and high levels of freedom given to followers.	Can reduce the efficiency of groups and teams	Encourages creativity, innovation, and self-reliance
Participative	Attempts to create equality between leaders and followers.	Employees whose ideas are not used may feel alienated.	Increased team cohesion, improved team performance
Autocratic	Decision making is solely for formally designated leaders.	Followers feel excluded, limited range of opinions goes into decision making	Promotes speedy decision-making
Leader Exchange	Emphasis on the dyadic relationship between leaders and each of their followers	Individual personalities might clash and taint the nature of the dyadic relationship	Promotes two-way relationship exchanges between leaders and followers, facilitates strong personal relationships
Transactional	Common in culture driven society	Only motivates if followers are interested in what they are being offered as an incentive	Operates on a simple to understand reward/punishment basis
Situational	Leadership style will vary upon the situation and the specific circumstances of decisions to be made	Lack of consistency might be confusing to employees	Highly flexible, can be tailored to suit different situations
Charismatic	Highly expressive leaders with an emphasis on exerting social influence	Can cultivate unrealistically high expectations	Can serve to highly motivate employees and positively influence employee commitment

Source: El-Zayaty (2016, p.62-63)

2.1 Leadership styles investigated in this research

Transformational leadership: This form of leadership adopts an environment of trust and loyalty, raises employees' self-confidence, motivate employees and build good relationships with them to form team/organizational commitment (Yukl, 2006; Jin, 2010;

Men and Stacks, 2013; Zagoršek *et al.*, 2009). Therefore, transformational leadership style has strong positive and significant relation with the organizational commitment and job satisfaction (Cheung and Wong, 2011; Aydin *et al.*, 2013). There are five primary behaviours that constitute transformational leadership (as shown in Table 3).

Table (3): Transformational Leadership Attributes

Transformational leadership
<ul style="list-style-type: none"> • Idealized influence (II) <ul style="list-style-type: none"> - Goes beyond self-interest - Displays power and confidence • Idealized influence- behaviour (II-B) <ul style="list-style-type: none"> - Emphasizes the collective mission - Talks of values • Inspirational motivation (IM) <ul style="list-style-type: none"> - Talks optimistically - Talks enthusiastically - Arouses awareness about important issues - Expresses confidence • Intellectual stimulation (IS) <ul style="list-style-type: none"> - Suggests different angles - Suggests new ways - Seeking different views - Re-examines' assumptions • Individualized consideration (IC) <ul style="list-style-type: none"> - Teach and coaches - Personal attention - Differentiates among employees - Helping subordinates develop their strengths

Source: Stone *et al.* (2004); Xirasagar (2008)

Transactional leadership:

Transactional leaders usually practice organizational bureaucracy, policy, power, and authority to sustain control (Bennett, 2009). It offers rewards/punishments for the performance of desired

behaviours and utilises more control (Men and Stacks, 2013), but it is less likely to generate trust, emotional appeal and commitment to work (Zagoršek *et al.*, 2009). Table (4) summarize the two functional areas of transactional leadership.

Table (4): Transactional Leadership Attributes

<p>Transactional leadership (TL)</p> <ul style="list-style-type: none"> • Contingent reward <ul style="list-style-type: none"> - Recognize achievement - Responsible for achievement - Clarifies rewards - Assists based on effort • Management by exception – active <ul style="list-style-type: none"> - Concentrates on failures - Tracks on mistakes - Focuses on mistakes
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Source: Xirasagar (2008)

Autocratic leadership attributes:

Autocratic leaders are likely to have power over their employees; leaders make decisions without consulting their team. Autocratic leadership is very competent in situations of crisis where quick decisions must be made and fol-

lowed, when there is no need for agreement, or at routine tasks. As a consequence, it may cause high levels of job dissatisfaction and turnover (Cremer, 2006, 2007; Kibbe and Chen 2015). Table (5) summarize the characteristics of Autocratic leadership.

Table (5): Autocratic Leadership Attributes

<p>Autocratic leadership (AL)</p> <ul style="list-style-type: none"> • Retains all power, authority, and control, and reserves the right to make all decisions. • Group members are rarely trusted with decisions or important tasks. • Adopts one-way communication. • Closely supervise and control people under them. • Get work done by issuing threats and punishments and evoking fear. • Assume full responsibility and take full credit for the work.
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Source: Black *et al.* (2015), Bright Hub (2016)

3. Research method

The research employs the concept of systematic literature review to identify journal articles, survey reports, master theses, doctoral theses and paradigmatic books dealing with leadership styles and lean six sigma implementation (Tranfield *et al.*, 2003), using management data sources, such as Emerald Insight and Direct Science. Papers written in other languages rather than English are also excluded.

