International Journal of Quality & Reliability Management

Lean for airport services: a systematic literature review and agenda for future research

Sigrid Syltevik, Stavros Karamperidis, Jiju Antony, Babak Taheri,

Received 22 August 2016
Revised 23 October 2016
Accepted 28 November 2016

QUALITY PAPER

Lean for airport services: a systematic literature review and agenda for future research

Sigrid Syltevik, Stavros Karamperidis, Jiju Antony and Babak Taheri
School of Social Sciences, Department of Business Management, Heriot-Watt University, Edinburgh, UK

Abstract

Purpose – The purpose of this paper is to present the key findings of a systematic literature review (SLR) on Lean for services and, in particular, airport services.
Design/methodology/approach – The authors have utilised an SLR methodology proposed by Denyer and Tranfield (2009). A total of 23 papers published in 18 scientific journals have been systematically reviewed for evaluating and establishing the current status of Lean for airport services.
Findings – It was observed that there are no journal publications on the use of Lean in UK airport services. Although value stream mapping has been widely accepted as a powerful Lean tool across many service organisations, its applications in airport services is in its early stages. One of the biggest challenges in the implementation of Lean for airport services is about maintaining the level of service standards. The most common barriers in the implementation of Lean for airport services may include: resistance to change, varied definitions of the term Lean for different people across the business and understanding the need for Lean in airport services as there is a misconception that Lean is confined to manufacturing.
Research limitations/implications – This paper seeks to contribute to and broaden the limited body of evidence of the applicability of Lean to airport services and identify areas for further research and review.
Originality/value – This paper makes an attempt to demonstrate the use of Lean thinking for service industries and, in particular, airport services. The authors have identified less than five papers on the use of Lean thinking in airport services and this paper sets the foundation for future research on the use of process excellence methodologies such as Lean. Moreover, the authors firmly believe that the results of this SLR can be extremely beneficial to many managers working in Airport Service contexts, irrespective of the country and culture of the organisation.

Keywords Lean, Systematic literature review, Airport services, Lean services

Paper type Literature review

Introduction

Originating from the floors of the Toyota Production System (Hines *et al.*, 2004), Lean was initially intended to enable Japanese car manufacturers to compete with dominating American manufacturers through eliminating waste in the production chain (Hines *et al.*, 2004). Lean has since become an internationally renowned management philosophy, with a purpose designed to enhance the efficiency of manufacturing processes. In recent years, Lean is also increasingly applied to a wide range of service operations as it is believed that more benefits may be gained from this sector than in the original, i.e., manufacturing (Alsmadi *et al.*, 2012).

Academics debate whether Lean is an appropriate strategy for the service industry, much due to the difficulties of measuring the outcomes of services compared to those in the manufacturing industry (Bowen and Youngdahl, 1998). Having that in mind, it is difficult to deny the many challenges involved with Lean implementation in the service industry. However, with customers expecting a higher quality from services, process excellence methodologies such as Lean have attracted interest from both organisations and academics who have read success stories of other companies (Suárez-Barraza *et al.*, 2012). Thus, now they are inspired to achieve similar results in their organisations whilst still meeting the market expectations (Suárez-Barraza *et al.*, 2012).

International Journal of Quality & Reliability Management
Vol. 35 No. 1, 2018
pp. 34-49

0265-671X
DOI 10.1108/IJQRM-08-2016-0135

Though many organisations within the service industry are increasingly becoming more intrigued by Lean theories and wish to implement them into their own organisations, the amount of published literature on the topic is still under development (Bowen and Youngdahl, 1998). Many service sectors are still scarce for research within their topic exploring the potential for Lean management. An example of this lack of research could be found in airport services. The aviation sector is of great importance for the global economy with $2.4 trillion of global economic impact (or 3.45 per cent of the global GDP) and 58.1 million jobs related to aviation, out of which 470,000 are directly related to airport operations (Smyth and Pearce, 2007; Air Transport Action Group (ATAG), 2014). Regardless of the great size and importance of that sector, according to a systematic literature review (SLR), only a handful of articles have, to date, been published on the topic.

To best explore the opportunities and already existing literature on Lean implementation in the airport services, this paper conducted an SLR of published articles on Lean with a specific focus on airport services. With the use of an SLR approach, the rest of the paper will identify key areas of Lean in airport services from the perspective of operational and managerial aspects, which include: tools utilised, challenges, success factors, benefits, limitations and agenda for future research.

Methodology

A literature review can be carried out through a narrative review (as was the case for many years in management science), or SLR and meta-analysis (as was the case for many years in medicine) (Tranfield *et al.*, 2003). SLR has been widely adopted recently in management studies. According to Suárez-Barraza *et al.* (2012), SLR follows a scientific, systematic and transparent method. In addition, traditional narrative literature review has been criticised by experts, Mulrow (1994) and Denyer and Neely (2004), as it can be heavily influenced by research bias. Using the SLR framework, the bias and systematic error can be explicitly minimised (Petticrew and Roberts, 2006).

