

Obstacles in Adopting Lean Thinking at the Driver and Vehicle Licensing Authority in Ghana

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Abstract

The Lean Thinking ideology has established tools and techniques needed to reduce non-value-added activities such as waiting time, overproduction, transportation, motion, inventory and defects within an organization's value stream. Numerous organizations across the world have applied Lean Thinking and have attained vast benefits. This research examined the obstacles or barriers to Lean implementation at the Driver and Vehicle Licensing Authority (DVLA) in Ghana. The research used the concurrent mixed methods research design. A total of 399 clients of DVLA were sampled for the study using a simple random sampling approach. The data analysis for the study was grounded on the standardized Z-test and thematic analysis. The results from the study revealed that lack of top management support, consulting cost in Lean, stringent requirements and approval, lack of knowledge in Lean, and lack of government support for research and collaboration in Lean were the barriers in the Lean implementation process. It was therefore recommended that management and employees of DVLA should focus on identifying and eliminating the obstacles in Lean implementation which affect their operations.

Keywords: Clients, Lean, Waste, Organization, Ghana.

Introduction

Globalization, economic uncertainties and inconsistent market demands have compelled leaders all over the world to expand processes and operations with the view to improving their operations and services in a responsive way (Mora & Bribiescas, 2015; Rathilal & Singh, 2018). The integration of the global economy has also resulted in difficulties being experienced from both external and internal environments (Hallgren & Olhager, 2009; Mora & Bribiescas, 2015). These impacts not only increase the difficulty in public governance but also cause public establishments within the mixed governance setting to expand governance capability in order to guarantee efficient delivery of services (Mora & Bribiescas, 2015).

The service sector is considered the fulcrum of economic activities; a pillar supporting agriculture, mining and manufacturing (Liete & Viera, 2013). Cobra (2004) explains that there are five vital service areas namely:

- a. Infrastructure: transportation, communications, etc.;
- b. Public administration: government, education, etc.;
- c. Commercial: retail, repairs, maintenance, etc.;
- d. Business: consulting, banks, finance, etc.; and
- e. Social and personal: restaurants, health, supermarkets etc.

These five areas make an important contribution to Gross Domestic Product (GDP) in most countries by providing jobs, inputs and public services to the economy. In addition to being critical in producing occupations, service sector organizations are also available to assist in the industrial, agricultural and commercial activities (Liete & Vieira, 2013). The public sector is also an important section under the service industry as this sector provides jobs as well as other major health and educational services in developing countries. Measuring and determining the public sector's performance has in recent times become an increasingly important subject (Mihaiu, 2014). With the growing burden on public spending which is caused by high population growth and globalization, competence and performance should be of importance to any party-political program. Coordination, proper management of resources and effective service delivery can improve performance in the public sector which should increase public confidence in government (Mihaiu, 2014; Okeke-Uzodike & Chitakunye, 2014). In 2016,

overall government spending in Sub-Saharan Africa was on the average 16.1% of the total Gross Domestic Product (GDP) which was lower than the global figure of 17.1% and higher in South Asia and North America (Ibrahim Forum Report, 2018). Even though the public sector dynamics in African countries vary mainly due to the various cultural situations, they, however, operate in an environment of fragile service delivery. Most often, such poor performance could be traced to social, political, environmental, and economic factors (Mihaiu, 2014; Okeke-Uzodike & Chitakunye, 2014). In order to have an effective and robust management of service delivery, the public sector must have a well-trained and skilled human resource base who should be well grounded in appropriate workplace ethics and values. Equally, values such as positive work ethics, focus on customer interests, accountability, and consciousness of the needs of the citizens are other critical areas of great concern to the public sector (Okeke-Uzodike & Chitakunye, 2014). Thawesaengskulthaia and Jarumanee (2016) explain that the race for the achievement of service delivery in both public and private sectors must be of great concern to managers and other stakeholders in order to react fast enough to meet the needs of clients. Governments around the world are restructuring policies to make organizations improve upon their operations by decreasing the waiting time to be served and improving public services rapidly in order to make them efficient. Therefore, government agencies should increase the operational output of organizations and make them as active as possible in terms of service delivery (Thawesaengskulthaia & Jarumanee, 2016). Motor vehicles are one of the main modes of transportation, ensuring a maximum degree of movement all over the globe. In all nations, vehicles offer significant social, economic, educational and financial opportunities for people (Gyamfi, 2015). Gyamfi (2015) notes that, effective transportation is a prerequisite for catering for the everyday supply of goods and services for citizens. According to the World Health Organization (2009), motor vehicle transportation is projected to kill 1.2 million individuals each year making up 25 percent of all mortalities. Internationally, between 20 million and 50 million individuals are disabled each year as a result of road traffic accidents. Unlicensed drivers are found to be the main cause of accidents, and as Gyamfi (2015) and Watson (2003) assert, accidents caused by unlicensed drivers are more serious than those committed by licensed drivers, causing higher rates of mortality and severe injuries. In Ghana for instance, the body responsible for licensing vehicles to make them roadworthy and reduce accidents is the Driver and Vehicle

Licensing Authority (DVLA) which is a state organization. The Driver and Vehicle Licensing Authority (DVLA) is a semi-autonomous public sector organization under the Ministry of Transportation recognized by Act 569 of 1999 Constitution as amended. The mandate of the organization under the Act is to encourage good driving values and maintain the welfare of pedestrians and vehicles on the roads. The Authority does this by issuing roadworthy and licensing permits separately to vehicles and drivers respectively (Driver and Vehicle Licensing Authority, 2019; Wireko & Skouby, 2016). One of the major tasks of the Authority is to maintain roadworthy certificates and driver licenses which provide legal privileges for a vehicle to be on the road and for individuals to drive a vehicle so as to guarantee safety on our road networks. In current times, the Authority has come under constant criticism to the extent that many citizens have lost confidence in it. The DVLA has also been indicted on corrupt practices in numerous areas of its operations (Wireko & Skouby, 2016). Through a system run by persons referred to as 'goro boys' (middlemen), operating clandestinely at almost all the licensing locations in Ghana, one can obtain a motorist's driving license or be issued with a roadworthy certificate for a faulty vehicle within the shortest time without going through any of the requirements, processes/transactions and obligations. On the other hand, individuals who go through the normal procedure take several months to get their certificates (Anas, 2014; Wireko & Skouby, 2016). These 'goro boys', in collusion with some DVLA officials, side step the compulsory requirements and processes/transaction for obtaining licenses. These challenges persist even when the needed infrastructure, equipment and facilities have been provided (Wireko & Skouby, 2016). The Fair Wages and Salaries Commission indicated that 13 state organizations including DVLA were weaned off the Government payroll, which means that they must use the revenue generated to pay their employees just as private companies do (Pulse-Ghana, 2018). The Board Chairman of the DVLA also argued that the Authority has been removed from government of Ghana's subvention and payroll and stressed that employees need to work hard in order for the organization to generate its own revenue to pay salaries and emoluments of its staff (Adu-Gyamrah, 2016). The public sector in Ghana in the 2019 Client Service Report, has been recognized as the poorest sector for client satisfaction. The Ghana Customer Service Index (GCSI) Report used variables such as: 'look and feel', 'competence', 'employee engagement', 'response and complaints', 'professionalism', and 'comfort of doing

