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Lean Service Tools for the Positive Sustainable Growth - A Critical Literature Review

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***Abstract*:- The research paper aims to study the Systematic Literature Review (SLR) on how lean systems implemented in service industries and extended to the sustainability model. This study explores SLR considering 137 papers published from 2002 to 2019 into account and focusing on the significance of sustainable development of a conceptual model to explore the research further. This literature review triggered the sustainability development in service sectors such as healthcare, education, public sector, banking, and financial services, IT/ITES, telecom services, hotel, and product services. The limitation of this work excluded lean related studies applied in manufacturing sectors and books during the period of study. Specific features discussed on implications of lean applied in service industries and its importance of sustainability, which is scant in the literature. Hence, both academicians and practitioners can be beneficiary from the SLR point of view.**

Keywords:- Lean service, Service industries, Sustainable growth, Systematic literature review

1. INTRODUCTION

Today across the globe, all the organizations facing the intricate problems of environmental and social sustainability (McCarty et al., 2011). Service operations are often well known around the globe. Suppliers, service organizations, and customers link it through service, information sometimes capital flows. Companies all over the world are trying to figure out how to manage their environmental and social performance better. Hence, enhancing sustainability performance and decreasing environmental problems will ensure business in an imperative form. Service organizations responsible for the environmental and sustainability of their customers. For instance, hospitals generate a lot of healthcare waste, and there are issues with storage, transportation, and disposal of that waste. (Unger, Campion, Bilec, & Landis, 2016). Mazzocato et al. (2010) implemented lean in the healthcare sector. The results showed that staff empowerment and continuous improvement in operations prominent to sustainable outcomes. Hence, lean is sustainable in the long term, which is more effective than other approaches in the healthcare department.

In India, the postal department utilizes abundant labour availability for their postal services. Postal service industries make environmental pollution by emitting gas through their vehicle transportation. In the sealing section, employees knowingly or unknowingly inhale the smoke during the dispatched delivery article sealing bags (Ramachandiran.K, 2011). It is a hazard that can cause cancer after a particular period. The postal department has to give prime importance to address this problem and improve the social protection of human well-being through their sustainability. By observing lean performers, Niepce and Molleman (1998) discovered correlations between lean and socio-technical architecture. Venkat and Wakeland (2006) investigated the lean supply chains using CO_2 gas emissions as a key performance indicator to measure environmental performance. Leite et al. (2015) suggested that when a lean system implemented correctly in service industries, a lot of benefits can get it from the organization in terms of operational and financial performance. The word “sustainable development” has attained significant importance in current periods, which will impact our life and society. Hence, organizations have recognized sustainability as a competitive advantage.

Higher education institutes can improve sustainability and reduce environmental problems through assignment submission and academic files, and it must be in digital form. The motto of the education institutes goes by “save the environment; save trees” concepts. Comm & Mathaisel, 2005 criticized that there is no school has awarded as a sustainable practice. Hence the articles, as mentioned earlier, were explained lean applied in service industries and the importance of sustainability issues. Research Questions (RQs) formulated to address these issues,

(1) Under which conditions lean service articles classified?
(2) What is the significance of the sustainability model in service industries?
(3) What are the research gaps and future scope of this review paper?

The paper arranged as follows. Section 2 deals with methodology; Section 3 explains a descriptive analysis of SLR; Section 4 describes the importance of sustainable development and model for this research; the section 5 concludes with limitations and future research directions.

1.1 Basic terminology

The book "The computer that changed the world" by Womack and Jones (1990) popularised the lean idea. First and foremost, manufacturing companies all over the world have gradually introduced Lean Manufacturing (LM). The advantage of LM produces more outputs with less input, such as space, material, human effort, and time. It requires fewer inventories on hand to provide the quality of variety products (Womack, J.P, Jones D.T. 1990). In several industries, especially automotive manufacturers and their suppliers, LM techniques aided in the production volume. In the lean definitions, eight forms of wastes

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known as TIMWOODS (transport, inventory, motion, waiting, over-processing, overproduction, defects, and underutilization of resources).

These wastes were something that customers do not wish to pay known as non-value added activities. Hunter (2002) showed that by introducing the LM, not only does it require less human effort, but it also increases productivity while reducing inventory. According to lvarez et al. (2008), value stream mapping can easily define waste and areas in need of improvement, and the card system (Kanban) can help reduce inefficiencies. In the United States, Zhou (2012) performed an empirical analysis on SMEs. According to the findings, the majority of businesses are aware of the lean model and its values. The majority of businesses save money by implementing quality enhancement, reducing waste, and improving the overall plant/facility layout. Slowly, LM concepts moved to service industries and implemented successfully in service operations. Progressively, lean concepts implemented in healthcare, education, public services, hotel, financial and IT industries, etc. and stimulating developments started from 2005. The rise of environmental and sustainability, the USA's Environmental Protection Agency (EPA, 2003) defined lean as "Produce high-quality goods at a low cost, with the shortest lead time possible, and with constant waste reduction while putting people and the environment first.

