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Lean Six Sigma Practices and Business Performance in A Service-Based Company in China

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ABSTRACT: The study employed a quantitative, comparative–correlational research design. Approximately 222 employees were targeted to obtain statistically valid results and allow for meaningful comparison across demographic and professional subgroups. The assessment of Lean Six Sigma practices revealed that the respondents generally perceived LSS practices as Evident, with an overall mean of 3.066 and a standard deviation of 0.528. Among the LSS constructs, Leadership and Governance obtained the highest overall mean of 3.386, suggesting that leadership support, resource allocation, and governance mechanisms were among the most visible LSS practices in the organization. On the other hand, Sustainability Integration received the lowest overall mean of 2.628, although still interpreted as Evident. The assessment of business performance showed that the respondents also rated business performance as Evident, with an overall mean of 3.017 and a standard deviation of 0.531. The highest-rated business performance construct was Human, Cultural, and Ownership Enablers, with an overall mean of 3.579, interpreted as Strongly Agree or Highly Evident. However, Sustainability and Risk Governance recorded the lowest mean of 2.511, only slightly above the Evident range. However, prior LSS exposure produced a significant difference in overall LSS practices, $F = 2.713$, $p = 0.046$. The correlation results showed a positive and statistically significant relationship between Lean Six Sigma practices and business performance. The overall correlation between Lean Six Sigma Practices and Business Performance was $r = 0.839$, indicating a very strong positive relationship.

KEYWORDS: Lean Six Sigma; business performance; service-based company; China; continuous improvement

1. INTRODUCTION

Business performance has long been regarded as the principal indicator of organizational success, encompassing a multidimensional framework that integrates financial outcomes, operational efficiency, innovation capacity, and strategic adaptability. Contemporary scholarship suggests that performance is not merely the result of resource accumulation but rather of a firm's ability to orchestrate tangible and intangible assets within a dynamic environment (Varadarajan, 2020). In the digital economy, the conceptualization of business performance has evolved from profit-based measures toward broader constructs that include customer satisfaction, knowledge management, digital transformation, and sustainability (Mubarak et al., 2019; Ukko et al., 2019).

China has quickly moved from an economy focused on making things to one that's more about services. This change has changed how companies think about working being more productive and giving value to customers. In the twenty years the service part of the economy has become the main part of growth in China. It makes up than half of the countrys economic output and gives jobs to a big part of the people who live in cities. This change has created problems for how companies run their operations. Now the focus is not just on making products but on how good the service is, how well technology is used and how happy customers are. In this changing world Lean Six Sigma, a way of working that mixes ideas about cutting waste with ideas about using numbers to be better has become more important. Companies are using it to stay competitive and to do work.

The reason for this study comes from the fact that Chinese service companies even though they are getting better with technology often have trouble keeping their service the same every time and responding to customers. Many companies have used Lean Six Sigma in the places where they make things. Not many have tried it in the service part of their business. The person doing this study noticed that even though people say Lean Six Sigma is good service companies have trouble with leaders agreeing on what to do with workers being ready and with knowing how to measure if they are doing well. This gap between what's possible and what actually happens made the researcher want to look more closely at how Lean Six Sigma affects business results in the service industry.

Looking at what others have written shows that there is a missing part. Many studies have looked at how Lean Six Sigma works in factories (Chiarini & Kumar 2021; Kaswan & Rathi 2020). Not many have looked at how it works in service companies especially in China. Few studies have looked at how using Lean Six Sigma affects things like ideas being good to the environment and using technology in non-factory settings. Without this kind of understanding it is hard to build ideas and also to help companies use what they know. This study wants to fill that gap by looking at how Lean Six Sigma helps a company that's in the service business in China. It wants to add to what's already known and give a real way for companies to get better in the service part of the economy.This study uses three ideas to understand what is happening. These are the Resource-Based View, the Dynamic Capabilities Theory and the Total Quality Management Theory. Together these help to explain how Lean Six Sigma helps business results in a company that's in the service area in China.