transaction' to examine nine public sector establishments including the Driver and Vehicle Licensing Authority (DVLA) (Business and Financial Times, 2020). The increasing importance of the public sector for socio-economic development of the nation is replicated in the bigger interest of scholars looking for answers about effective tools and methods for the administration of public sector institutions (Szymaniec-Mlicka, 2014). One of the proposed answers is to apply the resource-based view method which focuses on the inner structure of the institution, as well as its capabilities and resources that will better solve the developing challenges (Szymaniec-Mlicka, 2014). The Resource-Based View argues that the success of an institution lies within the institution itself, or in its tangible and intangible resources which enable it to attain a sustainable competitive advantage (Barney & Clark 2007). Also, in order to be more efficient, managers of public organizations try to develop their processes by tackling the needs of the clients (Hallgren & Olhager, 2009). The Lean Thinking ideology is one important way to help public sector organizations improve upon their performance by eliminating non-valued activities such as waiting time, defects, inventory, overproduction, transportation, over processing and unused skills. The emphasis of Lean is centered on waste removal within an organization. Waste in Lean is defined as something that does not add value to manufactured goods or services from the client's viewpoint (Jasiulewicz-Kaczmarek & Saniuk, 2018). As waste removal is one of the goals of Lean, it is vital for businesses to detect waste related to: waiting time, defects, inventory, overproduction, transportation, over processing and unused skills. It is of importance to recognize waste and take steps to remove or restrain waste in order for the waste not to distract the operational performance of the firm (Braglia et al., 2006; Machado, 2012). Lean Thinking begins with the client and the meaning of value (Melton, 2005). Consequently, Lean is a means of bringing value (a produce) to the client as the philosophies of Lean Thinking are appropriate to development activities (Bhat et al., 2016; Braglia et al., 2006; Melton, 2005; Staats & Upton, 2009). It is imperative to construct an organization's production structure grounded on this thinking by mapping out the value stream of the organization (Machado, 2012; Petterson, 2008). Value Stream Mapping is a pictorial diagram for analyzing the current state and designing a future state map within the work process. Lean is not a package, nor a fast solution, nor a technique that can be substituted, nor a worthy development tool. It is a social revolution that

changes how a business works (Toussaint & Berry, 2013; Young, 2014). No individual remains on the sidelines in the search to learn to expand their activities. It entails different skills, innovative habits, and often an innovative attitude all over business from high-ranking supervision to front-line customer service providers. Building a philosophy of Lean is to produce a constant want for development which indicates adopting innovative and positive attitudes towards work with focus on change management (Mora & Bribiescas, 2015; Toussaint & Berry, 2013; Young, 2014). In modern days, Lean is a widespread managerial exercise which allows establishments to increase their effectiveness and efficiency by removing non-value accumulating actions from their structural processes. Many researchers have advised firms to operationalize the Lean Thinking principles for improving their operations (Mofizul, 2016). Most governments in industrialized nations have to some varying points integrated Information and Communication Technologies (ICTs), principally the internet within government service delivery procedures. This is an attempt to provide the citizens, industries and other government organizations with access to government services, information and opportunities (Wireko & Skouby, 2016). The introduction of Lean Thinking is not a simple task. Lean is not only about tools. Instead, it is a new management approach which should involve enablers or drivers in implementing Lean such as being customer-oriented, and the need for survival etc. The implementation of Lean Thinking could also be confronted with financial, management, and other barriers within an organization (Salonitis & Tsinopoulos, 2016). With regards to the benefits derived from Lean thinking, Maleyeff (2007) explained that the Washington State Department of Licensing was aware of offices which made clients wait for long hours before being able to renew or obtain a new license. After Lean practice, waiting time has reduced significantly by 50 percent or more in an improvement in customer service satisfaction. Chen and Cox (2012) also explain that though Lean was originally implemented by the automobile firms, its philosophies have in recent times been extended to other organizations. There are some other establishments that have enjoyed the benefits of applying Lean thinking in their organizations. For example, Boeing implemented Lean to remove waste and make its products more cost effective. After applying Lean, Boeing positively cut its expenses by 75 percent, which gave rise to cost investments of about \$655,000 for each aircraft (Chen & Cox, 2012). Also, the city of Hartford, Connecticut, which is

a public sector organization, effectively decreased the processing time for checks in their tax collection. Most of the checks are processed within one working day which brought about important higher interest accrued by the city (Maleyeff, 2007). This research aims to examine the severity of the obstacles in the Lean implementation processes at DVLA in Ghana. The next section of this paper reviews literature on Lean theory and the obstacles of Lean implementation. The subsequent section looks at the methodology that was used in the research. After the methodology, the next section presents the analysis of data in relation to existing literature. The last section deals with conclusions and recommendations derived from findings of the study.

Literature Review

During the 1980s several firms were competing with Japan as a growing manufacturing country. Firms like Nissan, Toyota, Honda or Sony started to increase market control not only in the Japanese marketplace but also in Europe and North America. The unexpected and quick rise of these firms set a search for other market actors, academics and consultants to find out how these firms planned, implemented and ran their manufacturing organizations (Iuga, & Kifor, 2013). These procedures were to be named “lean production” procedures. The roots of lean can be traced back to the American concern that the Japanese industrial firms within the vehicle business would take control and gain a supreme competitive urge. These concerns pushed Western competitors and academics to employ a sequence of benchmarking actions in order to attain the source of the Japanese victory (Iuga, & Kifor, 2013). The fathers of the lean manufacturing were Sakichi Toyoda and his children namely Eiji Toyoda and Kiichiro Toyoda, as well as Taiichi Ohno, an industrial engineer (Dekier, 2012). Lean Manufacturing was framed in the year 1991 by James P. Womack, Daniel T. Jones and Daniel Roos in their book ‘The Machine That Changed the World’, in which they compared American and Japanese firms. The Toyota Production System (TPS) welcomed the first arrangement working in agreement with the rules of Lean (Dekier, 2012). Lean theory focuses on removing waste or non-value-added actions within an organizational operation while making the most of the value-added activities as needed by the client (Womack & Jones, 1996). Lean thinking or Lean theory stresses on value formation by removing waste. Waste in Lean is non-value-added actions that add to product price for which the client is reluctant to pay. In Lean thinking, seven type of waste, such as defects,