As the purpose of this research is to examine the impact of leadership styles on Lean Six Sigma deployment, this research could be categorized as an exploratory research. The unit of analysis is the total population that includes 82 Egyptian organizations (51 manufacturing and 31 service) that have ISO 9001 and ISO 14000 certificates, according to the productivity and quality institute

database; believing that those organizations have the potential to apply LSS.

Due to the exploratory nature of the research, interviews were carried out where interviewees (10 practitioners) were encouraged to discuss the current state of leadership in Egyptian business organizations and speak freely about the impact of leadership styles on Lean Six Sigma implementation, to support the internal validity by removing inappropriate and unsuitable questions, and asking only those questions that are applicable to the objective of this study. According to Yin (2015), this method is appropriate since such approach studies both meanings as well as causes. The interviewee selection was limited to 82 organizations at Alexandria, Egypt. All interviews were carried out in person. Meeting notes were sent back to the interviewees for verification in order to increase reliability of the collected empirical data (Yin, 2015).

Survey research was selected for analytical validation out of the exploratory nature of this research. The information was collected with a structured questionnaire via email. Multiple informants from each company have been used enhancing the validity of the research findings. In total, 217 questionnaires were collected (two/three for each one of the 82 companies that participated on the study); from different departments: supply, production, marketing, and human resource managers. The questionnaire was used to gather data regarding Employees' perception about their leadership styles and LSS implementation within their organizations. Questionnaire was utilized for collecting data from 217 employees at

one point during the period from July to October 2016. The questionnaire consists of three parts: The first part seeks the demographic data including participant name (optional), gender, age, and the type of organization whether it is service or manufacturing. The second part of the questionnaire is designed to measure Employees' perception about their leadership styles; using the following scale (1) strongly disagree and (5) strongly agree. The third part of the questionnaire was intended to measure LSS implementation using a five-point Likert scale ranging from (1) Strongly not implemented, to (5) Strongly implemented.

4. Reliability Analysis

Reliability is the assessment instrument property that assures producing consistent results if assessment measures are repeated (Brochado, 2009). Reliability analysis is accomplished through the internal consistent reliability concept which is assessed by calculating Cronbach's alpha (α) for each of the established dimensions. According to Sekaran (2003), the Cronbach's alpha (α) of 0.60 or higher explains a reasonable degree of internal consistency of dimensions. And the inter-item correlations should range between 0.30 and 0.70 for a good scale (Cohen *et al.*, 2013).

Therefore, Pilot study carried out to test the reliability of questionnaire. So, questionnaire submitted to 40 Egyptian manufacturing and service organizations through 95 employees (by asking 2 or 3 employees at one company). The value of Cronbach's alpha coefficient for the overall questionnaire (47 items) is 0.92. Consequently, no item out of

the 47 items had to be removed (29 items for Leadership Styles and 18 for LSSI). Table (6) demonstrates the Cro-

nbach's alpha coefficient for each factor, as well as the overall reliability of the questionnaire.

Table(6). Cronbach's alpha coefficient

Factor	No. of questions	Cronbach's alpha
Transformational leadership	16	0.992
Idealized influence	2	1
Idealized influence- behaviour	2	0.993
Inspirational motivation	4	0.995
Intellectual stimulation	4	0.998
Individualized consideration	4	00.954
Transactional leadership	7	0.556
Autocratic leadership	6	1
LSS implementation	18	0.975
Overall reliability	47	0.920

Accordingly, the questionnaire is reliable (as shown in Table 6) so distributed to the rest of companies.

5. Validity Analysis

Pilot study carried out to test the validity of questionnaire. So, questionnaire submitted to 40 Egyptian manufacturing and service organizations through 95 employees (by asking 2 or 3 employees at one company). The data

collected comprised an interval scale and cross-section. Following the suggestion of some studies (Hair *et al.*, 2010); this research tested the correlation between each factor and its related items. The results indicate that there are significant correlations between each factor and their related items (as shown in Table 7), since all significance levels are less than 0.05. Consequently, the questionnaire is valid and distributed to the rest of companies.

Table(7). Correlation between each items and its factor

Variable	Item	Correlation	Significance level*
Idealized influence - Transformational leadership	• Goes beyond self-interest	0.832	0
	• Displays power and confidence	0.832	0
Idealized influence- behaviour - Transformational leadership	• Emphasizes the collective mission	0.993	0
	• Talks of values	0.997	0
Inspirational motivation - Transformational leadership	• Talks optimistically	0.934	0
	• Talks enthusiastically	0.934	0
	• Arouses awareness about important issues	0.927	0

