

**APPLICATION OF THE LEAN CONCEPT IN THE
DELIVERY OF HEALTH CARE: THE CASE OF
REGIONAL HOSPITAL, SUNYANI IN GHANA**

by

Hammond, Emmanuel Kokroko

(PG3064109)



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I hereby declare that this submission is my own work towards the Executive Masters of Business Administration and that, to the best to my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

Emmanuel Kokroko Hammond

PG3064109

Student Name & ID

Signature

Date

Mr. Abubakari Yakubu

Supervisor Name

Signature

Date

Certified by:

Dean, IDL

Signature

Date

Abstract

Though Lean can be adopted as growth strategy or survival strategy, this research looked as Lean as improvement strategy for the delivery of health care in Ghana. This was a research on the application of Lean in the delivery of healthcare in Ghana. The general objective of this research was to assess how the Lean Concept can be adopted to improve the quality of healthcare in Ghana. The study therefore compared the efficiency in the delivery of health care in hospitals that have adopted Lean to other health care providers that do not use Lean, using the Regional Hospital, Sunyani as a case study. Having reviewed and observed the business processes (activities of the organization under study from the point of entry to the point of exit) of the Regional Hospital, Sunyani, both management, staff and patients were interviewed, the findings were documented and analyzed using Lean tools such as Value Stream Map, Spaghetti diagram, Process Flow Map, etc. The researcher in conclusion made it clear that the Lean Concept is applicable to operational activities and processes of the hospital. However, there are likely to be challenges and even resistance to any lean concept implementation mainly due to the fact that Lean is not known among the health workers and management and thus suggested a framework to be adopted for the implementation of the concept to improve health service delivery in Ghana.

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Table of Content

Abstract.....	iii
List of Tables	vii
Chapter 1 – Introduction	1
1.1 Background	1
1.2 The Problem Statement	3
1.3 Objectives Of The Study	6
1.4 Research Questions	6
1.5 Methodology	7
1.6 Justification of the Study	8
1.7 Significance Of The Study	9
1.8 Organization of the Study	10
Chapter 2 – Literature Review	11
2.1 Introduction	11
2.2 History of Lean.....	11
2.3 What is Lean?.....	13
2.4 Importance of Lean	17
2.5 Lean Implementation.....	19
2.6 Application of Lean.....	24
2.7 Hospitals Operations	26
2.8 Application of Lean in Ghana	30
2.9 Conceptual Definitions and Framework	31
Chapter 3 - Methodology.....	37

3.1	Research Strategy	37
3.2	Research Design	37
3.3	Sampling Technique and Size	38
3.4	Data Collection techniques.....	39
3.5	Analysis of Data	41
3.6	Limitations	41
Chapter 4 – Data Presentation, Analysis and Discussion.....		43
4.1	Introduction	43
4.2	Demographic Information	43
4.3	Knowledge of TLC in the delivery of health care.....	45
4.4	Applicability of TLC	49
4.5	Change Management.....	iv
4.6	Operational Activities of the Hospital.....	viii
4.7	Framework for the application of lean	viii
Chapter 5 – Summary of Findings, Recommendations and Conclusions.....		xv
5.1	Introduction	xv
5.2	Summary of findings	xv
5.3	Recommendation.....	xvi
5.4	Conclusions	xviii
References		xix
Appendix.....		xxiv

List of Tables

Table 1: Example of Lean Implementations in healthcare	18
Table 2 - Table Interview Participant	38
Table 3 - Gender Distribution of Respondents	43
Table 4 - Area or work or specialty	45
Table 5 - Validate what Lean is-Table A.....	47
Table 6 - Validate what Lean is - Table B	47
Table 7 - Area of Lean Applicability	48
Table 8 - Type Of Lean Concept To Adopt.....	49
Table 9 - Value and Non-Value Added Time Table.....	51
Table 10 – Picture Story Table – Timing at Service point	ii
Table 11 - Attitude of management towards change	v
Table 12 - Difficult in Lean Implementation.....	v
Table 13 – Possible Challenges of Lean Implementation.....	vi
Table 14 - Advice on Lean.....	vii
Table 15 - Success Factors/Indicators.....	vii
Table 16 - Failure Factors/Indicators	viii
Table 17 – Challenge and Success Factors	xi
Table 18 – Make Change Stick Checklist.....	xiii