overproduction, waiting, transportation, motion, inventory, and processing occur within several organizations worldwide (Womack & Jones, 2003). Knowing the hurdles to operationalize Lean Thinking and recognize the strengths to withstand the Lean passage is vital in order to thrive (Leite, Bateman & Radnor, 2016). Alinaitwe (2009) notes that engaging in Lean Thinking can be extremely rewarding for companies in Uganda. Conversely, Lean Thinking in some other nations have not been worthwhile due to the several barriers to its effective application. The barriers hinder the application of Lean across the firm. Examples of such barriers are absence of communication, leadership battles and resource scarcity (Alinaitwe, 2009; Leite, Bateman & Radnor, 2016). Crawford (2016) also examined the extent to which Lean implementation enablers and barriers affect the ability of public sector institutions to operationalize Lean thinking in Sweden. The study adopted a case study research approach, examining Migrationsverket as a public sector organization in applying Lean. The results revealed that there was clear indication of both barriers and enablers of Lean Thinking at Migrationsverket. These barriers and enablers had quite an important degree of impact on the operations of Migrationsverkets in implementing Lean Thinking. Bahidrah and Korkmaz (2017) argue that the central difficulty in the operationalization of Lean Thinking is people's approaches concerning the competence and practicability of green practices in manufacturing projects. Thus, hurdles to Lean Thinking operationalization can be at the organizational level, individual level and project-specific level. Navarro (2020) also identified five main major challenges to Lean implementation within small and medium scale enterprises. These are inadequate management time to back the implementation of Lean, absence of understanding profits of Lean thinking, inadequate personnel skills to operationalize Lean, undervaluing worker attitudes, struggle to change, and relapsing to the old unproductive ways of doing things. Some barriers for Lean Thinking operationalization can be seen in Table 1 below.

Table 1: Barriers for Lean Construction Implementation

Barrier Type	Barrier
Individual Level	Absence of understanding concerning Lean Thinking construction
	Lack of Lean construction education
Organizational Level	Lack of top management support
	Lack of training
	Refusal to change
Project Level	Weak channels of communications
	Lack of teamwork

(Source: Adapted from Bahidrah and Korkmaz, 2017)

Kim and Park (2006) established the importance of Lean thinking in the planning, implementation, and administration of projects. Despite the importance of Lean Thinking, the absence of top management backing hinders the marginal utility of such ideas or plans to fully operationalize Lean. Consequently, Lean Thinking must be preserved in key management practices at every step of the assignment for it to be fruitful in every given market (Leite et al., 2016; Bahidrah & Korkmaz, 2017). The above assertion is valid because the absence of support of top management in any project means the project is bound to face challenges or halt completely. Top management plays a vital role in making sure the organizational objectives are geared towards success. Alinaitwe (2009) also argues that excellent communication is essential when applying Lean Thinking. Every firm needs cooperation from all actors and the management. Coordination of the labor flow among all players becomes vital for the positive operationalization of Lean Thinking. Thus, logistics and management constitute key factors in the Lean Thinking application (Singh & Singh, 2016). Table 2 below offers Lean adoption barriers.

Table 2: Lean Adoption Barriers

Major Barrier to Adoption of Lean Manufacturing Tools	Challenges Experienced During Implementation of Lean Tools
Tools too costly to implement	Lack of commitment from top management
Lack of staff with sufficient knowledge to implement tools	Financial problems
Absence of top management backing in adopting tools	Absence of cooperation with suppliers to establish Lean supply chain
Lack of cooperation with suppliers to establish Lean supply chain	Cultural and social barriers to change
Not familiar with tools	Lack of skilled employees
	Lack of collaboration between different functions
	Employee resistance to change
	Coping with change

(Source: Mapfaira et al., 2014)

Methodology

The researchers adopted the concurrent mixed method design for the study (Creswell, 2009). This design was chosen because it requires a shorter data gathering time frame similar to the sequential methodologies which collect information in different phases. With this design, both qualitative and quantitative data were collected concurrently which saved time and resources in conducting the research. This was vital for the study since the researchers used both the questionnaire and interview guide in the investigation (Creswell, 2009). For the purpose of the study, the researchers purposively selected four leading offices (Tamale, Kumasi, Accra, and Takoradi offices) of DVLA in Ghana. The selection of these offices was because they have the highest number of clients in the country. The researchers used the sample size calculation of Miller and Brewer (2003); that is, $n = N/[1+N(\alpha)^2]$, where n is the sample size, N is the sample frame which denotes the entire number of customers at DVLA. The degree of error was fixed (α) at 5% ($\alpha = 0.05$). The researchers further used the cluster sample size formula ($n_j = (N_j/N) \times n$) as explained by Al-hassan (2015) to disaggregate the data.

The overall number of customers for Tamale, Kumasi, Accra, and Takoradi was 23,657, 56,280, 98,809, and 52,894, respectively from the statistics provided by DVLA (DVLA, 2019). The researchers purposively collected information using the interview guide from the four Regional Managers of the selected DVLA offices, Client Service Officers, Assistant Technical Managers, Administrators, Technical Managers, and the Director of Planning, Monitoring and Evaluation at the head office of DVLA. The decision to include clients as the main respondents in this study was grounded on the explanation by Calborg et al., (2013) that from a managerial viewpoint, studies that assess the client’s viewpoint will be helpful since they might serve as a tactical tool to specify where, and for which service procedures, Lean values could be implemented. Such evidence from customers possibly will help directors determine whether efficiency enhancements will lead to revenue increases. As such, an advantage will not be gained if client satisfaction is harmfully affected to any excessive level. Likewise, the choice of using clients was grounded on findings of Assen (2021) which indicates that Lean is a practical method to expand methods by recognising and removing non-value-added activities from a client viewpoint.