Meanwhile, Robin Roy et al. (2000) highlights the significance of lean sustainable product-service systems. The sustainable development started in 1972 at the UN Conference on "Human Environment" held in Stockholm (Rogers et al., 2008). In service sectors, sustainability aims to improve the service operations in higher customer satisfaction (example: patient safety in hospitals) and profits with minimization environmental impacts, use the resources and energy optimally. The three scopes of sustainability, as described by Dyllick and Hockerts (2002), are business case (economic), natural case (environmental), and societal case (social). The primary outline of this paper is how sustainability helps in service industries while considering the goals of all three dimensions in service operations.

2. RESEARCH METHODOLOGY

The research aims to analyse the suitable articles for the scope of sustainable development in service industries, which is scant in literature. A literature review is a logical method to formulate model in any developing field (Easterby-Smith et al., 2002). The top journal articles considered from the period of 2002 to 2019. The reason for selecting 2002 is lean manufacturing concepts widely adopted in service industries, and the argument started on sustainability during this period. We have used keywords such as lean service, lean applied in service industries, lean implemented in service, sustainability, sustainable service, lean sustainable service. Refer Figure 1 SLR process of literature review flowchart.

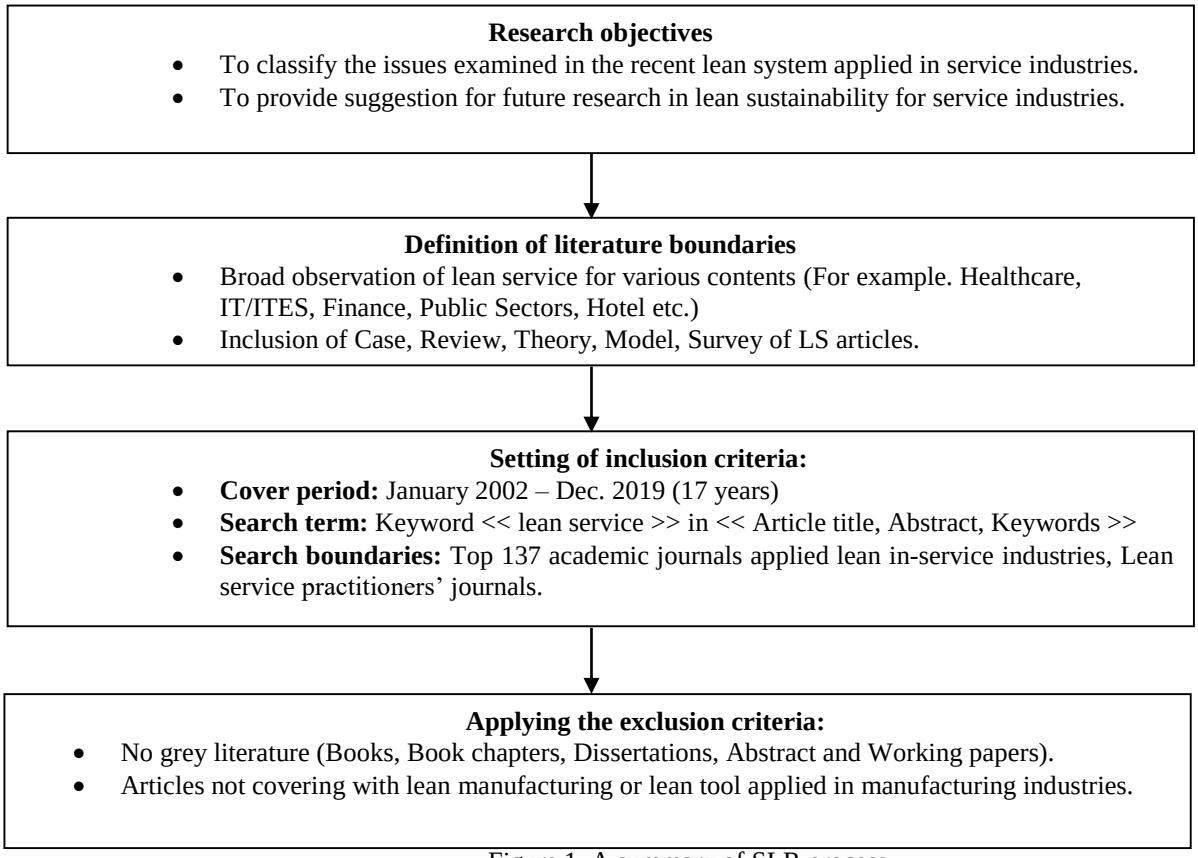

Figure 1. A summary of SLR process

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The Boolean operators (AND and OR) has been used to find the relevant titles. All 137 selected papers analysed concisely to ensure that articles were significant to our review. An Excel database was created to classify the articles according to their inter-relationships.

3. DESCRIPTIVE ANALYSIS

3.1 Selection of articles and time zone

137 papers considered from 2002 to April 2019 as shown in Figure 2 in a year wise distribution. Figure 3 shows papers becoming greater in size published over the period of time. More than 52% of the papers were published in JCLP, IJLSS, and POM journals. The JCLP literature review papers played a major role as it contributes 6.56%. Interestingly, from 2013 to 2016 greener management related articles were published in reputed journals such as JCLP (9), IJLSS (3), PP&C (4).