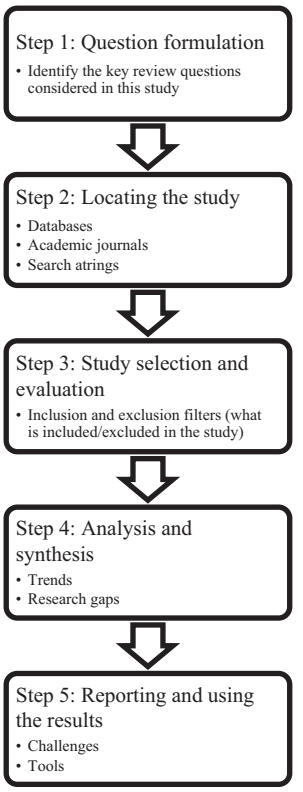
According to Denyer and Tranfield (2009, p. 677) management research is "a nascent field still developing in terms of agenda and focus. In contrast with more mature fields, such as medicine or engineering; management research does not enjoy consensus on research methods and convergence on research questions". Integration and creation of coherent knowledge on specific phenomena is missing as there is usually a lack of synthesising miscellaneous literature, which will create knowledge that could serve research and practitioner communities (Denyer and Tranfield, 2009).

Systematic reviews "bring together as many studies as possible that are relevant to the research being undertaken, irrespective of their published location, or even disciplinary background" (Thorpe *et al.*, 2005; p. 258). That has to be done in a way which ensures that any undertaken decision during the review process is transparent. By doing that, the suitability of the studies reviewed could be revised by the readers who would be able to extract outcomes for the robustness of the study (Denyer and Neely, 2004).

The SLR applied herein has followed the five stages (Figure 1) developed by Denyer and Tranfield (2009), namely: question formulation, locating studies, study selection and evaluation, analysis and synthesis and reporting and using the results.

Step 1: question formulation (identify the key review questions considered in this study)

Building on the research objectives, the systematic review's main focus will be to determine key areas of Lean in airport services, if there are any benefits or challenges to implementing Lean, and to identify which Lean tools are considered to be effective in airport services and how they are then measured. According to Denyer and Tranfield (2009), it is specifically important to engage experts for the formation of review questions when the literature is sparse. A group considered by many in the research environment to



Source: Adapted by the authors from Denyer and Tranfield (2009)

Figure 1.
SLR roadmap

be world-leading academics reviewed the initial review questions under the spectrum of the Context-Intervention-Mechanism-Output framework (Table I (Tranfield *et al.*, 2003)). The purpose behind this framework is to help focus the review question and make it even more specific (Tranfield *et al.*, 2003).

Step 2: locating the study

In the second step, the identification of the databases, search engines and journals that could be considered to find literature through the use of the defined search terms takes place

Context:	Intervention:
Which relationships, institutional settings or wider systems are being studied?	Which effects of the events, actions or activities are being studied?
Lean services applied to airports	Lean tools
Output:	Mechanism:
What are the effects of the interventions?	What are the mechanisms that explain the relationship between interventions and outcomes?
Benefits and challenges of Lean implementation	Use of Lean services

Source: Denyer and Tranfield (2009)

Table I.
C-I-M-O framework

(Denyer and Tranfield, 2009). The databases used for the SLR search were "Emerald Insight", "Ingenta" and "Science Direct". Search engines utilised were primarily Discovery (Heriot-Watt University) but also Google Scholar. The primary focus was on academic journals, where Table III displays the relevant articles used for the study.

Step 3: study selection and evaluation (inclusion and exclusion filters)

In the third step, a selection of the articles was carried out (Figure 2), based on the inclusion and exclusion criteria used in the review (Table II). Petticrew and Roberts (2006) state that filters determining what is to be included and excluded must be specified in the report as they depict the type of study, intervention, population and outcomes that are appropriate to review in depth. After entering the search string "lean + services", 322 articles were found; as this hit was too wide the scope had to be further narrowed down. Through the use of the inclusion and exclusion filters, a more achievable amount of literature was then found allowing research to focus on the most relevant articles for the SLR. Similarly, due to the low amount of existing literature on Lean in airport services, articles including information on how quality and success of other services are measured were of relevance to the search. Therefore, despite some journals not meeting the filter of being within an ABS rank 3* or 4*, there are still articles retrieved from specialised journals in the field of Lean which were found to be relevant for this research.

Healthcare articles appear to be the category with the largest number of Lean service articles and it is the only sector that is extensively studied academically according to Suárez-Barraza *et al.* (2012). Additionally, healthcare services appear to have several similarities with services provided within airports. Moreover, airports and healthcare services seem to have the same level of complexity as they have to manage a high number of contractors (Fitzsimons, 2011; Smythe, 2015). However, in our study, articles related to the healthcare sector were excluded due to the fact that healthcare is classified under the public sector in the UK rather than classified under the service sector. In the USA, healthcare is