	• Expresses confidence	0.929	0
Intellectual stimulation - Transformational leadership	• Suggests different angles	0.888	0
	• Suggests new ways	0.892	0
	• Seeking different views	0.892	0
	• Re-examines' assumptions	0.895	0
Individualized consideration - Transformational leadership	• Teach and coaches	0.996	0
	• Personal attention	0.972	0
	• Differentiates among employees	0.673	0
	• Helping subordinates develop their strengths	0.972	0
Transactional leadership	• Recognize achievement	0.404	0
	• Responsible for achievement	0.404	0
	• Clarifies rewards	0.477	0
	• Assists based on effort	0.477	0
	• Concentrates on failures	0.593	0
	• Tracks on mistakes	0.593	0
	• Focuses on mistakes	0.593	0
Autocratic leadership	• Retains all power, authority, and control, and reserves the right to make all decisions.	1	-
	• Group members are rarely trusted with decisions or important tasks.	1	-
	• Adopts one-way communication.	1	-
	• Closely supervise and control people under them.	1	-
	• Get work done by issuing threats and punishments and evoking fear.	1	-
	• Assume full responsibility and take full credit for the work.	1	-

*. According to SPSS, Significance level 0 means that its value is less than 0.005.

6. Descriptive Data

To achieve the objective of this research, the unit of analysis is the total population that includes 82 Egyptian organizations (51 manufacturing and 31 service). Those or

ganizations have ISO 9001 and ISO 14000 certificates, according to the productivity and quality institute database; believing that those organizations have the potential to apply LSS. In total, 217 questionnaires

were collected (two/three for each one of the 82 companies that participated on the study); from different departments: supply, production, marketing, and human resource managers. A survey was administered to stratified random samples of employees of each of the surveyed companies. Two levels of employees we-

re surveyed: middle-level managers, and production employees. The age of participants ranged from 30 years to more than 45 years. 80 per cent of the participants were from 35 to 40 years. And 26 per cent of the participants were more than 45 years (as shown in Table 8).

Table (8). Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30-35 years	43	19.8	19.8	19.8
	35-40 years	80	36.9	36.9	56.7
	40-45 years	68	31.3	31.3	88.0
	More than 45 years	26	12.0	12.0	100.0
	Total	217	100.0	100.0	

Moreover, Manufacturing industry represented 58.5 per cent of the

respondents, where service industry represents 41.5 per cent (as shown in Table 9).

Table(9). Industry Sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	service	90	41.5	41.5	41.5
	manufacturing	127	58.5	58.5	100.0
	Total	217	100.0	100.0	

7. Correlation Analysis

Correlation analysis had been done to test the correlation between the independent variables (leadership styles) and the dependant variable (lean six sigma implementation), as well as, the correlation between all the independent variables between each other (as shown in Table 10).

There may be a negative correlation, if the correlation coefficient is less than zero. Such as, the results

indicate that there are negative significant correlations (significance level less than 0.05) between *dependant* (lean six sigma implementation) and *independent* (Transactional leadership and Autocratic leadership). Moreover, there are negative significant correlations between *independent* (Idealized influence) and *independent* (Transactional leadership and Autocratic leadership).

Also, the results indicate that there are positive significant correlations (significance level more than 0.05) between *dependant* (lean six sigma implementation) and *independent* (Ideal-

ized influence, Idealized influence - behaviour, Inspirational motivation, Intellectual stimulation, Individualized consideration).

Table (10). Correlation Analysis

			II	II-B	IM	IS	IC	TL	AL	LSSI
Spearman's rho	Average_of_II	Correlation Coefficient	1.000	.842**	.864**	.679**	.838**	-.080	-.572**	.792**
		Sig. (2-tailed)	.	.000	.000	.000	.000	.242	.000	.000
		N	217	217	217	217	217	217	217	217
	Average_of_II-B	Correlation Coefficient	.842**	1.000	.945**	.853**	.918**	.034	-.750**	.749**
		Sig. (2-tailed)	.000	.	.000	.000	.000	.623	.000	.000
		N	217	217	217	217	217	217	217	217
	Average_of_IM	Correlation Coefficient	.864**	.945**	1.000	.716**	.882**	.036	-.752**	.722**
		Sig. (2-tailed)	.000	.000	.	.000	.000	.595	.000	.000
		N	217	217	217	217	217	217	217	217
	Average_of_IS	Correlation Coefficient	.679**	.853**	.716**	1.000	.853**	.119	-.696**	.716**
		Sig. (2-tailed)	.000	.000	.000	.	.000	.081	.000	.000
		N	217	217	217	217	217	217	217	217
	Average_of_IC	Correlation Coefficient	.838**	.918**	.882**	.853**	1.000	-.095	-.637**	.836**
		Sig. (2-tailed)	.000	.000	.000	.000	.	.162	.000	.000
		N	217	217	217	217	217	217	217	217
	Average_of_TL	Correlation Coefficient	-.080	.034	.036	.119	-.095	1.000	-.322**	-.260**
		Sig. (2-tailed)	.242	.623	.595	.081	.162	.	.000	.000
		N	217	217	217	217	217	217	217	217
	Average_of_AL	Correlation Coefficient	-.572**	-.750**	-.752**	-.696**	-.637**	-.322**	1.000	-.425**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.	.000
		N	217	217	217	217	217	217	217	217
	Average_of_LSSI	Correlation Coefficient	.792**	.749**	.722**	.716**	.836**	-.260**	-.425**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.
		N	217	217	217	217	217	217	217	217