List of Figures

Figure 1 - Lean Process.....	21
Figure 2 : General Process Flow of Patient	27
Figure 3 – Operating Profit Margin, 750 Hospitals in US	29
Figure 4 - 5S.....	34
Figure 5 – Sample of Spaghetti diagram A.....	35
Figure 6 - Sample of Spaghetti diagram B.....	36
Figure 7 - S Area Of Work Distribution Table	44
Figure 8 – Pie Chart of Knowledge of Lean.....	45
Figure 9 - Knowledge Level of Lean Graph.....	46



Chapter 1 – Introduction

3 Background

The quest to be effective and efficient in the delivering of services is very critical in this age where resources are limited. The service industry is reforming, adopting and applying all available tools and techniques to improve quality for service consumers. Most of these approaches aim at identifying and removing waste and one of such is the Lean concept's methodologies and tools, which aim at identifying and reducing or removing process variation. The Lean Concept (TLC) is a growth strategy, a survival strategy, and an improvement strategy. The goal of lean is; first, to provide value to the patient/customer and, in so doing, eliminate the delays, overcrowding, frustration, irritation, and patient complaints associated with the existing system (Zidel, 2006). Simply stated, Lean thinking is about achieving more with less. It is not about 'sweating the assets' but about carefully analyzing how best to achieve a given result with the purpose of utilizing resources to their best advantage (Atkinson, 2004). This research work focuses on TLC as an improvement strategy in the health sector since reduction in waste will results in quality improvement, which is the plight of all stakeholders.

Many countries share an increasing concern, that healthcare costs have escalated but with no evidence of an equivalent improvement in healthcare delivery. Even with increases in healthcare spending, it seems there is a need to improve healthcare delivery and thus TLC has proven to be the vehicle to achieve this (Souza, 2009). Health service providers desire to improve on their operational activities, become more effective and efficient. The application of TLC in the health sector is critical since it aims at eliminating the delays, overcrowding, and frustration associated with the existing system (Womack, 2005). It is

worth mentioning that the application of TLC in healthcare has been a debated issue and implementations seem to outnumber the currently available literature (Souza, 2009).

Since 2002 the concept has gained widespread attention both academically and practically and must be given a trial mainly because the concept constitutes an innovative philosophy, which aims at using little resources that focuses on general principles at a strategic level, and tools and techniques at an operational level, compared to traditional mass production systems. In addition to this argument, the TLC has been applied in a number of hospitals in developed countries (such as Scotland Cancer Treatment, Royal Bolton Hospital, Nebraska Medical Center, UK Hospital, The Pittsburgh General Hospital) and the benefits make it worth emulating in developing countries where we are constrained by resources.

In Ghana, the Public Health Service is practicing TLC either knowingly or unknowingly. One of the prime objectives of this concept is to maximize value while minimizing waste by effective and efficient utilization of resources, which is also the objective of every service provider especially the health sector.

One of the objectives of the Ghana Health Service is to “*Manage prudently resources available for the provision of the health services.*” (“Ghana Health Service”, 2011). In this regard, one can say that the health services providers (hospitals) have similar objectives as TLC but might not be using the concept directly in their operations.

Consequently, we asserted that, if the idea is clear and the concepts are applied, there will be a relatively improved and efficient healthcare delivery in Ghana.

Lean thinking is about driving out waste so that all work adds value and serves the customer’s needs. Identifying value-added and non-value-added steps in every process is

the beginning of the journey toward lean operations. Lean is also about tools that address workplace organization, standardization, visual control and elimination of non-value added steps are applied to improve flow, eliminate waste and exceed customer expectations.