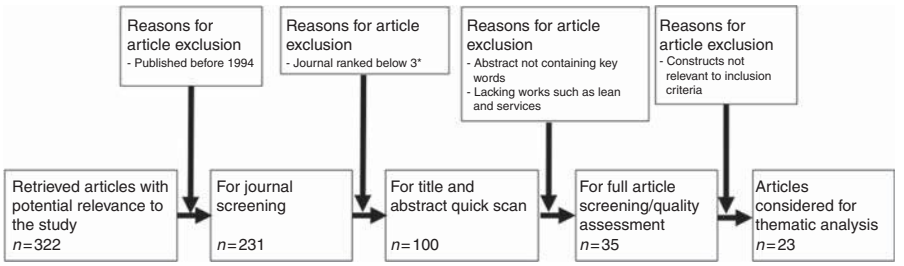


Figure 2.
Article selection process for the SLR

Filters for inclusion	Filters for exclusion
Articles published after 1994	All articles published before 1994
Academic journals ranked 3* or 4* (according to ABS ranking list)	Journals ranked below 3* (unless of relevance to topic)
Specialised journals (journals with greater focus on the subject matter)	Abstract does not contain keywords "lean + services" or information of relevance
Articles referring to management of airport quality/services	
Abstract containing key words "lean + services" or information of relevance	

Table II.
Inclusion and exclusion filters

considered as a service because it is private thus hospitals are trying to provide the best possible quality of service. The authors did not include conference proceedings and, for that reason, we have excluded some papers that were identified in our search.

Step 4: analysis and synthesis

According to Denyer and Tranfield (2009), the aim of the analysis is to describe individual studies which were broken down to their components and identify how those parts are related to each other. The aim of the synthesis is to link the parts identified in individual studies. Within this study, an exploration of the topics related to Lean services and Lean in airport services was conducted. Subsequently, a thematic analysis (O'Gorman and Macintosh, 2014) was conducted (Table III).

The analysis commenced by familiarising with the data available before generating initial codes of the literature available, labelling what topics literature came from, where they were published and when. Searching for themes then refocused the analysis. These themes were recoded through the use of visual graphs and tables to create a map of the analysis. The visual representations of the data further aided in defining themes and trends in the literature. Based on the trends found in the literature, which countries produce the largest amount of journal articles within Lean services and Lean within airport services, which journal produces the highest amount of relevant articles and, finally, the analysis identified the research gaps were found in the systematic review. These trends are the foundations that the review will be shaped by.

Step 5: reporting and using the results

The final step according to Denyer and Tranfield (2009) provides a report which demonstrates clearly how the review process was conducted together with the overall results. This allows the repeatability of the review and makes clear what the outcomes of the research would be. The next section presents the results of the SLR.

Discussion of results and key themes emerged

In total, the review identified 322 journal articles, of which 23 met the final inclusion criteria. Those 23 articles are presented in Figure 3 where they are segmented according to country of origin between the years 1998 and 2015. The UK and USA are the dominating countries with the highest number of articles identified, with five articles, respectively, followed by the United Arab Emirates and Sweden with two articles, respectively. The remaining identified countries have published one article according to the results demonstrated in Figure 3.

Phase	Description of the process
1. Familiarisation with the data	Data transcription (if necessary). "Active" reading and writing down initial ideas
2. Generating initial codes	Coding data (posteriori) in a systematic fashion across entire data set
3. Searching for themes	Re-focusing the analysis at the broader level. Forming codes into potential themes
4. Reviewing themes	Checking themes against the coded extracts and in relation with each other. Forming a thematic "map" of the analysis
5. Defining and naming themes	Further refinement of identified themes. Locating the overall story of the analysis
6. Producing the report	Writing-up the analysis results with vivid extract examples and comprehensive commentary

Source: O'Gorman and Macintosh (2014)

Table III.
Phases of thematic analysis

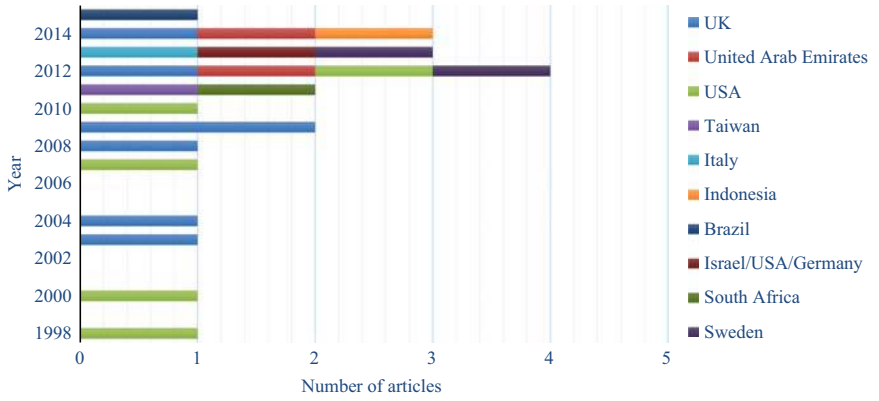


Figure 3.
Country and year of publication

As announced by Airport Council International (ACI) in 2007, customer demands are continuously moving towards higher service quality expectations (Fodness and Murray, 2007). The consumer trend is reflected in the increase in published research on Lean services from the late 2000s (Figure 3). As illustrated in Figure 3, Lean services were initially mentioned in 1995 by Bowen and Youngdahl (1998). However, the real popularity for Lean services has come about as a result of customers' increasing desire for quality from their services (Bowen and Youngdahl, 1998; Fodness and Murray, 2007). This is illustrated by Figure 3 indicating a boost from the mid-2000s where, roughly, only one article per year is published on the topic, to 2014 where there are three available articles on the topic.