Table 3: Sample Size Calculation

Study Offices	Study Population	Sample Size Calculation $n = N/[1+N(\alpha)^2]$	Cluster Sample Size Calculation $n_j = (N_j/N) \times n$
Accra	98,809	$231640/[1+231640(0.05)^2]$	170
Takoradi	52,894		91
Kumasi	56,280		97
Tamale	23,657		41
	231,640	399	399

(Source: Field Data, 2019)

In investigating the obstacles to a Lean implementation process at DVLA, the quantitative responses were measured on a ratio scale. The analysis for the quantitative responses was done using the standardized z-test (one tailed)

since the questionnaire was quantitative in nature. With regards to the interpretation of the z-test result, the researcher examined the magnitude and direction of the original variables. Respondents were asked on an interval scale to assess the severity of the obstacles of Lean implementation process from a scale of one to five, where one referred to no extent at all and five represented a very large extent. With regards to the descriptive statistics, the study was focused on the size of the sample as the main step before beginning the analysis. In the second step, the mean was used to describe the sample with a single value that represents the centre of the data. In the next step, the researchers used the standard deviation to determine how spread out the data were from the mean. Finally, the data were compared to different groups. The qualitative responses were also put into themes to support the results from the quantitative data. In terms of the qualitative data, the researchers provided codes to the information gathered through the interview guide to explain the content. In addition, the researchers looked for themes in relation to the study objective from various key informants and thus, defined the themes to produce the report.

Presentation of Findings

Educational Qualification Attained

The data on the educational qualifications attained by respondents in the study, as seen in Table 4 below, show that majority of the individuals who applied for the services at DVLA were Basic Education Certificate Examination (BECE) holders, representing 27.6 percent of the respondents. Ninety-six customers, representing 24.1 percent of the respondents were holders of Senior Secondary School Certificate Examination (SSSCE) or West African Secondary School Certificate Examination (WASSCE). Other respondents representing 14 percent were holders of a Bachelor's Degree while 12 percent of the respondents were Diploma holders. Table 4 shows that 6.5 percent had no educational qualification while another 6.5 percent had Teachers Post 'A' certificate. Also, 5.8 percent were holders of a Masters Degrees. The study also show that 2.8 percent of the respondents were holders of vocational certificates, while 18 out of the 26 respondents did not have any educational qualification at all. With respect to the educational qualification of the specific DVLA offices, Accra office had 11.8 percent without any educational certificate attained while 31.2 percent were BECE holders. Also, 3.5 percent of the respondents at the Accra office were vocational certificate

holders while 2.4 percent were SSSCE/WASSCE certificate holders. Table 4 also shows that 20 percent, 10.6 percent, 15.9 percent, 14.7 percent of the Accra office population were holders of Teacher’s Post “A”, Diploma, Bachelor degree, and Master’s degree certificates respectively. The Kumasi DVLA office had 2.1 percent respondents with no certificate. It also had 35.1 percent, 39.2 percent, 33.1 percent, 5.2 percent, 13.4 percent and 2.1 percent of the respondents being BECE, SSSCE/WASSCE, Teacher’s Post “A”, Diploma, Bachelor degree, and Master’s degree certificate holders respectively. Also, Table 4 shows that the Takoradi DVLA office had 15.4 percent, 20.9 percent, 17.6 percent, 25.3 percent, 11 percent and 9.9 percent of the respondents being BECE, vocational certificate, SSSCE/WASSCE, Teacher’s Post “A”, Diploma, Bachelor degree, and Master’s degree certificates holders respectively. Tamale DVLA office had 9.8 percent of the respondents without any educational certificate. The Tamale office also had 22 percent, 12.2 percent, 12.2 percent, 7.3 percent, 12.2 percent, 14.6 and 9.8 percent of the population being BECE, vocational certificate, SSSCE/WASSCE, Teacher’s Post “A”, Diploma, Bachelor degree, and Master’s degree certificates holders respectively.

Table 4: Educational Qualification Attained

Educational Qualification Attained	Accra		Kumasi		Takoradi		Tamale		Total Freq	Total %
	Freq	%	Freq	%	Freq	%	Freq	%		
one	20	11.8	2	2.1	0	0	4	9.8	26	6.5
BECE	53	31.2	34	35.1	14	15.4	9	22.0	110	27.6
Vocational Certificate	6	3.5	0	0	0	0	5	12.2	11	2.8
SSSCE/WASSCE	4	2.4	38	39.2	19	20.9	5	12.2	96	24.1
Teachers Post A	34	20.0	3	33.1	16	17.6	3	7.3	26	6.5
Diploma	18	10.6	5	5.2	23	25.3	5	12.2	51	12.8
Bachelor Degree	27	15.9	13	13.4	10	11.0	6	14.6	56	14.0
Master’s Degree	8	14.7	2	2.1	9	9.9	4	9.8	23	5.8
Total	170	100	97	100	91	100	41	100	399	100

Source: Field Study (2020)

Obstacles to Lean Implementation Process

The null hypothesis was that the obstacles in the Lean implementation process were not severe, while the alternate hypothesis asserted that the

obstacles in the Lean operationalization process were severe. The mean score was fixed at 4.000 which explains that all the obstacles that were below 4.000 shows that the severity was less and all the obstacles which were above the mean score of 4.000 indicate a higher severity. Table 5 shows that lack of top management backing, consulting cost in Lean, strict approval and requirements, lack of knowledge in Lean, and lack of government backing for research and teamwork in Lean all had hypothesized values above 4.000. This shows that these obstacles are very severe since they are above the stipulated mean value of 4.000. It can further be argued that customers who patronized the services of DVLA noticed that these obstacles occur with a higher severity level in terms of its occurrence as compared to the other four obstacles which were less severe since they were all below 4.000. Although the complexity of Lean philosophy and terms, lack of long-term philosophy, and lack of organizational communication, are all obstacles within the Lean implementation process at DVLA, they are not very severe in terms of their occurrence since they are all below the hypothesized value of 4.000. The z-statistic also explains how far away the severity of the obstacles of Lean implementation are from the hypothesized mean comparatively. A low z-statistics explains the closeness to the hypothesized mean value (4.000) while a high z-statistic indicates distance away from the hypothesized mean value (4.000). The abbreviation (symbol) SD, S.E and S₂ mean standard deviation, standard error and variance respectively. Table 5 shows lack of top management support, consulting cost in Lean, strict approval and requirements, lack of knowledge in Lean, and lack of government backing for research and teamwork in Lean were all significant with a higher severity (mean = 4.251 [median = 4.000], SD = 0.752, S.E = 0.038, S₂ = 0.565, z-statistic = 6.660, p-value = 0.000; mean = 4.090 [median = 4.000], SD 0.917, S.E = 0.046, S₂ = 0.841, z-statistic = 1.970, p-value = 0.025; mean of 4.248 [median = 4.000], SD = 0.848, S.E = 0.042, S₂ = 0.720, z-statistic of 5.840 and a p-value of 0.000; mean = 4.160 [median = 4.000], SD = 0.661, S.E = 0.033, S₂ = 0.436, z-statistic = 10.310, p-value = 0.000; mean = 4.160 [median = 4.000], SD = 0.945, S.E = 0.047, S₂ = 0.047, z-statistic = 3.390, p-value of 0.000 respectively).