** . Correlation is significant at the 0.01 level (2-tailed).

8. Multinomial Logistic Regression

Logistic regression is helpful in predicting a Categorical Variable from a set of predictor variables. *Binary logistic regression* is similar to linear re

gression except that it is used when the dependent variable is dichotomous (zero, one variable). *Multinomial logistic regression* is used when the dependent/outcome variable has more than two categories (Tabachnick and Fidell, 2013; Ho, 2014).

Therefore, this research is using the *Multinomial logistic regression* with the use of SPSS to measure LSS implementation (as a dependent variable) using five-point Likert scale ranging from (1) Strongly not implemented, to (5) Strongly implemented.

The results of the multinomial logistic regression for the Model Fitting Information shows Chi-Square value equal 724.874 and significance levels 0 (less than 0.05). Therefore, the model is significant. Also, the R-Square is calcu-

lated using Cox and Snell = 0.965, Nagelkerke = 0.981, and McFadden = 0.812. Accordingly, the model explains at least 81% of the variations of the dependent variable (LSSI).

The Idealized influence transformational leadership, Individualized consideration transformational leadership, and Autocratic leadership have significant impact on Lean Six Sigma implementation (the significance level is zero which is less than 0.05). As shown in Table (11).

Table (11). Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	90.978 ^a	.000	0	.
Idealized influence - Transformational leadership	176.192	85.214	24	.000
Idealized influence- behaviour - Transformational leadership	90.978	.000	0	.
Inspirational motivation - Transformational leadership	108.334	17.356	16	.363
Intellectual stimulation - Transformational leadership	92.972	1.994	8	.981
Individualized consideration - Transformational leadership	109.828	18.850	8	.016
Transactional leadership	28.941	.	24	.
Autocratic leadership	161.139	70.160	8	.000

9. Discussion and Conclusions

Based on findings, *autocratic leaders* are likely to have power over their employees; leaders make decisions without consulting their team. *Autocratic leader* is competent in circumstances of crisis where quick decisions must be made and followed, when there is no

need for agreement, or at routine tasks (Cremer, 2006, 2007; Kibbe and Chen 2015). Hence, achieve the required LSS critical success factors like having vision and commitment and capable for leading, and supervising activities to ensure they are on-schedule in meeting the objectives and performance targets.

As well as, *idealized influence transformational leadership* goes beyond self-interest and displays power and confidence by motivating employees and appealing to their principles and moral values (Yukl, 2006). Accordingly, *idealized influence transformational leadership* includes the formation of an emotional attachment between leaders and employees, which achieve the required LSS critical success factors like communication and commitment executive employee.

Also, *individualized consideration transformational leadership* reflect an actual concern in the prosperity of their employees by giving them personal attention, helping to develop their strengths and coaching; that has been constantly related with superior work performance, trust in leaders, job satisfaction, team/organizational commitment, and loyalty (Zagoršek *et al.*, 2009). In short, *individualized consideration transformational leadership* achieve the required LSS critical success factors like training and recognition and rewards. This is because *transformational leaders* influence their employees to go beyond their abilities to attain goals, and increase confidence, commitment, and job performance (Bono and Judge, 2003; Cheung and Wong, 2011).

On the opposite, *transactional leadership* is not as much expected to create trust, emotional appeal and obligation to work (Zagoršek *et al.*, 2009). All these factors inhibit LSSI because team emphasis and employee engagement are associated by LSS critical success factors. This support the literature that indicated the successful implementation of LSS depends on the level of compe-

tences and roles of the individuals that run LSS project (Hilton and Sohal, 2012). Literature inferred that employee's performance might be absolutely managed by the charismatic influence, individualized consideration, inspirational motivation, and intellectual stimulation of transformational leader (Cheung and Wong, 2011). In addition, transformational leaders are encouraged to provide task support and relations support.

Those companies whom not ready to properly implement LSS either due to the lack of appropriate leadership, or to the incorrect selection of candidates for leadership positions that can take an inactive role and involvement (Brett and Queen, 2005; Malik and Blumenfeld, 2012). Also, Timans *et al.* (2012) emphasize some factors that prevent the success such as the internal resistance, the unavailability of resources, changing business objectives and lack of leadership.