Another outcome of the SLR is demonstrated in Figure 4, where it is evident that there are certain areas of Lean services that are more frequently mentioned than others. The majority of articles published on the topic of Lean in the service industry are published in the healthcare sector (Table IV), where there are eight articles based purely on Lean in healthcare services. Based on the UK definition of healthcare services as a public service, contra to the USA where it is considered a private service, there is no surprise that the majority of the articles published on this sector were in the USA. According to our findings, the second largest number of articles published are articles analysing Lean applications across several industries, with no specific industry as the main focus. Figure 4 further

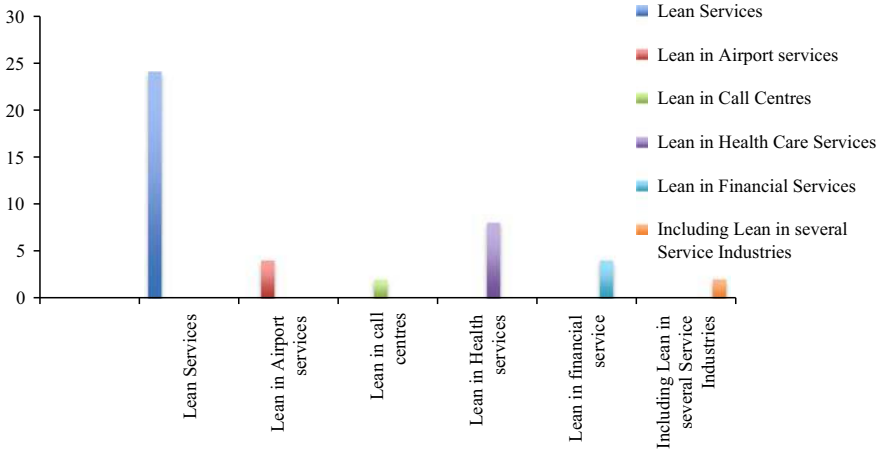


Figure 4.
Journal article publications within the different topics of Lean for services

visualises how much development research has had in journal publications on Lean services as a concept rather than niche research in areas such as Lean in airport services/industry, emphasising the current research gap within the field. When comparing Figures 4 and 5 it appears that, initially, more publications occurred in topics considering Lean in several service sectors. Publication growth on Lean in niche service sectors, however, has become more frequent in the last few years.

As evident in Figure 6, the maximum number of articles on Lean in airport services was published in Asia. Two articles were published in South Africa and one in the USA in collaboration with universities in Germany and Israel. The latter two, however, focused on benchmarking and airline services rather than airport services and, therefore, do not qualify as pure Lean in airport services publications. The geographical spread of publications as illustrated in Figure 6 shows the research gap on Lean in airport services outside of Asia. This gap further raises questions such as why the focus on Lean in airports is so much higher in Asia than in the rest of the world?

As demonstrated in Table V, the maximum number of articles on Lean services is published in the *Total Quality Management* and *Business Excellence* journal (eight publications), followed by the *International Journal of Operations and Production Management* with seven publications related to Lean services. Lean in airport services, on the other hand, has a more diverse spread. Each journal article available on the topic is published in different journals, illustrating that no journal has yet made a focus on this niche area of research.

Table IV.
Articles published purely on Lean in health services

Nat Natarajan (2006)	"Transferring Best Practices to healthcare: opportunities and challenges"
Weinstein (2014)	"Continuous improvement at CHG: CHG healthcare services got back to basics, focusing on Lean Management strategies and other organization strengthening initiatives"
Dahlgaard *et al.* (2011)	"Quality of lean and healthcare: a system for assessing and improving the health of healthcare organisations"
Dotun *et al.* (2014)	"Prioritizing lean supply chain management initiatives in healthcare service operations: A Fuzzy-AHP approach"
Cheng *et al.* (2015)	"Improving access to health services – challenges in Lean application"
Daultani *et al.* (2015)	"A decade of lean in healthcare: Current state and future directions"
D'Andreamatteo *et al.* (2015)	"Lean in healthcare: A comprehensive review"
Poksinska *et al.* (2013)	"The daily work of lean leaders. Lessons from manufacturing and healthcare"