Putting these ideas together the study sees business results as something that comes from using resources being able to change and think of new ideas and having a team that always wants to get better. Lean Six Sigma helps connect the things a company has and what it can do to make results. It does this by making work more efficient by focusing on customers and by making sure the company is working in the way. This way of thinking is especially important, in the service part of Chinas economy, where companies are trying to use technology fast and also make sure their service is good.

2. METHODS

Research Design

The study employed a quantitative, comparative–correlational research design. This design was used to quantify relationships among the key variables, specifically, the components of Lean Six Sigma (LSS) and the dimensions of business performance and to determine whether significant differences existed in respondents' assessments when grouped according to their demographic or organizational profiles. Meanwhile, the correlational component proved essential in establishing whether and to what extent the Lean Six Sigma (LSS) components—such as leadership and governance, process architecture, and sustainability integration—were associated with business performance dimensions like innovation, analytics capability, and risk governance. This relationship testing provided evidence of the interdependence between operational efficiency systems and performance outcomes.

Research Locale

The study was conducted in a service-based company located in Beijing, China, which operated within the field of business process management and customer-oriented solutions. The organization offered a wide range of professional services such as logistics coordination, administrative support, and digital client management to both local and international partners. Over the past decade, it gradually adopted quality management practices and process optimization frameworks to improve service efficiency, reduce operational delays, and enhance customer satisfaction—making it an appropriate site for research focused on Lean Six Sigma (LSS) and its influence on business performance.

Participants

The participants of the study were purposefully selected employees from a service-based company in China. They were chosen based on their direct involvement in process improvement, operational management, and service delivery functions where Lean Six Sigma (LSS) principles were actively applied. The study included employees occupying various levels of organizational hierarchy—ranging from supervisors and technical staff to managers and quality assurance personnel—to ensure that multiple perspectives on LSS implementation and business performance were represented.

Participation was voluntary, and all respondents were informed of the study's purpose and confidentiality measures. Approximately 222 employees were targeted to obtain statistically valid results and allowed for meaningful comparison across demographic and professional subgroups. The chosen participants provided insights into how LSS practices were operationalized in the service sector and how these practices contributed to measurable improvements in organizational performance within the Chinese context.

Research instruments

The primary data for this study was collected using a researcher-made questionnaire, which was designed to assess the relationship between Lean Six Sigma (LSS) practices and business performance in a service-based company in China. The questionnaire was divided into three major parts. Part II assessed the respondents' perceptions of Lean Six Sigma practices, covering nine constructs: (1) Leadership and Governance, (2) Process Architecture (DMAIC), (3) Toolsets and Analytics, (4) Digital and Quality 4.0 Infrastructure, (5) Sustainability Integration, (6) Human Systems and Organizational Readiness, (7) Integration with Standards and Formal Systems, (8) Sectoral Adaptation and Customization, and (9) Performance and Evidence Systems. Each construct contained six statements rated using a 4-point Likert scale (4 = Strongly Agree, 3 = Agree, 2 = Disagree, 1 = Strongly Disagree). Part III measured Business Performance through six constructs: (1) Strategic–Market Alignment, (2) Analytics Capability Embedded in Process Performance, (3) Digitally Enabled Operations and Automation, (4) Innovation and Business Model Renewal, (5) Human,

Cultural, and Ownership Enablers, and (6) Sustainability–Risk Governance. Like Part II, this section used a 4-point Likert scale to quantify respondents' agreement with each statement.

The instrument underwent content validation by a panel of experts in business management, operations, and research methodology to ensure clarity, relevance, and construct alignment. Construct validity was confirmed through factor analysis, ensuring that the items accurately represented their intended dimensions. Reliability was measured using Cronbach's Alpha coefficient, with an acceptable threshold of 0.70 or higher, which indicated internal consistency among items within each construct.