Table 5: Obstacles in Lean Implementation Process in Ghana

Obstacles	Hypothesized Value	Mean	Median	SD	S.E	S ²	N	Z-Statistic	P-value
Lack of top management backing	4.000	4.251	4.000	0.752	0.038	0.565	399	6.660	0.000
Consulting cost in Lean	4.000	4.090	4.000	0.917	0.046	0.841	399	1.970	0.025
Complexity of Lean philosophy and terms	4.000	3.045	4.000	1.372	0.069	1.882	399	-13.900	1.000
Lack of long-term philosophy	4.000	3.987	4.000	0.971	0.049	0.942	399	-0.260	0.602
Lack of organizational communication	4.000	3.068	4.000	1.168	0.058	1.365	399	15.940	1.000
Strict approval and requirement	4.000	4.248	3.000	0.848	0.042	0.720	399	5.480	0.000
Lack of knowledge in Lean	4.000	4.341	4.000	0.661	0.033	0.436	399	10.310	0.000
Lack of government backing for research and teamwork in Lean	4.000	4.160	4.000	0.945	0.047	0.894	399	3.39	0.000

It is evident from Table 6 at the Accra DVLA office that, three out of the nine obstacles in Lean implementation (lack of top management backing, strict approval and requirement, and lack of knowledge in Lean) were significant since they were below 0.05. This was obvious as lack of top management backing, stringent approval and requirement, and lack of knowledge in Lean had a mean value of 4.135 [median = 4.000], SD = 0.864, S.E = 0.066, S₂ = 0.746, z-statistic = 2.310, p-value = 0.011; mean = 4.176 [median = 4.000], SD 0.919, S.E = 0.070, S₂ = 0.844, z-statistic = 2.500, p-value = 0.006; mean of 4.212 [median = 4.000], SD = 0.755, S.E = 0.058, S₂ = 0.570, z-statistic of 3.660 and a p-value of 0.000 respectively.

Table 6: Obstacles in Lean Implementation Process at Accra Office

Obstacles	Hypothesized Value	Mean	Median	SD	S.E	S ²	N	Z-Statistic	P-value
Lack of top management backing	4.000	4.153	4.000	0.864	0.066	0.746	170	2.310	0.011
Consulting cost in Lean	4.000	3.912	4.000	0.922	0.071	0.850	170	-1.250	0.894
Complexity of Lean philosophy and terms	4.000	3.488	4.000	1.178	0.090	1.387	170	-5.660	1.000
Lack of long-term philosophy	4.000	3.907	4.000	0.968	0.074	0.938	170	-1.27	0.898
Lack of organizational communication	4.000	3.671	4.000	1.031	0.079	1.062	170	-4.170	1.000
Strict approval and requirement	4.000	4.176	4.000	0.919	0.070	0.844	170	2.500	0.006
Lack of knowledge in Lean	4.000	4.212	4.000	0.755	0.058	0.570	170	3.660	0.001
Lack of government backing for research and teamwork in Lean	4.000	3.994	4.000	1.035	0.079	1.071	170	-0.07	0.563

Source: Field Study (2020)

Information from the Kumasi DVLA office as captured on Table 7 shows that, five out of the eight obstacles in Lean implementation (lack of top management backing, lack of long-term philosophy, strict approval and requirement, lack of knowledge in Lean, and lack of government backing for research and teamwork) were significant since they were below 0.05. These five obstacles had mean values of 4.546 [median = 4.000], SD = 0.677, S.E = 0.069, S₂ = 0.459, z-statistic = 7.950, p-value = 0.000; mean = 4.753 [median = 4.000], SD 0.613, S.E = 0.062, S₂ = 0.376, z-statistic = 12.090, p-value = 0.000; mean of 4.753 [median = 4.000], SD = 0.578, S.E = 0.059, S₂ = 0.334, z-statistic of 12.830 and a p-value of 0.000; mean of 4.784 [median = 4.000], SD = 0.505, S.E = 0.051, S₂ = 0.255, z-statistic of 15.290 and a p-value of 0.000; and mean

of 4.804 [median = 4.000], SD = 0.448, S.E = 0.046, S₂ = 0.201, z-statistic of 17.670 and a p-value of 0.000 respectively.

Table 7: Obstacles in Lean Implementation Process at Kumasi Office

Lack of top management backing	4.000	4.546	5.000	0.677	0.069	0.459	97	7.95	0.000
Consulting cost in Lean	4.000	3.959	5.000	1.040	0.106	1.082	97	-0.390	0.652
Complexity of Lean philosophy and terms	4.000	2.742	3.000	1.481	0.150	2.193	97	-8.360	1.000
Lack of long-term philosophy	4.000	4.753	5.000	0.613	0.062	0.376	97	12.090	0.000
Lack of organizational communication	4.000	2.887	2.000	1.266	0.128	1.602	97	-8.660	1.000
Strict approval and requirement	4.000	4.753	5.000	0.578	0.059	0.334	97	12.830	0.000
Lack of knowledge in Lean	4.000	4.784	5.000	0.505	0.051	0.255	97	15.290	0.000
Lack of government backing for research and teamwork in Lean	4.000	4.804	5.000	0.448	0.046	0.201	97	17.670	0.000

Source: Field Study (2020)

Also, data from the Takoradi DVLA office as indicated on Table 8 shows that only two out of the eight obstacles in the Lean implementation (lack of top management commitment, and consulting cost in Lean) process were significant. This was obvious from the test figures as lack of top management support, and consulting cost in Lean had a mean value of 4.121 [median = 4.000], SD = 0.630, S.E = 0.066, S₂ = 0.396, z-statistic of 1.830 and a p-value of 0.034; and mean of 4.648 [median = 4.000], SD = 0.480, S.E = 0.050, S₂ = 0.231, z-statistic of 12.88 and a p-value of 0.000 respectively.