4 The Problem Statement

There are quite a number of problems (especially operational problems), that inhibit the desire of health providers to operate effectively and efficiently. Issues of understaffing (both medical and para-medical staff), facilities and equipment, long queues, facility layout issues, record handling, unclear processes and procedures, staff accommodation and lack of motivation etc. are some of the challenges in the provision of health care. Some of the issues mentioned above and many others can be better managed with TLC. In an interview with Dr. Alexander Kofi Egote of the Regional Hospital, Sunyani, he said 'lack of critical facilities, and other challenges had made it difficult for the urology department of the hospital to cope with the increasing number of patients. He also added that the department had inadequate human resource, wardrooms, office for specialist consultants and lacked surgical equipment/instrument' (Egote, Too many patients for small number of urologists at Sunyani Regional Hospital, 2011).

Recapping the 2009 Annual Report of the Regional Hospital, Sunyani, the report stated that 'an 80% increase in Anti-natal attendance has been achieved across the region, but maternal mortality was still on the rise and there was a need to focus on quality health care delivery and move away from stereotyping to new ideas'.

There had also been an annual increase in OPD attendance by 9% for the same period (OPD attendance increased from 191,385 in 2008 to 210,219 in 2009) with no corresponding increase in facilities and staff numbers. This would have resulted in

congestion at the OPD and some other department like Maternity, Surgical, Medical and A&E.

To improve the quality of service in the hospital, the number of doctors were increased from 42 in 2008 to 56 in 2009 and Professional nurses increased from 86 to 115 in 2009. Though, the established norms required Regional Hospital, Sunyani to have 725 complement of personnel, it had 692 which implies that there is deficit of 33 personnel. In 2009, about 10 different in-service training programmes and workshops for different category of professionals were organised.

Both the 2009 and 2010 Annual reports mentioned the following as some of the challenges hindering the hospital's operations;

- Poor office accommodation and in-adequate staff
- Poor skill MIX or inadequate skill mix
- How to get more staff and maintain them – Motivation for health workers.
- Attitudinal change of all staff
- Inconsistency in daily record keeping at the various wards especially the maternity ward.
- Inadequate security at the Live Records section
- Inadequate space for an organized and comprehensive Reproductive and Child Health services
- Incomplete filing of laboratory request forms by clinicians
- Escalating cost of running and maintaining hospital infrastructure and equipment

One other main challenge of the Regional Hospital, Sunyani is the fact that the Gate keeper concept is not working. Patients are expected to visit the community clinics while

the Regional Hospital, Sunyani is supposed to deal with referral cases from this clinics but that does not seem to be the case.

These myriads of issues are not peculiar with only the Regional Hospital, Sunyani alone but majority of the other hospitals. For instance, the 2009 Annual Report of the Goaso Municipal Hospital lamented some of its operational challenges such as lack of planning in all circles of managing various units and wrong usage of all type of resources.

There have been concerted efforts to increase the availability and efficiency of health care delivery throughout Ghana.

This notwithstanding, there are still some prominent problems and the approach seems not to be working. One may argue that the strategies being adopted to improve the delivery of healthcare such as privatization of healthcare, community involvement, increased incentive and motivation of health workers, increased infrastructure, review of policies, National Health Insurance program etc. requires huge financial resources to attain its aim. Conversely, there is a need to utilize the existing resources to provide efficient healthcare. Thus, supporting the view that, “the answer is better flow and not more room”. This therefore does not only call for a concern but also for something to be done about it. Another approach needs to be adopted to remedy the situation.

This approach is the adoption of Lean as an improvement strategy in the health sector so as to mitigate the challenges facing the healthcare industry.