References

1. Albliwi, S, Antony, S. and Lim, S. (2015) "A systematic review of Lean Six Sigma for the manufacturing industry", *Business Process Management Journal*, Vol. 21 Iss 3, pp. 665-691.
2. Albliwi, S., Antony, J., Lim, S. and Wiele, T. (2014) "Critical failure factors of Lean Six Sigma: a systematic literature review", *International Journal of Quality & Reliability Management*, Vol. 31 Iss 9, pp. 1012 – 1030.

3. Alonderiene, R. and Majauskaitė, M. (2016) "Leadership style and job satisfaction in higher education institutions", *International Journal of Educational Management*, Vol. 30 Iss 1, pp. 140 – 164.
4. Antony, J. (2008) "Reflective practice: can Six Sigma be effectively implemented in SMEs?", *International Journal of Productivity and Performance Management*, Vol.57 No.5, pp. 420-423.
5. Antony, J., Escamilla, J.L. and Caine, P. (2003) "Lean Sigma", *Manufacturing Engineer*, Vol. 82 No. 2, pp. 40-42.
6. Antony, J., Krishan, N., Cullen, D. and Kumar, M. (2012) "Lean Six Sigma for higher education institutions (HEIs): challenges, barriers, success factors, tools/techniques", *International Journal of Productivity and Performance Management*, Vol. 61 No. 8, pp. 940-948.
7. Appelbaum, S., Degbe, M. and MacDonald, O. (2015) "Organizational outcomes of leadership style and resistance to change (Part One)", *Industrial and Commercial Training*, Vol. 47 Iss 2 pp. 73 – 80.
8. Arnheiter, E.D. and Maleyeff, J. (2005) "The integration of lean management and Six Sigma", *The TQM Magazine*, Vol. 17 No. 1, pp. 5-18.
9. Assarlind, M. and Aaboen, L. (2014) "Forces affecting one Lean Six Sigma adoption process", *International Journal of Lean Six Sigma*, Vol. 5 Iss 3, pp. 324 – 340.
10. Assarlind, M., Gremyr, I. and Backman, K. (2012) "Multi-faceted views on a Lean Six Sigma application", *International Journal of Quality & Reliability Management*, Vol. 22 No. 3, pp. 21-30.
11. Aydin, A., Savier, Y., and Uysal, S. (2013) "The effect of school Principals' leadership styles on teachers' organizational commitment and job satisfaction", *Educational Sciences: Theory and Practice*, Vol. 13 No. 2, pp. 805–811.
12. Bennett, T.M. (2009) "A study of the management leadership style preferred by IT subordinates", *Journal of Organizational Culture, Communications and Conflict*, Vol. 13 No. 2, pp. 1-26.
13. Beyer, B. (2012) "Blending constructs and concepts: development of emerging theories of organizational leadership and their relationship to leadership practices for social justice", *International Journal of Educational Leadership Preparation*, Vol. 7 No. 3, pp. 1-12.
14. Bhasin, S. (2013) "Impact of corporate culture on the adoption of the Lean principles", *International Journal of Lean Six Sigma*, Vol. 4 Iss 2, pp. 118 – 140.
15. Bhuiyan, N., Baghel, A. and Wilson, J. (2006) "A sustainable continuous improvement methodology at an aerospace company", *International Journal of Productivity and Performance Management*, Vol. 55 No. 8, pp. 671-687.
16. Black, J., Oliver, R., King, J. (2015) "Leadership style matters: The de-