Table 8: Obstacles in Lean Implementation Process at Takoradi Office

Obstacles	Hypothesized Value	Mean	Median	SD	S.E	S ²	N	Z-Statistic	P-value
Lack of top management backing	4.000	4.121	4.000	0.630	0.066	0.396	91	6.660	0.034
Consulting cost in Lean	4.000	4.648	5.000	0.050	0.050	0.231	91	12.880	0.000
Complexity of Lean philosophy and terms	4.000	2.374	2.000	1.305	0.137	1.703	91	-11.890	1.000
Lack of long-term philosophy	4.000	2.989	3.000	0.105	0.011	0.011	91	-92.000	1.000
Lack of organizational communication	4.000	2.011	2.000	0.105	0.011	0.011	91	-181.000	1.000
Stringent approval and requirement	4.000	3.989	4.000	0.105	0.011	0.011	91	-1.000	0.841
Lack of knowledge in Lean	4.000	3.967	4.000	0.233	0.024	0.054	91	-1.350	0.911
Lack of government backing for research and teamwork in Lean	4.000	4.000	4.000	0.149	0.024	0.022	91	0.000	0.500

Source: Field Study (2020)

The data from the Tamale DVLA office which is shown on Table 9 indicates that only three out of the eight obstacles in the Lean implementation process (lack of top management commitment, lack of long-term philosophy, and lack of knowledge in Lean) were significant. This was obvious from the test figures, which shows that lack of top management commitment, lack of understanding of Lean Thinking, and lack of long-term philosophy had mean values of 4.422 [median = 4.000], SD = 0.435, S.E = 0.068, S₂ = 0.189, z-statistic of 3.590 and a p-value of 0.000; mean of 4.732 [median = 4.000], SD = 0.449, S.E = 0.070, S₂ = 0.201, z-statistic of 10.44 and a p-value of 0.000; and mean of 4.659 [median = 4.000], SD = 0.480, S.E = 0.075, S₂ = 0.230, z-statistic of 8.78 and a p-value of 0.000 respectively.

Table 9: Obstacles in Lean Implementation Process at Tamale Office

Obstacles	Hypothesized Value	Mean	Median	SD	S.E	S ²	N	Z-Statistic	P-value
Lack of top management support	4.000	4.244	4.000	0.435	0.068	0.189	41	3.590	0.000
Consulting cost in Lean	4.000	3.902	4.000	0.860	0.134	0.740	41	-0.730	0.766
Complexity of Lean philosophy and terms	4.000	3.415	4.000	1.245	0.194	1.549	41	-3.010	0.999
Lack of long-term philosophy	4.000	4.732	5.000	0.449	0.070	0.201	41	10.440	0.000
Lack of organizational communication	4.000	3.341	4.000	0.990	0.155	0.980	41	-4.260	1.000
Stringent requirement and approval	4.000	3.927	5.000	1.367	0.214	1.870	41	-0.340	0.634
Lack of knowledge in Lean	4.000	4.659	5.000	0.480	0.075	0.230	41	8.780	0.000
Lack of government support for research and collaboration in Lean	4.000	3.683	5.000	1.556	0.243	2.422	41	-1.300	0.904

Source: Field Study (2020)

Evidence from the DVLA offices in Ghana is that the obstacles in implementing Lean Thinking were severer in the Kumasi office followed by the Accra and Takoradi offices. Tamale office had the least obstacles occurring within its operations.

A middle man (Goro boy) within the premises of DVLA explained:

“There are many obstacles that impede the operations of DVLA. We the ‘goro boys’ are very close to the clients because most of them can’t sit at the DVLA office the whole day to procure the services of the Authority. Clients are supposed to be present themselves but they can’t make it here due to some reasons. I do not think we (Goro boys) are part of the problem that will prevent management from removing ‘non-value added’ activities because we are always prepared to do genuine work for our clients. We have to give officials of the Authority

additional money in order to hasten the work given to them though we are aware that they are being paid monthly salaries to perform their functions but that is the culture and we can't change it because we work together to make sure the customer is satisfied”.

Another middle man (Goro boy) within the premises of DVLA also had this to say:

“It will be difficult for employees of DVLA to change the way they serve customers because it is something that has been there for almost twenty years. Any new employee at the Authority will learn the traditional processes involved in serving customers and that is the culture of DVLA. New policies or automated services can be implemented but that can't change the manner in which employees serve customers because that is the tradition. Employees at DVLA can't stop collecting money from us (middle men) before they work because it is assumed that we charge more money from the customers and need to give them their share”.

A Regional Manager of DVLA also noted:

“As a public service organization, we are always trying to make sure our customers get the best of services from us. We most often try to adapt to the changing technology by providing modern ways to improve service delivery. We write proposals to management on ways to improve service delivery based on the monitoring activities we embark on. Every major activity we propose to implement needs to go through approval which may take a long time”.

A memo from the Director for Vehicle Inspection and Registration also explained:

“Ultimately, there is the expectation to end manual registration and its related activities which, undoubtedly are relatively inefficient and bedevilled with operational errors, and data insecurity and are incompatible with system integration. Rather unfortunately, the expectations of the Vehicle Registration System have not been met and as far as its patronage is concerned, evidence from the total number of operational activities registered on the system accounts for less than 5% of vehicle registration related activities. Reasons accounting for this

setback include functionality challenges as reported by most of the operational offices”.

Discussion of Findings

Drawing upon the research objectives that guided this study, this section discusses the challenges in relation to the findings. The key informants' explanations confirm the fact that some obstacles exist within the operations of the Authority. It was noted by the customers and key informants that the bureaucracy in government procedures inhibits the operationalization of the Lean tenets at DVLA. Any major decision the Authority wants to embark on needs to go through the Board of Directors for approval before implementation. This is because DVLA is a highly structured government organization where subordinates need to take instructions from senior management which is termed as top-down approach. This explains why the rules and regulations within the decision-making process might delay the implementation. Also, the key informants/respondents said that before changes to full Lean thinking can be operationalized, employees are the main focus for that change because if they do not demand money from the middle men all the backdoor processes will cease. Likewise, Vignesh et al. (2016) examined Lean Thinking in the municipal service sector in the supply chain management setting. The authors examined lean application in Danish cities. The outcomes explain that Lean is largely executed as “toolbox Lean,” with tools such as kaizen, value stream mapping, and information panels. Furthermore, the authors examine how the Lean idea could be used by the public sector to be active in terms of reduction in cost and service developments. Also, Laar et al., (2022) noted that Lean Thinking is needed in the service sector, firstly to recognise non-value-added activities in its current form and then eliminate these wastes by enhancing productivity, ensuring quality, reducing cost, and improving client satisfaction. The moment wasteful non-value-added activities are identified and understood, the needed Lean approaches must be implemented to rescue the situation. The study by Bahidrah and Korkmaz (2017) identified three major obstacles of waste which are individual level (absence of understanding and lack of education of Lean thinking), organizational level (lack of top management support, lack of training, and refusal to change) and project level (weak channels of communication, and lack of teamwork). The results from this study were contrary to the findings by Bahidrah and Korkmaz (2017) as this study focused not only on identifying the obstacles in the Lean