Table 1. Distribution of publications as per journals names

S.No.	Journals name	Publication
1	Anesthesiology Clinics	1
2	Annals of Emergency Medicine	2
3	ASQ	2
4	Benchmarking: An International Journal	3
5	Cardiovascular Revascularization Medicine	1
6	CIRP Journal of Manufacturing Science and Technology	1
7	Clinical Governance: An International Journal	1
8	Computers in Industry	1
9	Computers & Industrial Engineering	1
10	Empirical Software Engineering	1
11	European Journal of Marketing	1
12	European Journal of Operational Research	3
13	IBM Center for The Business of Goverment	1
13	ICMA Public Management Magazine	1
14	IFAC-Papers on Line	2
15	IFAC Proceedings	1
16	Industrial Management & Data Systems	1
17	International Conference on Technology and Business Management	1
18	International Journal of Basic & Applied Sciences	1
19	International journal of Business Excellence	1
20	International journal of Business information systems	1
21	International Journal of Business and Social Science	1
22	International Journal of Computational Intelligence Systems	2
	International Journal of Health Care Quality Assurance	2
24	International Journal of Information Management	1
25	International Journal of Lean Six Sigma	4
26	International Journal of Operations & Production Management	4
27	International Journal of Productivity and Performance Management	6
28	International Journal of Production Economics	1
29	International Journal of Production Research	1
30	International Journal of Quality & Reliability Management	4
31	International Journal of Quality and Service Sciences	1
32	International Journal of Scientific and Research Publications	1
33	International Journal Services Technology and Management	1
34	International Journal of Six Sigma and Competitive Advantage	4
35	International journal of Supply Chain Management	1
36	IOP Conference Series: Materials Science and Engineering	1
37	Journal of Cleaner Production	9
38	Journal of the American College of Radiology	1
39	journal of Engineering manufacture	1
40	Journal of Health Organization and Management	2
41	Journal of Information and Knowledge Systems	1
42	Journal of Manufacturing Systems	1
43	Journal of Manufacturing Technology Management	3
44	Journal of Organizational Excellence	1
45	Journal of Operations Management	3
46	Journal of Pediatric Surgery	1
47	Journal of Psychosomatic Research	1
48	Journal of Transport Geography	1
49	Leadership in Health Services	1
50	Marine Policy	1
51	Neural Computation & Applications	1
52	Perioperative Care and Operating Room Management	1
53	Production	1
54	Production Planning & Control	4
55	Production Planning & Control the Management of Operations	2
56	Procedia Engineering	1
57	Procedia Computer Science	1

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58	Procedia CIRP	5
59	Procedia Manufacturing	2
60	Procedia - Social and Behavioral Sciences	3
61	Public Management Review	1
62	Quality Assurance in Education	2
63	Sage	1
64	SAIIE25 Proceedings	1
65	Supply Chain Management: An International Journal	2
66	The Journal of Behavioral Health Services & Research	1
67	The British Accounting Review	1
68	The Online Journal of McKinsey & Co	1
69	The International Journal of Human Resource Management	2
70	Total Quality Management & Business Excellence	3
71	Tourism Management	1
72	Tropical Medicine and Health	1
73	Transformations in business & economics	1
74	The Surgeon	1
75	TQM	1
76	The TQM journal	3
77	TQM and Business excellence	1
78	International Journal of Business and Commerce	1
79	International journal of System Assurance and Engineering Management	1