- ployment of leadership skills in developing an organizational context-for-learning capability”, *Advances in Applied Business Strategy*, Volume 10, pp. 75-98.
17. Bono, J.E. and Judge, T.A. (2003) “Self-concordance at work: toward understanding the motivational effects of transformational leaders”, *Academy of Management Journal*, Vol. 46, pp. 554-71.
 18. Bossert, J.L. (2013) “Second chances”, *ASQ Six Sigma Forum Magazine*, Vol. 13 No. 1, pp. 4-5.
 19. Brett, C. and Queen, P. (2005) “Streamlining enterprise records management with Lean Six Sigma”, *Information Management Journal*, Vol. 39 No. 6, pp. 58-62.
 20. Breyfogle, F.W.I. II (2008) “Beyond troubleshooting”, *ASQ Six Sigma Forum Magazine*, Vol. 8 No. 1, pp. 27-31.
 21. Bright Hub (2016) Characteristics of Autocratic Leadership, Retrieved from <http://www.brighthubpm.com/resource-management/75715-a-critique-of-the-autocratic-leadership-style/>
 22. Brochado, A. (2009) “Comparing alternative instruments to measure service quality in higher education”, *Quality Assurance in Education*, Vol. 17 No. 2, pp. 174-190.
 23. Bryman, A. (2007) “Effective leadership in higher education: a literature review”, *Studies in Higher Education*, Vol. 32 No. 6, pp. 693-710.
 24. Carleysmith, S.W., Dufton, A.M. and Altria, K.D. (2009) “Implementing Lean Sigma in pharmaceutical research & development: a review by practitioners”, *R&D Management*, Vol. 39 No. 1, pp. 95-106.
 25. Chakravorty, S.S. and Shah, A.D. (2012) “Lean Six Sigma (LSS): an implementation experience”, *European Journal of Industrial Engineering*, Vol. 6 No. 1, pp. 118-137.
 26. Chen, H., Lindeke, R. and Wyrick, D. (2010) “Lean automated manufacturing: avoiding the pitfalls to embrace the opportunities”, *Assembly Automation*, Vol. 30 No. 2, pp. 117-123.
 27. Chen, M. and Lyu, J. (2009) “A Lean Six-Sigma approach to touch panel quality improvement”, *Production Planning & Control*, Vol. 20 No. 5, pp. 445-454.
 28. Cheung, M.F.Y. and Wong, C.S. (2011) “Transformational leadership, leader support, and employee creativity”, *Leadership & Organization Development Journal*, Vol. 32 No. 7, pp. 656-672.
 29. Cohen, L., Manion, L. and Morrison, K. (2013) *Research Methods in Education*, Published by Routledge, Sixth edition.
 30. Corbett, L.M. (2011) “Lean Six Sigma: the contribution to business excellence”, *International Journal of Lean Six Sigma*, Vol. 2, No. 2, pp. 118-131.
 31. Cremer, D. (2006) “Affective and motivational consequences of leader self-sacrifice: The moderating effect

- of autocratic leadership”, *The Leadership Quarterly*, Vol. 17 No.1, pp. 79-93.
32. Cremer, D. (2007) “Emotional Effects of Distributive Justice as a Function of Autocratic Leader Behavior”, *Journal of Applied Social Psychology*, Vol. 37 No. 6, pp. 1385-1404.
33. Dalu, R.S. (2011) “Evaluating Six Sigma implementation in medium scale Indian automotive enterprises”, *International Journal of Engineering Science and Technology (IJEST)*, Vol. 3, No. 3, pp. 1790-1796.
34. Drohomerski, E., Gouvea da Costa, S., Pinheiro de Lima, E. and Andrea da Rosa, P. (2013) “Lean, Six Sigma and Lean Six Sigma: an analysis based on operations strategy”, *International Journal of Production Research*, Vol. 52 No. 3, pp. 804-824.
35. El-Zayaty, N. (2016) *An Exploration of Leadership Styles and Motivation in Egyptian Business Organizations*, PhD Thesis, College of Management and Technology, Walden University, USA.
36. Ferguson, D. (2007) “Lean & Six Sigma: the same or different?”, *Management Services*, Vol. 51 No. 3, pp. 12-13.
37. Franchetti, M. and Yanik, M. (2011) “Continuous improvement and value stream analysis through the Lean DMAIC Six Sigma approach: a manufacturing case study from Ohio, USA”, *International Journal of Six Sigma and Competitive Advantage*, Vol. 6 No. 4, pp. 278-300.
38. Furterer, S. and Elshennawy, A.K. (2005) “Implementation of TQM & Lean Six Sigma tools in local government: a framework & a case study”, *Total Quality Management & Business Excellence*, Vol. 16 No. 10, pp. 1179-1191.
39. Gershon, M. and Rajashekharaiyah, J. (2011) “Double LEAN Six Sigma - a structure for applying Lean Six Sigma”, *The Journal of Applied Business and Economics*, Vol. 12 No. 6, pp. 26-31.
40. Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010) *Multivariate Data Analysis*, 7th ed., Prentice Hall, Englewood Cliffs, NJ.
41. Hilton, R.J. and Sohal, A. (2012) “A conceptual model for the successful deployment of Lean Six Sigma”, *International Journal of Quality & Reliability Management*, Vol. 29 No. 1, pp. 54-70.
42. Ho, R. (2014) *Handbook of Univariate and Multivariate Data Analysis with IBM SPSS*, 2nd Edition by Taylor & Francis Group, LLC
43. Hofstede Center (2014) What about Egypt? [online] (<https://geert-hofstede.com/egypt.html>)
44. Hopen, D. (2010) “The changing role and practices of successful leaders”, *The Journal for Quality and Participation*, Vol. 33 No.1, pp. 4-9.
45. Hu, G., Wang, L., Fetch, S. and Biddanda, B. (2008) “A multi-objective model for project portfolio selection