implementation process but also on assessing the severity of the obstacles at DVLA. Also, the results from this study did not detect lack of teamwork, weak channels of communications, and Lean construction education as obstacles that prevent the smooth implementation of Lean Thinking. Mapfaira et al., (2014) argued from a different perspective and identified eight challenges experienced during the implementation of Lean tools. Contrary to the findings of Mapfaira et al. (2014), this study only identified the barriers and failed to evaluate the severity of the specific barriers/challenges in relation to Lean implementation. Mapfaira et al. (2014) further identified challenges/barriers to Lean implementation such as difficulty in coping with change, lack of cooperation with suppliers to establish Lean supply, financial challenges, and lack of skilled employees. These are challenges which were not evident in this study. However, there were some similarities between the findings of Mapfaira et al. (2014) and those of the present study. Both studies identified five major barriers in the adoption of Lean manufacturing tools namely consulting cost in Lean, lack of top management support, and lack of knowledge of Lean. The results from this study did not corroborate those of Mapfaira et al. (2014) to the effect that lack of staff with sufficient knowledge to implement Lean tools, unfamiliarity of employees and management with Lean tools, and lack of cooperation with suppliers to establish Lean supply as major barriers to lean implementation.

Conclusions

Lean Thinking tenets are the application of the definition of Lean which focuses on value for money and waste elimination to effectively and efficiently focus on the needs of the customer. Services are different from manufacturing and Lean implementation has just started. In conclusion, the research reveals that there are non-value-added activities within the operations of the Authority. Lean Thinking philosophies are found to be appropriate in a public sector organization as these philosophies help in improving its effectiveness and efficiency. Also, the operationalization of Lean thinking in the service sector has been examined by many scholars and this study confirms that Lean Thinking applications in the public sector are attainable, irrespective of the type of the service rendered, financial return or customer satisfaction. The study concludes that DVLA has made efforts to implement Lean Thinking in their administration by automating their services.

Also, as Lean Thinking is new in Ghana, its implementation could pose challenges which should be expected within the operations of DVLA. The challenges to Lean operationalization were recognized and presented using hypothesized means to assess the levels of severity. Lack of top management support, consulting cost in Lean, strict approval and requirements, lack of knowledge in Lean, and lack of government backing for research and teamwork in Lean were the obstacles which prevented the Authority from reaping the full benefits of Lean thinking. The important conclusion drawn from the findings is that many of the challenges to lean implementation are internal and can therefore be dealt with by management of DVLA. Therefore, management's lack of interest to effect change is the main obstacle to lean implementation at the Authority.

Recommendations

The study recommends direct participation by high-level executives in implementing Lean Thinking within the organization. Management should make sure that employees are dedicated to the objectives of the Authority and that they work directly with customers who visit the offices rather than dealing with middlemen on behalf of customers. This will eliminate what customers pay for the services of middlemen otherwise known as 'goro' boys. Management should also sanction any staff found guilty of bribery and corrupt practices at the Authority, as it will serve as deterrent to other employees from engaging in similar unprofessional acts. Furthermore, since DVLA is a public organization, management should create equal opportunities for all customers and dissolve the premium and standard modes of serving customers. It will be very useful if government invests heavily in research activities which could help identify new areas that need to change within public organizations. Government could learn from the Toyota Production System (TPS) which used research to develop inventions, activities and tools to produce vehicles in the most efficient way as possible. Adapting the TPS could lead to the development of several Lean tools which might be relevant for DVLA's operation. Therefore, investing and embarking on research can help identify the best Lean tool for the Authority. It is only when the government of Ghana is dedicated to the positive impact of research that the Authority could reap the benefits of Lean Thinking implementation.

References

- Adu-Gyamrah, E. (2016). DVLA to go off Government Subvention Next Month. Graphic Online, Ghana.
- Al-hassan, S. (2015). Writing a Thesis – A Guide for Social Science Students. Supreme Concepts, Ghana.
- Anas, A.A. (2014). Ripples of ‘Soul Takers’ Expose’ DVLA Officials Weep. Modern Ghana Special Report.
- Assen, M.F. (2021) Lean, process improvement and customer-focused performance. The moderating effect of perceived organisational context. *Total Quality Management & Business Excellence*, 32:1-2, 57-75, DOI: 10.1080/14783363.2018.1530591
- Bahidrah, S., and Korkmaz, K.A. (2017). Barriers to the implementation of the 2030 Saudi Visions: Sustainable Construction Objectives. *Middle East Journal of Entrepreneurship, Leadership and Sustainable Development*, 1(1), 33-42.
- Bhat, S., Jnanesh N. A., Kamath, P.P., Nayak, R.R, and D’souza, M.N. (2016). Enhancing the Performance of an Automobile Service Industry: Lean Thinking Approach. *Journal of Mechanical Engineering and Automation*, 6(5A), 40-48. DOI: 10.5923/c.jmea.201601.08.
- Braglia, M. Carmignani, G., and Zammori, F. (2006). A new value stream mapping approach for complex production systems, *International Journal of Production Research*, 44:18-19, 3929-3952.
- Business & Financial Times. (2020, February 20). Customer Service in Public Sector Woeful. Retrieved on the August 29, 2022, from <https://www.ghanaweb.com/GhanaHomePage/business/B-FT-Editorial-Customer-service-in-public-sector-woeful-861946>
- Carlborg, P., Kindstrom, D., and Kowalkowski, C. (2013). A lean approach to service productivity improvements: Synergy or oxymoron? *Managing Service Quality*, (23), 4, 291-304. <http://dx.doi.org/10.1108/MSQ-04-2013-0052>
- Chen, J.C., and Cox, R.A. (2012). Value Stream Management for Lean Office - A Case Study. *American Journal of Industrial and Business Management*, 2, 17-29. <http://dx.doi.org/10.4236/ajibm.2012.22004>.
- Cobra, M. (2004). *Services: How to Build Value for the Client*. São Paulo: Marcos Cobra.