Statistical Treatment of Data

The data gathered was processed using Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics such as frequency, percentage, weighted mean, and standard deviation were used to describe the demographic profile and to interpret the level of assessment of each construct. To test for differences in respondents' assessments when grouped according to their profile variables, Analysis of Variance (ANOVA) and t-tests were applied as appropriate. To determine the relationship between Lean Six Sigma practices and business performance, Pearson's Product-Moment Correlation Coefficient (r) was utilized. The level of significance was set at 0.05, and results were interpreted based on established statistical decision rules.

Ethical Considerations

The study adhered to the ethical standards set forth in academic and research practice. Participation was entirely voluntary, and all respondents were informed of their right to withdraw from the study at any time without consequence. Informed consent was obtained before administering the questionnaires, and participants were assured of anonymity and confidentiality of their responses. The collected data was used solely for academic purposes and was stored securely, accessible only to the researcher. The study ensured that no personal or sensitive information was disclosed, and that findings were reported honestly, accurately, and objectively. Ethical clearance was sought from the institution's Research Ethics Committee prior to data collection to ensure that all procedures complied with ethical research standards.

3. RESULTS

Profile of the Respondents

Table 1. Respondents' Demographic Profile

Indicators	Classification	Frequency	Percentage (%)
Position	Manager	43	19.4
	Supervisor	58	26.1
	Technical Staff	67	30.2
	Administrative Staff	54	24.3
	Total	222	100.0
Years in Service	Less than 1 year	41	18.5
	1–3 years	64	28.8
	4–6 years	62	27.9
	More than 6 years	55	24.8
	Total	222	100.0
Type of Organization	Local	104	46.8
	Foreign-Owned	75	33.8
	Joint Venture	43	19.4
	Total	222	100.0
Prior Lean Six Sigma (LSS) Exposure	None	45	20.3
	Basic Training	101	45.5
	Project Involvement	51	23.0
	Certified (Green/Black Belt)	25	11.3
	Total	222	100.0

The profile of the respondents shows that the study involved 222 respondents from a service-based company in China. In terms of position, the largest group was composed of technical staff with 67 respondents or 30.2 percent, while managers formed the smallest group with 43 respondents or 19.4 percent. For years in service, most respondents had served for 1 to 3 years, with 64 respondents or 28.8 percent, followed closely by those with 4 to 6 years of service at 62 respondents or 27.9 percent. The smallest group consisted of employees with less than 1 year of service, with 41 respondents or 18.5 percent. Regarding type of organization, most respondents came from local organizations with 104 respondents or 46.8 percent, while joint venture organizations had the

smallest share at 43 respondents or 19.4 percent. In terms of prior Lean Six Sigma exposure, the largest group had basic training with 101 respondents or 45.5 percent, while only 25 respondents or 11.3 percent were certified Green Belt or Black Belt practitioners. Overall, the profile suggests that the respondents were mostly operational employees with basic exposure to Lean Six Sigma, which may have shaped their practical but not deeply technical assessment of LSS practices.

Assessment of Lean Six Sigma Practices

The assessment of Lean Six Sigma practices revealed that the respondents generally perceived LSS practices as Evident, with an overall mean of 3.066 and a standard deviation of 0.528. Among the LSS constructs, Leadership and Governance obtained the highest overall mean of 3.386, suggesting that leadership support, resource allocation, and governance mechanisms were among the most visible LSS practices in the organization. This was followed by Human Systems and Organizational Readiness with a mean of 3.310, indicating that teamwork, change communication, and employee development were also positively perceived. On the other hand, Sustainability Integration received the lowest overall mean of 2.628, although still interpreted as Evident. Digital and Quality 4.0 Infrastructure also obtained a relatively lower mean of 2.831. These results may suggest that the organization has visible leadership and human readiness for LSS, but sustainability-oriented improvement and digital integration may still need stronger implementation.