- to implement lean and Six Sigma concepts”, *International Journal of Production Research*, Vol. 46 No. 23, pp. 6611-6625.
46. Jin, Y. (2010) “Emotional leadership as a key dimension of public relations leadership: national survey of public relations leaders”, *Journal of Public Relations Research*, Vol. 22 No. 2, pp. 159-181.
47. Jobs, C., and Gilfoil, D. M. (2012) “Less is more for online Marcom in emerging markets: Linking Hofstede’s cultural dimensions and higher relative preferences for microblogging in developing nations”, *Academy of Marketing Studies Journal*, Vol. 16 No.2, pp. 79-96.
48. Kibbe, M. and Chen, H. (2015) *Leadership in Surgery*, published by Springer International Publishing Switzerland.
49. Kumar, M., Antony, J., Singh, R.K., Tiwari, M.K. and Perry, D. (2006) “Implementing the Lean Sigma framework in an Indian SME: a case study”, *Production Planning and Control*, Vol. 17 No. 4 pp. 407-423.
50. Lane, G. (2008) “Lean made your way”, *Industrial Engineer*, Vol. 40 No. 2, pp. 34-38.
51. Laureani, A. and Anthony, J. (2012) “Critical success factors for the effective implementation of lean sigma”, *International Journal of Lean Six Sigma*, Vol. 3 No. 4, pp. 274-283.
52. Lee, L. and Wei, C. (2009) “Reducing mold changing time by implementing Lean Six Sigma” *Quality and Reliability Engineering International*, Vol. 26 No. 4, pp. 387-395.
53. Lertwattanapongchai, S. and Swierczek, F. (2014) “Assessing the change process of Lean Six Sigma: a case analysis”, *International Journal of Lean Six Sigma*, Vol. 5 Iss 4, pp. 423 – 443.
54. Maleyeff, J., Arnheiter, A.E. and Venkateswaran, V. (2012) “The continuing evolution of Lean Six Sigma”, *TQM Journal*, Vol. 24 No. 6, pp. 542-555.
55. Malik, A. and Blumenfeld, S. (2012) “Six Sigma, quality management systems & the development of organisational learning capability: evidence from four business process outsourcing organisations in India”, *International Journal of Quality & Reliability Management*, Vol. 29 No. 1, pp. 71-91.
56. Manville, G., Greatbanks, R., Krishnasamy, R. and Parker, D.W. (2012) “Critical success factors for Lean Six Sigma programmes: a view from middle management”, *International Journal of Quality & Reliability Management*, Vol. 29 No. 1, pp. 7-20.
57. Men L. and Stacks, D. (2013) “The impact of leadership style and employee empowerment on perceived organizational reputation”, *Journal of Communication Management*, Vol. 17 Iss 2, pp. 171 – 192.
58. Näslund, D. (2008) “Lean, six sigma and lean sigma: fads or real process improvement methods?”, *Business Process Management Journal*, Vol. 14 No. 3, pp. 269-287.

59. Näslund, D. (2013) "Lean and Six Sigma critical success factors revisited", *International Journal of Quality and Service Sciences*, Vol. 5 No. 1, pp. 86-100.
60. Pantouvakis, A. and Patsiouras, C. (2016) "Exploring the role of leadership style on the service quality-customer satisfaction link", *International Journal of Quality and Service Sciences*, Vol. 8 Iss 1, pp. 88 – 101.
61. Pepper, M.P.J. and Spedding, T.A. (2010) "The evolution of Lean Six Sigma", *International Journal of Quality & Reliability Management*, Vol. 27 No. 2, pp. 138-155.
62. Richard, D.S. (2008) "How lean is your Six Sigma program?", *ASQ Six Sigma Forum Magazine*, Vol. 27 No. 4, pp. 42-45.
63. Saeed, T., Almas, S., Anis-ul-Haq, M., Niazi, G. (2014) "Leadership styles: relationship with conflict management styles", *International Journal of Conflict Management*, Vol. 25 Iss 3, pp. 214 – 225.
64. Sakiru, O., D'Silva, J., Othman, J., DaudSilong, A., & Busayo, A. (2013) "Leadership styles and job satisfaction among employees in small and medium enterprises", *International Journal of Business & Management*, Vol. 8 No. 13, pp. 34-41.
65. Salah, S., Rahim, A. and Carretero, J.A. (2010) "The integration of Six Sigma and lean management", *International Journal of Lean Six Sigma*, Vol. 1 No. 3, pp. 249-274.
66. Sekaran, U. (2003) *Research Methods for Business: A Skill Building Approach*, Fourth Edition, John Wiley and Sons.
67. Shah, R., Chandrasekaran, A. and Linderman, K. (2008) "In pursuit of implementation patterns: the context of Lean and Six Sigma", *International Journal of Production Research*, Vol. 46 No. 23, pp. 6679-6699.
68. Shahin, A. and Alinavaz, M. (2008) "Integrative approach and framework of Lean Six Sigma: a literature perspective", *International Journal of Process Management and Benchmarking*, Vol. 2 No. 4, pp. 323-337.
69. Shanker, R., Bhanugopan, R., and Fish, A. (2012) "Changing organizational climate for innovation through leadership: An exploratory review and research agenda", *Review of Management Innovation & Creativity*, 5(14), 105-118.
70. Shaw, J. and Newton, J. (2014) "Teacher retention and satisfaction with a servant leader as principal", *Education*, Vol. 135 No. 1, pp. 101-106.
71. Siddique, A., Aslam, H.D., Khan, M. and Fatima, U. (2011) "Impact of academic leadership on faculty's motivation and organizational effectiveness in higher education system", *International Journal of Academic Research*, Vol. 3 No. 2, pp. 730-737.
72. Smith, B. (2003) "Lean and Six Sigma – a one-two punch", *Quality Progress*, Vol. 36 No. 4, pp. 37-41.