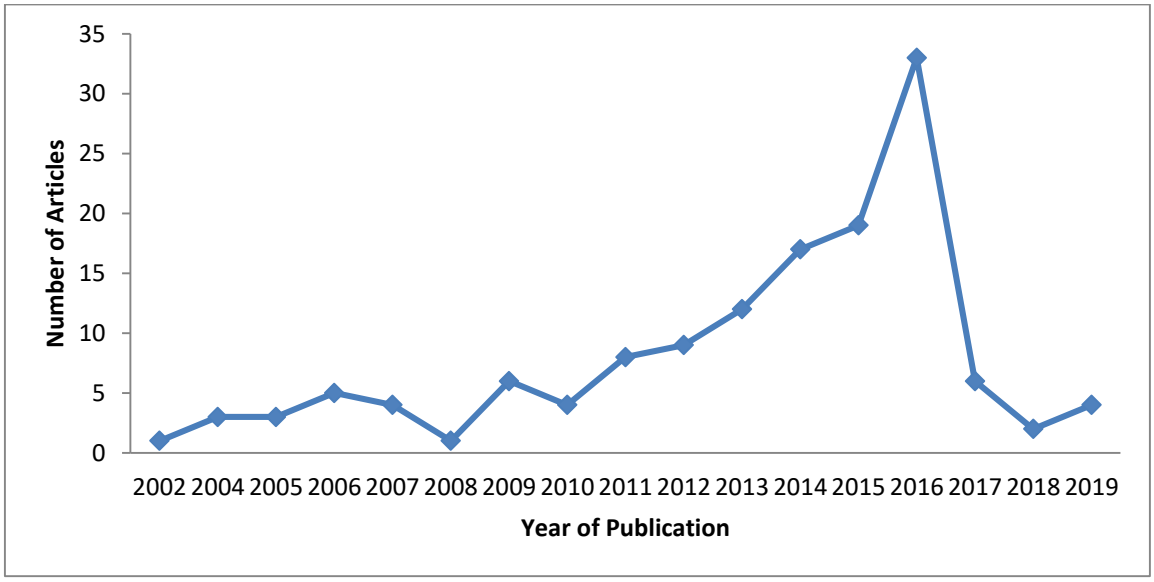

Figure 2. Across the time period distribution of publications

3.2 Articles classifications

The articles arranged into five categories, namely theoretical or conceptual, case study, surveys, modelling, and literature review. Further, for clear understanding to readers, Fifty four papers presented in empirical research. Twelve articles were theoretical or conceptual. Some journals do not come under case papers, and theoretical papers such as survey accounts for 13 journals and literature review has 24 papers. Finally, the conceptual models' articles are 34, which is the intermediate link between the theoretical and case papers has considered. Figure 3 shows the research methodology applied in this SLR. The Venn diagram describes the distribution of papers among these five research methodologies.

Table 2. Summary of research methodologies applied

Research methodology	No.of papers
Case study (C)	54
Model (M)	34
Review (R)	24
Survey (S)	13
Theory (T)	12

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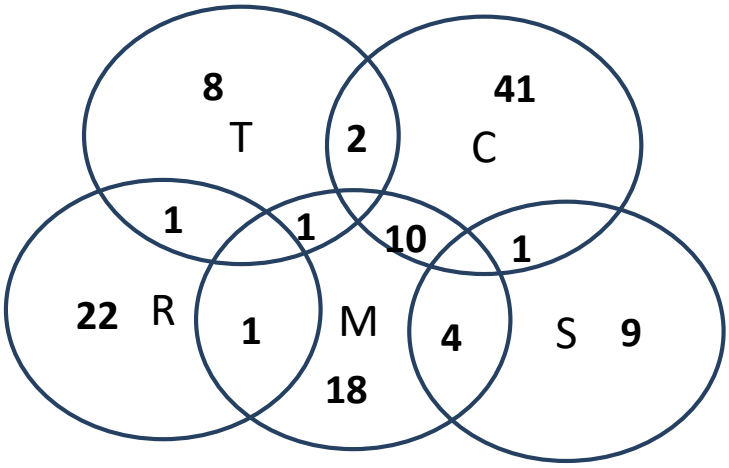

Figure 3. Distribution papers according to the rearch methodologies employed

3.2 Geographical contributions

Table 3 shows the details about the geographical regions selected for lean service and sustainability development articles. Developed countries made valuable contributions to their research in lean service and sustainability, almost 70% of contribution leading countries such as the USA, UK, Sweden, Spain, and Australia. Developing countries contributed 30% emerging countries such as India, Malaysia, Turkey, and Srilanka are in a nascent stage. Underdeveloped countries like Ethiopia (0.08%). Developed countries have to encourage the importance of incorporating lean service and sustainability principles to underdeveloped countries. Developing countries has to improve their social-economic feature through implementing sustainability principles.

Table 3. Distribution of countries publications (Developed,Developing and Under developed countries

Developed countries	**Publications**
USA	26
UK	22
Sweden	9
Netherlands	3
Italy	3
Norway	2
Canada	2
Australia	4
France	1
Singapore	1
Ireland	2
Spain	5
Portugal	1
Soothe Arabia	1
New Zealand	1
UAE	1
Germany	1
Taiwan	5
Finland	1
Greece	1
Japan	1

Developing countries	**Publications**
India	13
Malaysia	5
Turkey	6
Mexico	2
Republic of Serbia	1
Brazil	3
Morocco	1
Srilanka	4
Omen	1
Libya	1
Indonesia	3
South africa	1
Poland	1
China	1