- Crawford, J. (2016). *Lean Production in the Public Service Sector Migrationsverket and the Missing Links in the Value Chain*. [Masters Thesis, Uppsala University].
- Creswell, J.W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. (3rd ed) Sage Publications.
- Deiker, L. (2012). The Origins and Evolution of Lean Management System. *Journal of International Studies*, 5(1), 46-51.
- Driver and Vehicle Licensing Authority. (2019). About the Driver and Vehicle Licensing Authority, Ghana. <http://www.dvla.gov.gh/>
- Driver and Vehicle Licensing Authority, (2019). Data on number clients at DVLA offices in Accra, Takoradi, Kumasi and Tamale. Ghana.
- Gyamfi, A.A. (2015). *Application of Queuing Model at the Driver and Vehicle Licensing Authority-Kumasi (Eye-Test Section)*. [Master's Thesis. Kwame Nkrumah University of Science and Technology. Ghana].
- Hallgren M., and Olhager, J., (2009). Lean and agile manufacturing: external and internal drivers and performance outcomes. *International Journal of Operations and Production Management*. 29(10), 976-999.
- Ibrahim Forum Report. (2018). *Public Service in Africa*. Mo Ibrahim Foundation.
- Iuga, M.V., and Kifor, C.V. (2013). Lean manufacturing: The when, The where, The who. 18, *Land Forces Academy Review*, 404-410
- Jasiulewicz-Kaczmarek, M., and Saniuk, A. (2018). How to Make Maintenance Processes More Efficient Using Lean Tools? R.H.M. Goossens (ed.), *Advances in Social and Occupational Ergonomics, Advances in Intelligent Systems and Computing*, 605.
- Laar, S., Kojo, Dukper, B.K., and Boadu, A.J. (2022). Lean Operations in Tertiary Institutions: A Tool for Elimination of Waste in Technical Universities, Ghana. *Archives of Business Research*, 10(05). 92-107. DOI:10.14738/abr.105.12297.
- Liete, H.R., and Viera, G.E. (2013). Lean Philosophy and its Applications in the Service Industry: A Review of the Current Knowledge. *Production*. doi: <http://dx.doi.org/10.1590/0103-6513.079012>.
- Machado, J.P.F. (2012). *Application of Lean Thinking Approach to an Internal Service System of a Utilities Company*. [Master's Thesis. Instituto Universitario de Lisboa].

- Maleyeff, J. (2007). Improving Service Delivery in Government with Lean Six Sigma. Strategy and Transforming Series.
- Mapfaira, H., Mutingi, M., Lefatshe, L., and Mashaba, T. (2014). Lean Manufacturing Adoption and Implementation Barriers in Botswana Manufacturing Companies. International Conference on Advances in Marine, Industrial and Mechanical Engineering.
- Melton, T., (2005). The Benefits of Lean Manufacturing: What Lean Thinking has to Offer the Process Industries. Chemical Engineering Research and Design, 83(A6): 662–673.
- Mihaiu, D. (2014). Measuring Performance in the Public Sector: Between Necessity and Difficulty. Studies in Business and Economics. Lucian Blaga University of Sibiu, Faculty of Economic Sciences, 9(2), 40-50.
- Miller, R.L., and Brewer, J.D. (2003). A-Z of Social Research. Dictionary of Key Social Sciences. Sage Publications.
- Mofizul, I.A., (2016). Breaking the Barrier of Service Hostility: A Lean Approach to Achieve Operational Excellence. International Journal of Business and Economics Research. Special Issue: Supply Chain Management: Its Theory and Applications. 3(6), 65-73.
- Mora, C.N., and Bribiescas, F. (2015). Respect for People: The Forgotten Principle in Lean Manufacturing Implementation. European Scientific Journal, 11(13), 1857- 7431.
- Navarro, N.T. (2022). Five Obstacles to Implementing Lean in Small Business. Retrieved on the 8th September, 2022 from <https://www.everettcc.edu/ccec/enewsletters/five-obstacles-implementing-lean-small-business>
- Okeke-Uzodike, O.E., and Chitakunye, P. (2014). Public Sector Performance Management in Africa: Reforms Policies and Strategies. Mediterranean Journal of Social Science. 5(26), 85-92.
- Petterson, J. (2008). Defining Lean Production: Some conceptual and practical issues. 11th QMOD Conference. Quality Management and Organizational Development Attaining Sustainability from Organizational Excellence to Sustainable Excellence.
- Pulse-Ghana. (2018). DVLA, EPA, 11 others to be taken off Government Payroll. Retrieved on the 20th August, 2022 from <http://www.Pulse.com.gh>

- Rathilal, R., and Singh, S. (2018). A Lean Six Sigma framework to enhance the competitiveness in selected automotive component manufacturing organizations. *South African Journal of Economic and Management Sciences*, 1015-8812.
- Salonitisa, K., and Tsinopoulos, C. (2016). Drivers and Barriers of Lean Implementation in the Greek Manufacturing Sector. 49th CIRP Conference on Manufacturing Systems, 57, 189 – 194.
- Singh, A.K., and Singh, M.P., (2016). Major Obstacles and Relationship among Barriers in Implementing Lean Manufacturing in Indian Industries. *IOSR Journal of Mechanical and Civil Engineering*, 13(1), 80-86.
- Staats, B.R., and Upton, D.M. (2009). Lean Principles, Learning, and Software Production: Evidence from Indian Software Services. Harvard Business School. Working Paper 08-001.
- Szymaniec-Mlicka, K. (2014). Resource-based view in strategic management of public organizations – a review of the literature. *Management*, 18(2), 1-7.
- Thawesaengskulthaia, N., and Jarumanee, P. (2016). Improvement of Vehicle Service System by the Application of Lean Six Sigma. *Engineering Journal*. 20(2).
- Toussaint, J.S., and Berry, L.L. (2013). The Promise of Lean in Health Care. *Mayo Clinic Proceedings*, 88, 74-82.
- Vignesh, V., Suresh, M., and Aramvalathan, S. (2016). Lean in service industries: A literature review. *IOP Conf. Series: Materials Science and Engineering* 149 (2016) 012008 doi:10.1088/1757-899X/149/1/012008
- Watson, B. (2004). *The Psychological Characteristics and on-road behavior of Unlicensed Drivers*. [PhD Thesis. Queensland University of Technology, Brisbane. Australia].
- Wireko, J.K., and Skouby, K.E. (2016). Transition to e-government in Developing countries: The Case of Driver and Vehicle Licensing Authority (DVLA) e-Service Smart City Initiatives in Ghana, 27th European Regional Conference of the International Telecommunications Society (ITS), Cambridge, United Kingdom, 7th - 9th September 2016, International Telecommunications Society (ITS), Cambridge, UK.
- Womack, J. P., and Jones, D. T. (1996). *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*. Simon and Schuster.

Womack, J. P., and Jones, D. T. (2003). *Lean thinking: Banish waste and create wealth in your corporation*. Revised and Updated. Free Press.

World Health Organization (2009). *Global status report on-road safety: time for action*. In Geneva, World Health Organization. Retrieved on the 1st March, 2022 from <https://www.afro.who.int/publications/global-status-report-road-safety-time-action>

Young, F.Y.F. (2014). The Use of 5S in Healthcare Services: A Literature Review. *International Journal of Business and Social Science*. 5(10).