73. Snee, R.D. (1999) "Why should statisticians pay attention to Six Sigma?", *Quality Progress*, Vol. 32 No. 9, pp. 100-3.
74. Snee, R.D. (2010) "Lean Six Sigma – getting better all the time", *International Journal of Lean Six Sigma*, Vol. 1 No. 1, pp. 9-29.
75. Stone, A., Russell, R., and Patterson, K. (2004) "Transformational versus servant leadership: a difference in leader focus", *Leadership & Organization Development Journal*, Vol. 25 Iss 4 pp. 349 – 361.
76. Tabachnick, B. and Fidell, L. (2013) *Using Multivariate Statistics*, 6th Edition, Pearson Education, USA.
77. Thomas, A., Barton, R. and Okafor, C. (2009) "Applying lean six sigma in a small engineering company – a model for change", *Journal of Manufacturing Technology Management*, Vol. 20 No. 1, pp. 113-129.
78. Thomas, A.J., Rowlands, H., Byard, P. and Rowland-Jones, R. (2008) "Lean Six Sigma: an integrated strategy for manufacturing sustainability", *International Journal of Six Sigma and Competitive Advantage*, Vol. 4 No. 4, pp. 333-354.
79. Timans, W., Antony, J., Ahaus, K. and Solingen, R. (2012) "Implementation of Lean Six Sigma in small and medium-sized manufacturing enterprises in the Netherlands", *Journal of Operational Research Society*, Vol. 63 No. 3, pp. 339-353.
80. Timans, W., Antony, J., Ahaus, K. and Van Solingen, R. (2012) "Implementation of Lean Six Sigma in small- & medium-sized manufacturing enterprises in the Netherlands", *Journal of the Operational Research Society*, Vol. 63 No. 3, pp. 339-353.
81. Tranfield, D., Denyer, D. and Smart, P. (2003) "Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review", *British Journal of Management*, Vol. 14, No. 3, pp. 207-222.
82. Tsironis, L. and Psychogios, A. (2016) "Road towards Lean Six Sigma in service industry: a multi-factor integrated framework", *Business Process Management Journal*, Vol. 22 Iss 4 pp. 812 – 834
83. Vinodh, S., Gautham, S.G. and Ramiya, A. (2011) "Implementing lean sigma framework in an Indian automotive valves manufacturing organisation: a case study", *Production Planning & Control*, Vol. 22 No. 7, pp. 708-722.
84. Vinodh, S., Kumar, S.V. and Vimal, K.E.K. (2012) "Implementing Lean Sigma in an Indian rotary switches manufacturing organisation", *Production Planning & Control*, Vol. 25 No. 4, pp. 1-15.
85. Womack, J.P. and Jones, D.T. (1996) *Lean Thinking*, Simon & Schuster, New York, NY.
86. Womack, J.P. and Jones, D.T. (2003) *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*, Free Press, New York, NY.
87. Womack, J.P., Jones, D.T. and Roos, D. (1990) *The Machine that Changed the World*, Rawson Associ-

- ates/Macmillan Publishing Company, New York, NY.
88. Xirasagar, S. (2008) "Transformational, transactional and laissez-faire leadership among physician executives", *Journal of Health Organization and Management*, Vol. 22 Iss 6, pp. 599 – 613.
89. Yang, Y.F. and Islam, M. (2012) "The influence of transformational leadership on job satisfaction: balanced scorecard perspective", *Journal of Accounting & Organizational Change*, Vol. 8 No. 3, pp. 386-402.
90. Yin, R. (2015) *Qualitative Research from Start to Finish*, Guilford Publications.
91. Yukl, G. (2006) *Leadership in Organizations*, 6th ed., Prentice Hall, Upper Saddle River, NJ.
92. Zagoršek, H., Dimovski, V. and Skerlavaj, M. (2009) "Transformational and transactional leadership impacts on organizational learning", *Journal for East European Management Studies*, Vol. 2 No. 1, pp. 145-164.