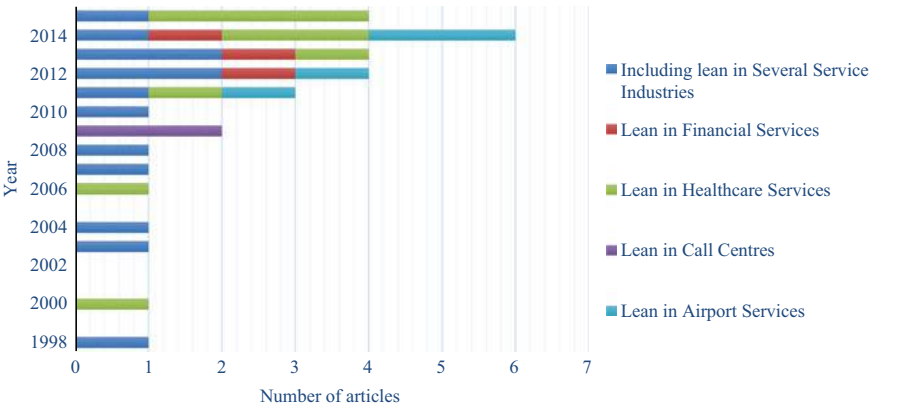


Figure 5.
Journal article publications on the different topics within a year of publication

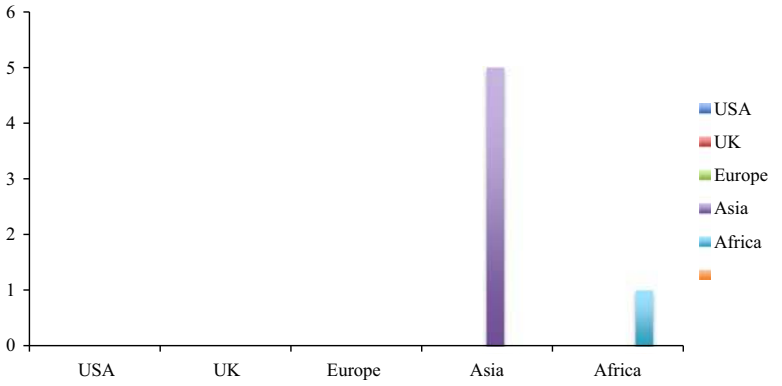


Figure 6.
Geographical spread of publications on Lean in airport services

Journal	ABS 2015 rating	Database	No. of relevant articles	Country of publication
Journal of Total Quality Management (*Total Quality Management and Business Excellence*)	2	Business Source Premier	8	UK
Research Journal of Applied Sciences, Engineering and Technology	N/A	Discovery	1	United Arab Emirates
International Journal of Social Management, Economics and Business	N/A	Discovery	1	–
Journal of Service Management (former *International Journal of Service Industry Management*)	2	Emerald Insight	1	USA
Applied Soft Computing	N/A, 5-year impact factor 3.222	Science Direct	1	Taiwan
Journal of Service Marketing	2	Emerald Insight	1	UK
International Journal of Operations and Production Management	4	Emerald Insight	7	UK
Journal of Service Science and Management	N/A	Discovery	1	–
Production	N/A	Discovery	1	–
Omega	3	Science Direct	1	USA
Journal of Air Transport Management	1	Science Direct	1	USA
Managing Service Quality: An International Journal	N/A	Emerald Insight	1	UK
Quality Engineering	N/A	Business Source Premier	3	USA
Journal of Operations Management	4*	Science Direct	2	USA
International Journal of Public Sector Management	2	Emerald Insight	1	UK
Global Business Review	N/A	Sage Journals	1	UK
European Journal of Marketing	3	Emerald Insight	1	UK

Table V.
Journals from which relevant papers were sourced

The SLR conducted has demonstrated various aspects that were unknown so far for Lean in airport services. Due to the small number of articles identified, we have made a comparison of Lean publications on health services and airport services. That was the case because the authors felt that healthcare services and airport services share a number of things and

moreover Lean in healthcare sector is much more advanced and therefore a number of lessons can be learned from this sector (Smythe, 2015). Most of the papers published in Lean airport services were published in Asia without their representation by a main journal so far.

Key findings and discussion

A common finding in the majority of Lean services literature is that though most literature is written from a favourable perspective, very few have identified the actual proven advantage Lean has had to the services (Hines *et al.*, 2004; Leite and Vieira, 2015). Furthermore, with the purpose of determining whether or not Lean is an efficient operational strategy for services, it is difficult to be objective when very little literature challenge Lean's efficiency in the service industry (Hines *et al.*, 2004; Suárez-Barraza *et al.*, 2012). Research does identify challenges and possible barriers; however, few actually challenge and argue for why Lean should not be applied in a service context.

The findings compared with existing authors are fairly unique. However, to date, little research has been conducted on the use of Lean and Six Sigma for airport services. Al Muhareb and Graham-Jones (2012) analyse the available services at King Khaled International Airport (KKIA) and how their operational function may improve through the implementation of Lean and Lean Six Sigma.

The aviation industry, in general, is 3.6 times more productive than other jobs (ATAG, 2014). However, that productivity is not equally distributed around the globe (ATAG, 2014). In order to measure the aviation footprint to an economy, airport connectivity is used as it is highly linked with GDP increase and labour productivity (Smyth and Pearce, 2007). Thus, emerging economies seem to focus on increasing their airport connectivity, which is remarkably low compared to developed economies (Smyth and Pearce, 2007). Their airport connectivity could be increased by the airport services offered (Fodness and Murray, 2007). This seems to be the case through the application of Lean services in an airport operation. Through the improvement of airport operations, connectivity of developing countries could increase; thus, developing economies could increase as well. As demonstrated in Figure 7, developing economies are trying to increase their airport services (and their airport connectivity) with the use of Lean tools and techniques.