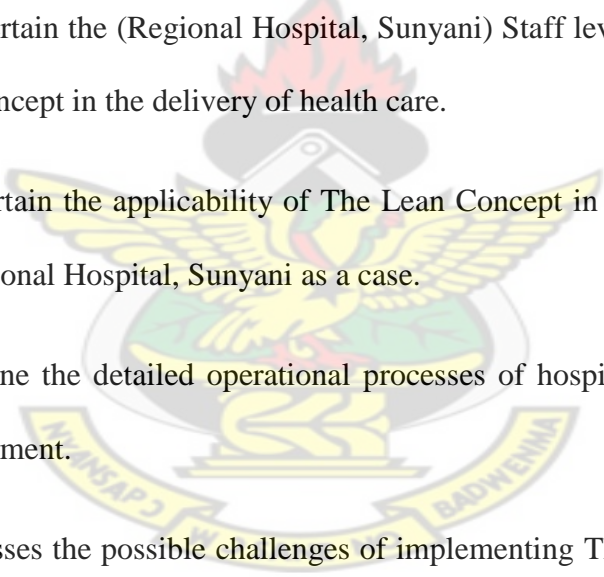
5 Objectives Of The Study

1.3.1 General objective

To assess the application of The Lean Concept in healthcare delivery at the Regional Hospital, Sunyani.

1.3.2 Specific objectives

Specifically, this study seeks;

- 
- a. To ascertain the (Regional Hospital, Sunyani) Staff level of knowledge of the Lean concept in the delivery of health care.
 - b. To ascertain the applicability of The Lean Concept in a public hospital using the Regional Hospital, Sunyani as a case.
 - c. To outline the detailed operational processes of hospitals for the purpose of improvement.
 - d. To assesses the possible challenges of implementing The Lean Concept at the Regional Hospital, Sunyani.

6 Research Questions

- a. Does the management of hospitals know about the Lean Concept?
- b. Is the concept of Lean, applicable in a Ghanaian public hospital?
- c. What are the operational processes involved in the delivery of health care?
- d. What are the possible challenges of implementing any of the Lean Concept?

7 Methodology

Research Design

This diagnostic research investigated the extent to which TLC can be adopted in the application of healthcare delivery. We obtained detailed baseline information by observation and participation.

The primary data collection methods were the use of Interviews and the self-administration of questionnaires. Data was a diverse mix of professionals such as Doctors, Nurses, Hospital Administrators, Supporting Staff in the Out Patient Department (OPD) and the Pharmacy of the Regional Hospital, Sunyani under study. Secondary data sources included books, journals, publications, thesis from operation management, information technology, and hospital administration.

Employing triangulation, the research used interviews, observations and structured questionnaires (Open and Close Ended) for the primary data collection. This Triangulation approach was adopted to increase the credibility and validity of the information. The target population for this research was the staff of the Regional Hospital, Sunyani. The sample frame was the hospital staff, made up of nurses, doctors, accountants, pharmacist and the hospital administrators.

The sampling technique was a mixture of both probabilistic and non-probabilistic approaches. These were Judgmental or Purposive methods to select the ten (10) health professionals for the interview. We also used the stratified sampling to select twenty (20) respondents for the questionnaire.

Value Stream mapping for both the current state and the proposed future state were produced, data analysis was done using Statistical Analysis Software (Statistical Package for the Social Sciences - SPSS).

The business processes were clearly outlined and using the baseline information, spaghetti diagram, value stream map and future state map were drawn for results and recommendations.

8 Justification of the Study

Justifications for this research project are as follows:

In the contribution to the body of knowledge, there are a number of literatures on the application of TLC to the operational activities of hospitals in developed countries. However, there is little or no information about that of developing countries like Ghana. This therefore necessitates the need to research into this to add up to the existing knowledge or to pave way for other researchers to delve into the concept.

Though the available literature indicates that opportunities for the application of TLC in healthcare are limitless (Zidel, 2006), this is not the case for developing countries. Currently in Ghana, there is no evidence that TLC is being applied in any hospital and thus the need to investigate and propose a framework to adapt the application of this concept in both public and private hospitals.