Differences in Lean Six Sigma Practices Across Profile Variables

The test of difference on Lean Six Sigma practices showed that position, years in service, and type of organization did not produce significant differences in the respondents' assessment of LSS practices. The overall LSS results were not significant when grouped according to position, $F = 0.661$, $p = 0.577$; years in service, $F = 1.259$, $p = 0.289$; and type of organization, $F = 0.887$, $p = 0.413$. This indicates that respondents generally assessed LSS practices similarly regardless of their organizational role, tenure, or organization type. However, prior LSS exposure produced a significant difference in overall LSS practices, $F = 2.713$, $p = 0.046$. Significant differences were also found in Leadership and Governance, $F = 3.751$, $p = 0.012$, and Performance and Evidence Systems, $F = 2.800$, $p = 0.041$. The mean scores increased according to exposure level, from 2.946 among those with no exposure to 3.276 among certified respondents. This finding may suggest that employees with deeper LSS exposure are more likely to recognize and evaluate LSS practices positively.

Assessment of Business Performance

The assessment of business performance showed that the respondents also rated business performance as Evident, with an overall mean of 3.017 and a standard deviation of 0.531. The highest-rated business performance construct was Human, Cultural, and Ownership Enablers, with an overall mean of 3.579, interpreted as Strongly Agree or Highly Evident. This suggests that the company's strongest performance area may be its people-centered culture, particularly open communication, collaboration, competence, accountability, and employee engagement. Strategic-Market Alignment also received a favorable mean of 3.343, indicating that customer satisfaction and market positioning were evident in the company's performance orientation. However, Sustainability and Risk Governance recorded the lowest mean of 2.511, only slightly above the Evident range. Innovation and Business Model Renewal also obtained a modest mean of 2.786. These results suggest that while the company's human and cultural systems are strong, its risk governance, sustainability practices, and business renewal mechanisms may still require closer attention.

Differences in Business Performance Across Profile Variables

The test of difference on business performance similarly showed no significant differences when respondents were grouped according to position, years in service, and type of organization. The overall business performance results were not significant by position, $F = 1.003$, $p = 0.392$; years in service, $F = 1.886$, $p = 0.133$; and type of organization, $F = 1.498$, $p = 0.226$. This suggests that business performance was perceived in a relatively similar manner across these profile groups. However, prior LSS exposure produced a significant difference in overall business performance, $F = 3.661$, $p = 0.013$. Significant differences were also found in Strategic-Market Alignment, $F = 3.276$, $p = 0.022$; Analytics Capability Embedded in Process Performance, $F = 2.658$, $p = 0.049$; Innovation and Business Model Renewal, $F = 3.361$, $p = 0.020$; and Sustainability and Risk Governance, $F = 2.998$, $p = 0.032$. The overall business performance mean increased from 2.900 among respondents with no LSS exposure to 3.247 among certified respondents. This may indicate that prior LSS exposure strengthens employees' understanding of how process improvement connects with business outcomes.

Relationship Between Lean Six Sigma Practices and Business Performance

Table 2. Correlation Between the Subconstructs of Lean Six Sigma Practices and Business Performance

Variable 1: Lean Six Sigma Practices	SMA	ACEP	DEOA	IBMR	HCOE	SRG	Overall Business Performance
Leadership and Governance	0.595***	0.552***	0.512***	0.600***	0.623***	0.570***	0.687***

Process Architecture (DMAIC)	0.688***	0.595***	0.601***	0.700***	0.655***	0.568***	0.758***
Toolsets and Analytics	0.562***	0.608***	0.589***	0.619***	0.613***	0.510***	0.697***
Digital and Quality 4.0 Infrastructure	0.582***	0.625***	0.579***	0.647***	0.572***	0.544***	0.709***
Sustainability Integration	0.560***	0.524***	0.503***	0.532***	0.556***	0.508***	0.633***
Human Systems and Organizational Readiness	0.650***	0.602***	0.520***	0.616***	0.609***	0.576***	0.712***
Integration with Standards and Formal Systems	0.632***	0.582***	0.520***	0.650***	0.632***	0.571***	0.714***
Sectoral Adaptation and Customization	0.596***	0.552***	0.505***	0.581***	0.588***	0.510***	0.663***
Performance and Evidence Systems	0.641***	0.587***	0.513***	0.612***	0.557***	0.553***	0.692***
Overall Lean Six Sigma Practices	**0.737***	**0.701***	**0.650***	**0.744***	**0.723***	**0.657***	**0.839***