It seems that mainly in developing countries (Asia and Africa) we observe an increased "willingness" for Lean application in the airport operation section in comparison with the overall Lean services used in other sectors. Figure 7 further illustrates the geographical spread in Lean services publications. Countries that are generating high numbers of publications on Lean services are barely publishing on the use of Lean thinking in airport services.

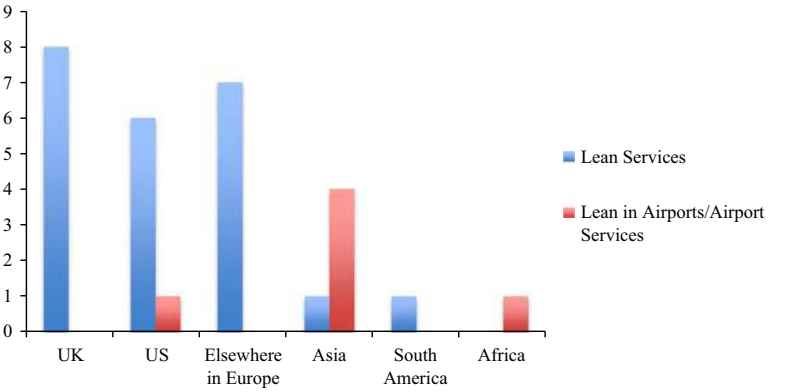


Figure 7.
Geographical comparisons of journal publications by topic

Contrastingly, the Asian and African countries publish close to a very few or no articles on the topic of Lean in services. However, the most available literature on the use of Lean for airport services emerges from the Asian and African contexts rather than from the rest of the world.

Lean tools for airport services

Given the early stage of research Lean in airport services is currently at, it has been challenging from the SLR to identify Lean tools applied in airport services. Rooted from Lean manufacturing, Womack and Jones' five Lean principles are the methodology applied in all sectors of the economy (Piercy and Rich, 2009a; Womack and Jones, 1996). Most of the analysed case studies within Lean services identify the importance of Womack and Jones' methodology for creating and optimising the value and use of 5S as a fundamental Lean tool for standard housekeeping. 5S, referring to sort, set in order, shine, standardise and sustain were used for analysing problems in the departure area in KKIA (Al Muhareb and Graham-Jones, 2014).

In 2007, the ACI announced that airport managers ought to pay attention to the importance of passengers in the operations of airports. ACI stated that if passengers had the opportunity of choice, they would prefer airports offering the best level of service due to their increasing expectations of high service quality standards (Fodness and Murray, 2007). As one of the ACI's main functions is their Airport Service Quality System (ASQS), an internationally standardised service quality survey, the ACI have reasoning behind their bold statement. The ASQS is not a Lean tool; however, it is a benchmarking tool that allows airports to see where they position themselves compared to their competitors (Airport Service Quality Survey, 2011; Fodness and Murray, 2007).

Lean tools such as process mapping, value stream mapping (VSM), reporting and communication have been strongly advocated in other Lean services publications (Di Pietro *et al.*, 2013; Piercy and Rich, 2009a; Leyer and Moormann, 2014). These tools, though not as extensively discussed in airport services publications, can be of relevance for the airport services. Ikatrinasari and Haryanto (2014) demonstrate such potential for VSM in airport services in Indonesia. Of the 82 companies analysed, Ikatrinasari and Haryanto's hypothesis was that Lean thinking would improve operational lead times in the airport services. Lead time for a particular process has reduced significantly from 71 days to less than 30 days after the implementation of Lean tools.

Building on the reflective statements from Ikatrinasari and Haryanto (2014) that "in Lean application, a project management needs to be formed" and "training should not be limited to only one Lean tool because it will only study the potential of VSM application alone", we may conclude that, potentially, one Lean tool is not sufficient for a proper Lean application in the airport services, due to the complex nature of the services provided (Ikatrinasari and Haryanto, 2014). It is quite apparent that airport services are in their early stages in the adoption of Lean and there is a huge potential for pursuing research to understand the maturity of Lean tools within airport services. It could be possible that Lean in airport services still needs more time before it can progress from very basic tools to advanced Lean tools. The development of a Lean toolbox, specifically, for airport services would be highly beneficial to many managers and Lean champions who are engaged in continuous improvement (CI) methodologies for Operational and Service excellence.

Challenges in the use of Lean for airport services

Research performed in healthcare services highlights that measuring the outcome of Lean in services is more complex than in production or manufacturing scenarios as the processes in services are not very transparent; moreover, the flow of process and information from one department to another is not at all straight forward (Nat Natarajan, 2006). In airport services, Lean application is very challenging due to the difficulty of maintaining the level of

service standards (Al Muhareb and Graham-Jones, 2014). Another challenge identified is the lack of understanding about the relationships between customer expectations about a service, management perceptions about the service, external service delivery and service quality (Al Muhareb and Graham-Jones 2012; Spreng and Mackoy, 1996).