Under developed countries	**Publications**
Ethiopia	1

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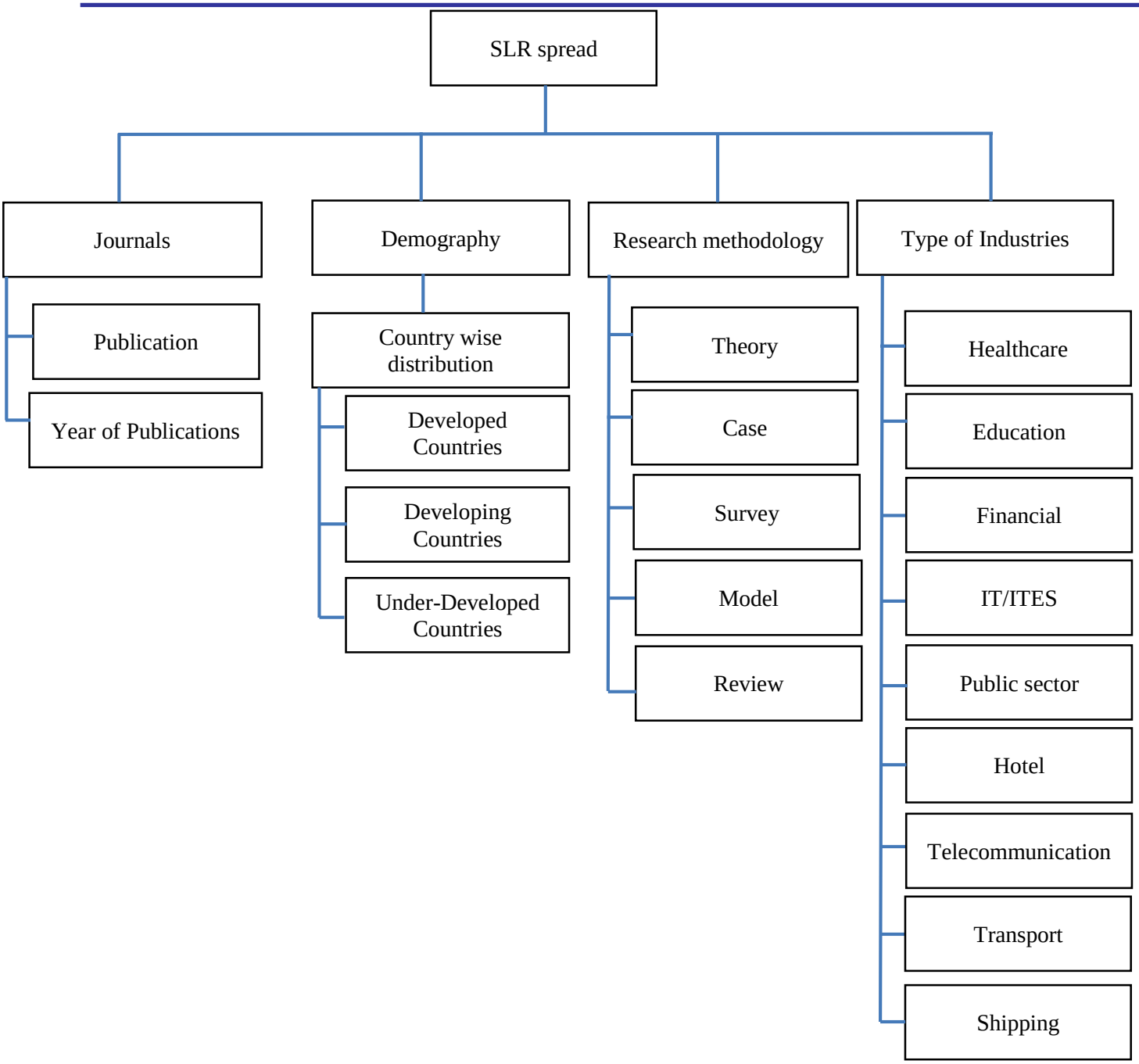

Figure 4. Lean service - literature classification

3.3 SLR spread

From the Figure 5 show that the most of the articles were related to healthcare, followed by IT/ITES and other service sectors. The dominance of the health sector initially implemented the lean concepts in the year 2009 in the UK and later combined with sustainability to identify and remove the hospital wastes. Then, IT and ITES sectors looking for an improved process, eliminate wastes, reducing the documentation work (paperwork) to measure with CMMI level, and SCROM compliance certificates. From the SLR, more force has been given to hospital to develop sustainability in their operations in terms of patient safety and care.

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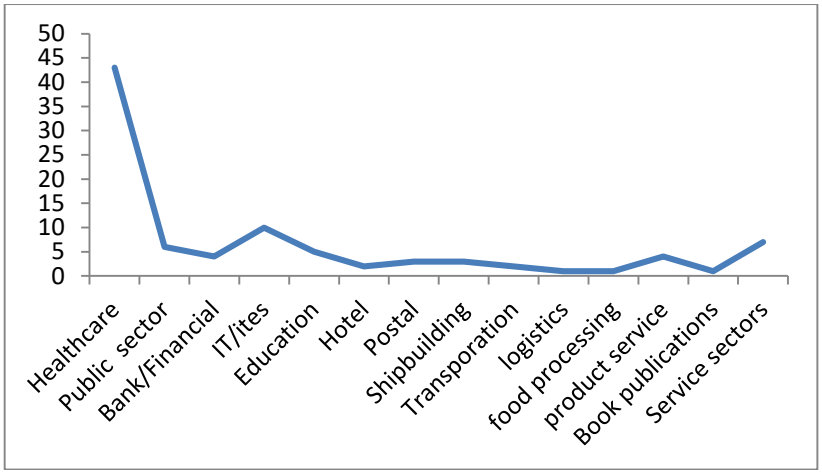

Figure 5. Distribution of research by industrial sector

3.4 Development of sustainable development

The articles have five categories of sustainable development. The five types are (1) economy (2) social (3) environmental (4) sustainable (5) others. Most of the articles (82) were dealing with economic issues. The economy category has the majority of the publications, whereas remaining groups need more attention to the lean service practitioners and academicians — the sustainability based on three pillars (Economic, Environmental, and Social). If one's support is fragile, then the whole system is not stable. Rightly Gladwin et al. (1995) mentioned that, if any organization wants to achieve sustainability these three dimensions must be satisfied.