Legend: SMA = Strategic–Market Alignment; ACEP = Analytics Capability Embedded in Process Performance; DEOA = Digitally Enabled Operations and Automation; IBMR = Innovation and Business Model Renewal; HCOE = Human, Cultural, and Ownership Enablers; SRG = Sustainability and Risk Governance

Table 2 presents the correlation between the subconstructs of Lean Six Sigma practices and the subconstructs of business performance. The results show that all paired correlations were positive and statistically significant at $p < .001$. This means that higher assessments of Lean Six Sigma practices were associated with higher assessments of business performance. The overall correlation between Lean Six Sigma Practices and Business Performance was $r = 0.839$, which indicates a very strong positive relationship. This is one of the most important findings of the study because it suggests that LSS practices are closely linked with business performance outcomes in the service-based company.

Looking at the relationship between LSS subconstructs and overall business performance, Process Architecture (DMAIC) had the highest correlation with overall business performance at $r = 0.758$. This may suggest that structured problem-solving is strongly connected with better business performance. Integration with Standards and Formal Systems followed with $r = 0.714$, Human Systems and Organizational Readiness with $r = 0.712$, and Digital and Quality 4.0 Infrastructure with $r = 0.709$. These are all strong positive relationships. The lowest correlation with overall business performance was Sustainability Integration at $r = 0.633$, although this is still a strong and significant relationship. This pattern may suggest that while sustainability integration contributes to performance, the more immediate drivers of business performance may be structured process architecture, formal systems, digital infrastructure, and organizational readiness.

The correlations between overall Lean Six Sigma practices and the business performance subconstructs also show a clear pattern. The strongest relationship was with Innovation and Business Model Renewal at $r = 0.744$, followed by Strategic-Market Alignment at $r = 0.737$, Human, Cultural, and Ownership Enablers at $r = 0.723$, and Analytics Capability Embedded in Process Performance at $r = 0.701$. The lowest relationship was with Digitally Enabled Operations and Automation at $r = 0.650$, although this is still strong and significant. These results may suggest that LSS practices are not only associated with operational efficiency but also with broader performance areas such as strategic alignment, service renewal, employee ownership, analytics use, and responsible governance. The finding is useful because it shows that Lean Six Sigma may operate beyond cost reduction or defect control. It may also support how a company adapts, learns, and competes.

Proposed Strategic Business Program

The proposed program, titled Strategic Lean Six Sigma Business Performance Enhancement Program, is designed to strengthen Lean Six Sigma implementation and improve business performance in a service-based company in China. The program is anchored on the study findings, which showed that Lean Six Sigma practices were generally evident, with an overall mean of 3.066, while business performance was also evident, with an overall mean of 3.017. However, the findings also pointed to specific areas needing attention. Sustainability Integration received a relatively low mean of 2.628, while Digital and Quality 4.0 Infrastructure obtained a mean of 2.831. In terms of business performance, Sustainability and Risk Governance received the lowest overall mean of 2.511, while Innovation and Business Model Renewal obtained a modest mean of 2.786.

4. DISCUSSION

The results generally show that both Lean Six Sigma practices and business performance were positively assessed, although the strength of evidence varied by construct. Among the LSS dimensions, Leadership and Governance had one of the higher overall

means at 3.39, while Sustainability Integration had the lowest at 2.63. This suggests that leadership support and readiness structures may be more visible than sustainability-oriented LSS applications. For business performance, Human, Cultural, and Ownership Enablers obtained the highest overall mean at 3.58, while Sustainability and Risk Governance obtained the lowest at 2.51. The broad pattern may suggest that the organization's strongest foundation lies in people, culture, leadership support, and customer-oriented strategy, while its more technical and future-facing systems, particularly digital integration, innovation, sustainability, and risk governance, still require deeper attention. In summary, the findings appear to describe a service-based company that is reasonably prepared for Lean Six Sigma implementation but may still need stronger integration of advanced analytics, digital systems, sustainability goals, and preventive governance mechanisms to move from evident practice to highly evident performance.