Another challenge associated with Lean application in airport services is to understand the key performance indicators and their performance goals. Very limited research has been pursued on this topic and there is clearly scope for research to understand the importance of performance measurement systems related to airport services and the use of Lean tools to improve the service performance (Ikatrinasari and Haryanto, 2014). Ikatrinasari and Haryanto (2014) claim that such a challenge can be dealt with through continuous measurements and careful strategic planning.

Leyer and Moormann (2014) argue that a Lean mindset which reflects the attitudes and behaviours leading to cultural change in organisations is believed to be more important than the mere application of Lean tools and techniques. Piercy and Rich (2009b) claim that the greatest challenge when implementing Lean into a pure service environment is the retraining of staff. In the call centre service, a great issue is to solve customer issues and provide excellent service through only one point of contact rather than an ongoing conversation (Piercy and Rich, 2009b). The challenge thus when implementing Lean in a call service is identifying the best method of training, so that the transformation to new customer call processes would be as smooth as possible.

Finally, a challenge in the use of Lean for airport services is that within the airport there are several services that exist. For example, one company may provide the electrical generators which airplanes use when they are docking in the airport and a second could provide the ladders while a third could provide the catering services. Therefore, within the airport, we could have several companies providing various services. As no Lean-related papers have been available in any of the above areas, the authors would argue that there are immense opportunities for the use of Lean thinking across all types of services. Moreover, it is important for Lean practitioners to understand the type of tools which can be used for improving the quality of service for the above types of services.

Common barriers in the implementation of Lean for airport services

Suárez-Barraza *et al.* (2012) state that one of the greatest initial barriers of Lean in services is the difference in interpretation of what Lean actually means. With research still in development, there are few definitions of Lean and its role in the service environment. This lack of a unified understanding of what the value of Lean in services actually means is a barrier as participants in a Lean transformation would potentially be working towards different goals.

Similar to any change process, the application of Lean in services is victim to resistance of change (Leite and Vieira, 2015). Resistance by internal and external stakeholders can become a threatening barrier if efforts to mitigate resistance are not applied (Leite and Vieira, 2015).

Al Muhareb and Graham-Jones (2014) evolved their research stance from focusing on the efficiency of Lean in airport services to consider the benefit of using it along with Six Sigma tools. Their findings suggest that a barrier for Lean in airport services could be its need to be complemented with Six Sigma tools to achieve the greatest and superior results. Barriers and explanations identified in the literature are summarised and illustrated in Table VI.

Success factors – what are the critical success factors for implementing and sustaining Lean in airport services?

In health services, one of the main success factors was to start small when implementing Lean and then kick-off more complex projects which employ more advanced tools of Lean which demonstrate significant savings in terms of lead time or waste reduction (Nat Natarajan, 2006).

Barriers	Examples/explanations	References
Need for Lean to be complemented with Six Sigma tools	Al Muhareb and Graham-Jones evolved from pure Lean strategies in their 2012 research to Lean Six Sigma strategies in their 2014 research	Al Muhareb and Graham-Jones (2012, 2014)
Resistance to change	Leite and Vieira through an analysis of 25 service companies found that resistance to change was a common barrier for Lean in services	Leite and Vieira (2015)
Differing interpretations of definitions for the term Lean in service settings	Varied interpretations of definitions leading to research was restricted due to the lack of homogenous results Gaps in theory and practice making a standardised implementation of Lean in services challenging	Fodness and Murray (2007), Suárez-Barraza *et al.* (2012)

Table VI.
Barriers of Lean in airport services

Another critical success factor for Lean implementation is having a strategy and project management plan. Ikatrinasari and Haryanto (2014) demonstrate, in their case study, that Lean application in airport services could be successful if training and other methods are enforced in order to achieve the desired Lean outcomes. Though the research process lacked complete data and exclusively positive results, it highlighted the need for Lean application to occur over a longer time period. Furthermore, it also emphasised that Lean implementation is more likely to be successful if more than one tool is used in the implementation. This could be the reason why Al Muhareb and Graham-Jones (2012) found it more effective to also include Six Sigma tools, as the integrated approach of Lean and Six Sigma produces superior results than using Lean or Six Sigma alone (George *et al.*, 2005). However, no empirical research has been carried out to evaluate the critical success factors for implementing and sustaining Lean in airport services.

Benefits of Lean in services/airport services

It has already been asserted that more and more service organisations want to implement Lean thinking having read others' success stories (Suárez-Barraza *et al.*, 2012). With such a growing trend, it is difficult not to assume that there are great benefits to be gained from Lean in services, especially when applied successfully.

Long-term, significant financial benefits can be gained once training and restructuring processes have been integrated into new routines (Ikatrinasari and Haryanto, 2014). Improved operational efficiency is another Lean benefit where, in airports, this could mean a cut in the waiting time for passengers between getting off the flight and collecting their bags (Ikatrinasari and Haryanto, 2014). One of the benefits of Lean in healthcare services, according to a number of sources, is the improved staff notion of self-value (Nat Natarajan, 2006; Poksinska *et al.*, 2013). With employees encouraged to take greater responsibility for their work and being included in the shared vision, the everyday work environment benefits as well.