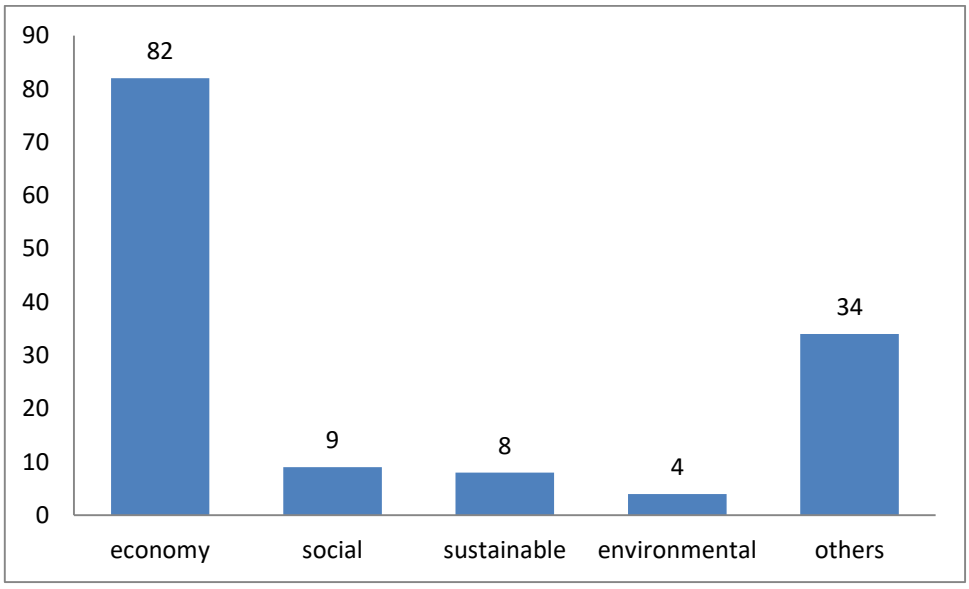

Figure 6. Distribution of articles based on sustainability

4. RESEARCH GAPS IN EXISTING LITERATURE

After carefully analysing the SLR, we have portrait the research gaps in present lean system conceptual and empirical world in the existing state of knowledge.

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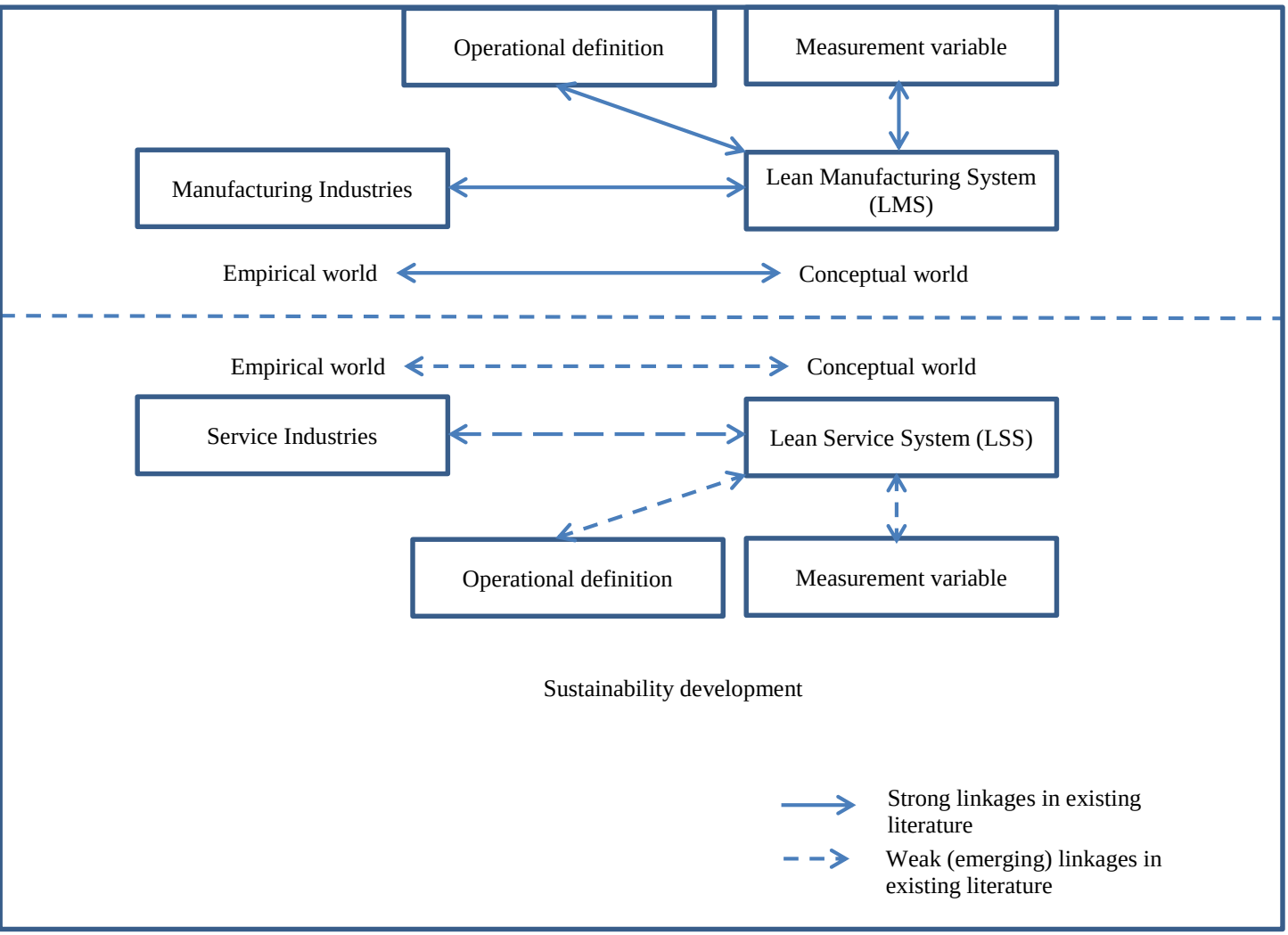