There is evidence that all efforts and programs implemented towards the achievement of effective and efficient operations in the health sectors have yielded little. In addition to this, the operational cost associated with the running of government hospitals keep increasing and as government is unable to provide adequate funds and logistics for its operations, it has compounded the problems of the health sector leading to degradation in the service delivered thus, the need to look into alternative solution.

The above thus call for a critical look at the operational activities of the health services providers (hospital). From the origin of lean and the application of lean in other sectors including the health service, there has been significant improvement and it is in this light that this research is conducted. More importantly, the implementation of this concept will lead to increased efficiency and effectiveness and reduce waste in the operational activities of the hospitals.

9 Significance Of The Study

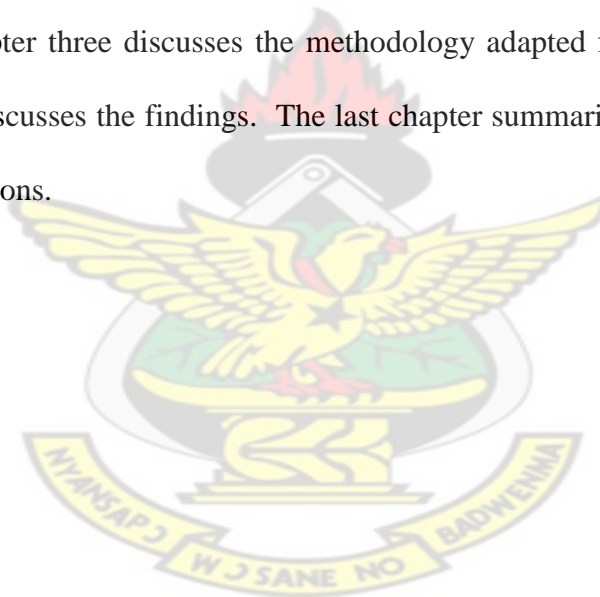
The study brings to light the significance of TLC to individuals so as to appreciate the applications of the concept in hospitals. It will also help readers to appreciate the operational activities of the hospitals in Ghana and to appreciate how Lean if is applied, can provide effective and efficient health care.

Heads of the various hospitals will come to the realization that the application of TLC in the health sector can help improve health service more effectively and efficiently by helping reduce bottlenecks and other wastes. This will also serve as a guide to the development and implementation of Lean concepts in other Ghanaian hospital.

This study will also contribute to existing knowledge and will be beneficial to students in the medical, operations and technological fields as it combines knowledge from these areas to the betterment of service provision in the health sector.

10 Organization of the Study

This study is organized in five chapters. Chapter one introduces the entire project by throwing more light on the issues and the need for the research whiles chapter two discusses in detail some research that has been done in other parts of the world. It also discuss some key Lean concepts such as 5S, type of waste etc. will be discussed with illustrations. Chapter three discusses the methodology adapted for this research whiles the next chapter discusses the findings. The last chapter summarizes the entire long easy with recommendations.



Chapter 2 – Literature Review

2.1 Introduction

This literature review among other things discusses how TLC originated, what the concept stands for, its importance, how it has been applied in the improvement of healthcare, and the benefit that has been derived from its application both in the health and other sectors like construction and manufacturing. This chapter also discusses some known challenges in the implementation of TLC. Efforts made in Ghana to provide effective and efficient healthcare will also be discussed.

2.2 History of Lean

TLC did not originate straight from the box but has a long history that dates back as far as 1450 (Jones & Womack, 1990). Although there were instances of rigorous processes in manufacturing in Arsenal in Venice in the 1450s, the first person truly to integrate an entire production process was Henry Ford. At Highland Park, MI, in 1913 he married consistently interchangeable parts with standard work, and moving conveyance to create what he called flow production. The public grasped this in the dramatic form of the moving assembly line, but from the standpoint of the manufacturing engineer, the breakthroughs actually went much further.

Ford lined up fabrication steps in process sequence wherever possible, using special-purpose machines and go/no-go gauges to fabricate and assembled vehicle components within a few minutes, and also deliver perfectly fitting components directly to line-side. This was a truly revolutionary break from the shop practices of the American System.