From a consumer perspective a benefit of Lean is the improved quality of service delivered (Nat Natarajan, 2006). This is also a benefit for the organisation and service provider as they can offer a higher quality and more competitive service to their customers. Table VII presents some of the benefits of Lean in services and the authors argue that the same benefits can be relevant to airport services.

Limitations and theoretical/practical implications of the study

The SLR identified three main limitations of Lean for the airport services: lack of research within the field, theoretical implications and practical implications (Table VIII). It was apparent from the SLR that there has been a dearth of literature on Lean in airport services

and this implies that very limited analysis can be carried out on the existing secondary data. As Suárez-Barraza *et al.* (2012) state, the lack of publications reflecting negative experiences and challenges associated with Lean in services resulted in challenges for the SLR to produce a critical analysis. For the present study, the authors have reviewed 3* and 4* journals as well as some subject-specialised journals to identify relevant articles. As the authors have not looked through 1* and 2* journals in ABS journal ranking guide (2015), a number of articles could have been missed in the study. Perhaps a more advanced and rigorous search could be pursued in the future. Moreover, a number of conference papers and other grey literature were not taken into account for the present study. Piercy and Rich (2009a, b) and Leite and Vieira (2015) considered the theoretical implications on Lean in services. The scarcity of articles published makes it difficult to create clear definitions and statements on the topic, which further leads to confusion in the interpretation of Lean and its context in services (Piercy and Rich, 2009a; Leite and Vieira, 2015). In implementing Lean for airport services, there must be a clear definition of the goals and what its implementation is set to achieve. Lean implementation will help airport services to attain improved service quality, to remain a leading service provider with good process technology performance, to practice just-in-time services delivery and to offer cost competitive services. The third limitation of Lean in airport services is the application of Lean methodology and the relevant Lean tools to make business processes in airport services more efficient and effective. There is an immense potential to pursue further research on the development of a customised Lean toolkit for tackling various problem areas in airport services. For instance, the authors would highlight the point that different services at the Airport would require different tools of Lean to make processes more efficient and effective. The choice of tools from the Lean toolbox depends heavily on the nature of the problem, whether or not the solution to the problem is known or unknown at the start of the problem definition, ease of implementation of the solution and so on. This leads to the development of a Lean maturity tool-grid showing the basic tools all the way through to very advanced tools.

Conclusion and future research directions

Although there are a number of papers published on Lean in manufacturing, it seems that there are a limited number of papers published in the existing literature on Lean in services

Benefits	References
Improved operational efficiency	Ikatrinasari and Haryanto (2014)
Improved staff notion of self-value	Nat Natarajan (2006), Poksinska *et al.* (2013)
Long-term financial benefits	Leite and Vieira (2015)
Improved quality of service delivered	Nat Natarajan (2006)

Source: Authors

Table VII.
Benefits of Lean in services

Limitations	Details/explanations	References
Lack of research within the field	Difficult to conduct critical analysis due to limited number of papers	Suárez-Barraza *et al.* (2012)
Theoretical implications	Scarce articles in literature Little evidence upon which to build statements	Leite and Vieira (2015), Piercy and Rich (2009a)
Practical implications	Lean practices and principles that have yet not been well defined and reported	Leite and Vieira (2015)

Table VIII.
Limitations of Lean in services

and, in particular, airport services. This paper presents the results of an SLR carried out on Lean in services and, in particular, airport services. Despite the limited number of papers on the topic, the authors firmly believe that there is an immense potential for pursuing research on Lean in airport services. The authors have noticed that there are no case studies on Six Sigma published in top notch academic journals and this is a clear gap in the existing literature. Perhaps we are still in the very early stages on the use of Six Sigma methodology and the associated tools for tackling various process and quality-related issues at Airports. The results of the SLR show that the application of Lean in airport services is in its early stages and only four relevant papers were identified in the literature. The paper presents some of the challenges, benefits, success factors and limitations of Lean in services/airport services based on the SLR methodology. However, it is essential to carry out an empirical study to understand if the findings of the empirical study are in alignment with the current literature. This could include an online survey to understand the current status on the use of Lean/Six Sigma or any other CI methodologies in the airport services context followed by carrying out semi-structured interviews to have greater and deeper insights into the extent of application of these process excellence methodologies.

So, what does the future agenda look like for this topic? First, the application of Lean tools in airport services is limited and it is important for academics and practitioners to look into the development of a basic and advanced toolkit for the implementation and sustainability of Lean in airport services. Second, the measurement of Leanness in airport services would be a very useful topic for senior managers to understand the key ingredients for airport services to become Leaner. Instead of applying the concepts of Lean everywhere across the airport services, the measurement of Leanness assists senior managers what areas to focus on and how to reduce process inefficiency issues in such critical processes. The last recommendation would be a good understanding of the fundamental barriers in the development and deployment of Lean in airport services.

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Corresponding author
Jiju Antony can be contacted at: j.antony@hw.ac.uk