Figure 7 Research scope for future sustainable model from the existing literature

4.1. Towards a sustainable development model

Both sustainability and lean service background the review conducted. Then, we try to conceptualize the model in three parts as follows:

- Triggers for lean sustainability in service industries
- Lean sustainability barriers and performance for adoption
- Lean sustainable service

4.1.1 Triggers for lean sustainability in service industries

The triggers for the field and related activities were identified by the careful analysis articles and it was highlighted in Figure 8. The first point is to apply lean concepts or techniques in the service sector based on their expectations. Then, organisation has to evaluate their barriers or critical success factors through survey or suitable methods. Third point any organisation needs to integrate the sustainability principle along with lean system. A Service industry has to perform their sustainability activities through standard guidelines given by environmental (ISO 14001) and social standards (SA 8000).

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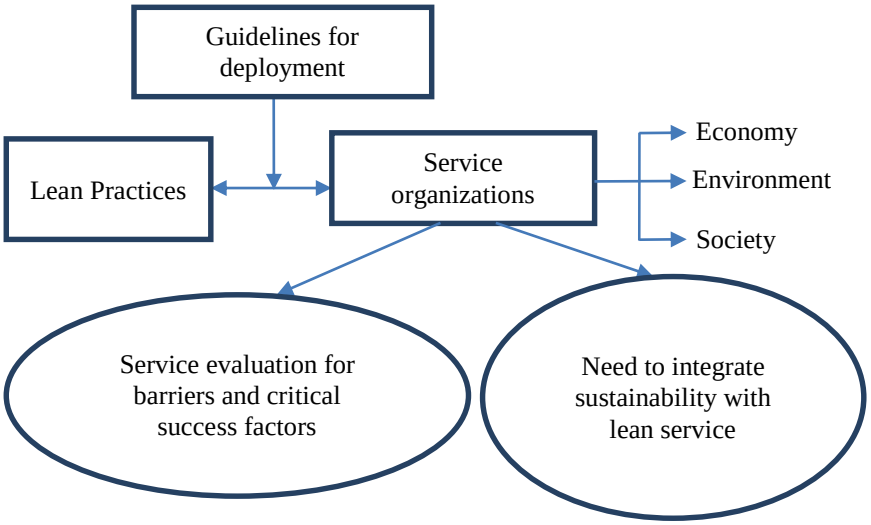

Figure 8. Motivations for lean sustainability in service industries

4.1. 2 Lean service barriers and performance

Three aspects mentioned as barriers for implementing sustainability in service sectors such as higher costs, the complexity of the service, and lack of coordination. Before incorporating sustainability, the lean system has to be appropriately aligned with standard models, integrate with appropriate tools, need clear guidelines, worker and manager's commitment, learning environments in the service organizations.