The result strongly aligns with the RRL on Lean Six Sigma training and capability building. LSS is not only a set of tools but also a way of seeing work processes. Employees with more exposure may be better able to identify waste, variation, root causes, process measures, and control mechanisms. Still, the result also suggests a practical concern. If employees with little or no exposure assess LSS practices less favorably, the organization may have a communication and capability gap. LSS may be happening, but not everyone understands it enough to recognize it. This makes training, project participation, and certification pathways important, not only for technical improvement but also for building shared understanding across the workforce.

In addition, it supports the literature position that Lean Six Sigma can contribute to business performance when it is implemented as an integrated management system rather than as isolated tools. Strong correlations do not prove direct causation, and this should be stated carefully. However, the consistency of the results across all subconstructs may suggest that LSS practices and business performance move together in a meaningful way. In a service-based company, this could mean that clearer process architecture, better performance evidence, stronger leadership, formal standards, and employee readiness are associated with better customer alignment, analytics use, innovation, culture, and governance. Overall, the study provides strong statistical support for the relationship between Lean Six Sigma practices and business performance, with the overall correlation of $r = 0.839$ showing that the two major variables are very closely connected in the respondents' assessment.

5. CONCLUSION

Lean Six Sigma practices in the service-based company were generally evident. Leadership and Governance, Human Systems and Organizational Readiness, and Integration with Standards and Formal Systems emerged as stronger areas, which suggests that the organization has visible leadership support, employee readiness, and formal quality-related structures. However, Sustainability Integration and Digital and Quality 4.0 Infrastructure received lower assessments, indicating that environmental sustainability, digital systems, automation, and Quality 4.0 practices may not yet be fully embedded in LSS implementation.

Business performance was also generally evident among the respondents. The strongest area was Human, Cultural, and Ownership Enablers, which suggests that collaboration, communication, accountability, competence, and employee engagement are important strengths of the organization. Strategic-Market Alignment was likewise positively assessed, indicating that customer satisfaction and market positioning are reasonably visible. However, Sustainability and Risk Governance received the lowest assessment, suggesting that preventive risk management, ethical-environmental standards, and long-term responsible management need more deliberate attention.

There were no significant differences in the assessment of Lean Six Sigma practices when respondents were grouped according to position, years in service, and type of organization. This means that LSS practices were perceived in a relatively similar manner across these profile groups. However, significant differences were found when respondents were grouped according to prior LSS exposure, particularly in overall LSS practices, Leadership and Governance, and Performance and Evidence Systems. This suggests that employees with greater LSS exposure tend to recognize and assess LSS practices more positively.

There were also no significant differences in the assessment of business performance when respondents were grouped according to position, years in service, and type of organization. This indicates that perceptions of business performance were generally consistent across these respondent groups. However, significant differences were found based on prior LSS exposure, particularly in overall business performance, Strategic-Market Alignment, Analytics Capability, Innovation and Business Model Renewal, and Sustainability and Risk Governance. This implies that LSS exposure may influence how employees understand and evaluate business outcomes.

Lean Six Sigma practices were significantly and positively related to business performance. The overall correlation between Lean Six Sigma Practices and Business Performance was very strong, $r = 0.839$, $p < .001$. This suggests that stronger LSS practices are associated with stronger business performance, especially in structured problem-solving, formal standards, organizational readiness, analytics, innovation, and strategic alignment. While the result does not prove causation, it strongly indicates that Lean Six Sigma may serve as an important support mechanism for improving business performance in a service-based company.

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