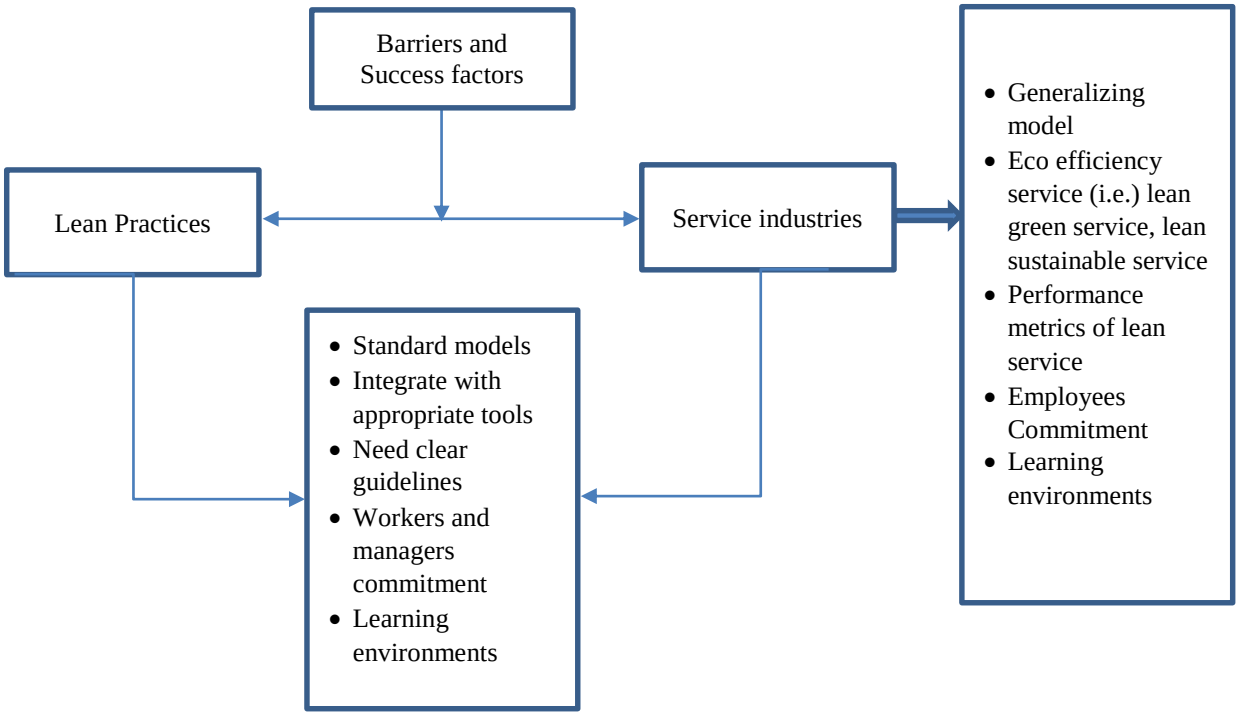

Figure 9. Lean sustainability barriers and success factors in service industries

4.1.3 Lean Service for sustainability

Sustainability is the term improved economic, social, and environmental standards. This paper has an extensive configuration of the triple bottom line of the framework with sustainability principles. The primary goal of this paper is to create a long-term framework model for service industries while also highlighting the market's competitive strategy.

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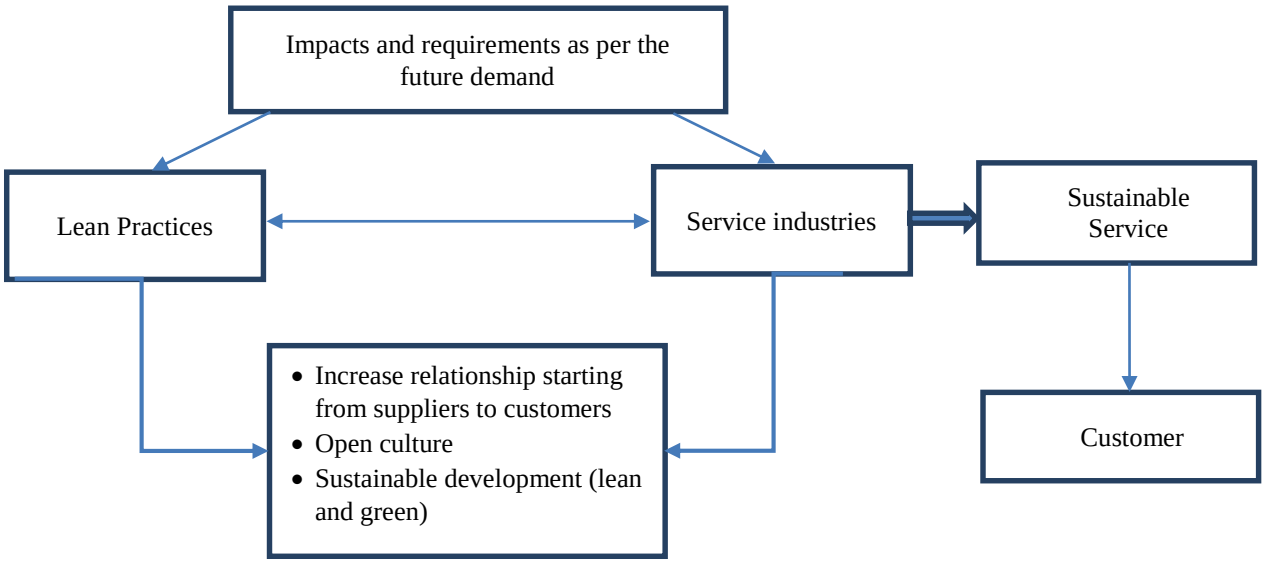

Figure 10. Lean sustainability for service industries

5. CONCLUSION

This paper highlights the SLR of lean applied in different service industries starting from January 2002 and ending to April 2019 in 137 top academic journals. First, this research provides recent patterns in LS literature - classifying research context, country wise. Second, we included conceptual, case study, theory, review, survey articles, to analyse different features and activities in lean service field. Third, we have depicted a clear and rigors lean sustainability model for service industries. Fourth, we have shown the importance of lean sustainability barriers and critical success factors while implementing in service industries. The limitation of this work we have excluded lean related studies and books and consideration of period study. The implication of this paper has a complete alignment with the triple bottom line framework of sustainability principles. In future scope, academicians and practitioners may apply this model to test empirically to check robustness & sustainability in different service industries.

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