It consisted of general-purpose machines grouped by process. These made parts that eventually found their way into finished products after a good bit of tinkering (fitting) in sub-assembly and final assembly.

As Kiichiro Toyoda, Taiichi Ohno, and others at Toyota looked at this situation in the 1930s, and more intensely just after World War II, it occurred to them that a series of simple innovations might make it more possible to provide both continuity in process flow and a wide variety in product offerings. They therefore revisited Ford's original thinking, and invented the Toyota Production System. This system in essence shifted the focus of the manufacturing engineer from individual machines and right-sizing machines for the actual volume needed, introducing self-monitoring machines to ensure quality, lining the machines up in process sequence, and pioneering quick setups concluded their utilization to the flow of the product through the total process. Each machine could make small volumes of many parts and each process step notified the previous step of its current needs for materials, which made it possible to obtain low cost, high variety, high quality, and very rapid throughput times to respond to changing customer desires.

2.3 What is Lean?

The term "lean" was coined to describe Toyota's business during the late 1980s by a research team headed by Jim Womack, Ph.D., at Massachusetts Institute of Technology (MIT)'s International Motor Vehicle Program (Womack et al., 2009). In other words, James Womack coined the term lean production to describe the profound revolution in manufacturing initiatives by the Toyota Production System, and which is rapidly replacing mass production (Liker, 2004).

At its heart, Lean is simply a philosophy designed to help organizations to systematically identify and eliminate activities and processes that are preventing them from being effective. Lean is a toolset, a management system, and a philosophy that can change the way production and services are organized and managed. Lean is a methodology that allows organizations to improve the quality of services by reducing errors and waiting times. Lean is an approach that can support employees eliminate roadblocks and allowing them to focus on providing the required services.

It is also a system for strengthening organizations in the long run, reducing cost and risks while also facilitating growth and expansion. Further, it helps break down barriers between disconnected department "silos," allowing different departments in an organization to better work together for the benefit of clients. The core idea is to maximize customer value while minimizing waste.

Simply, lean means creating more value for customers with fewer resources. It focuses on eliminating waste in processes, including the waste of work-in-progress and finished goods, which are the earmark of mass production (Graban, 2008).

This concept is much more than techniques; it is a way of thinking, a whole-systems approach that creates a culture in which everyone is continuously improving processes and production.

An organization that applies this concept understands customer value, focuses its key process, and continuously increases it. The ultimate goal is to provide perfect value to the customer through a perfect value creation process that has zero waste.

To accomplish this, 'lean' thinking changes the focus of management from optimizing separate technologies, assets, and vertical departments, to optimizing the flow of products and services through entire value streams that flow horizontally across technologies, assets, and departments to customers.

Eliminating waste along entire value streams, instead of at isolated points, creates processes that need less human effort, less space, less capital, and less time to make products and services at far less costs and with much fewer defects, compared with traditional business systems.

2.3.1 Strategies of Lean

As mentioned in the previous chapter, Lean is a growth strategy, a survival strategy, and an improvement strategy

2.3.1.1 Lean as a growth Strategy

Is a Growth Strategy where by creating value to the end market thus positioning your organization as the premier provider of choice. Lean Growth takes a holistic view of business development, starting with an assessment of what your strategic position really is and what this implies for your performance.

It is about aligning the company's objectives and priorities through all levels from product development, sales, scheduling, operations, and supply chain through to your end customer. As you employ a Lean Growth Strategy, the result is a high degree of alignment through the organization, positive impact to your cost base, shortened lead times and time-to-market for new products and superior flexibility with less capital investment, which allows you to plan for growth (Ohde, 2007).

2.3.1.2 Lean as a survival strategy

Bhim Singh, S.K. Garg, S.K. Sharma suggested that Lean can be a survival strategy during recessionary times. During recessionary time an industry need to be flexible enough to quickly change their strategies to meet the customer's expectations and to reduce the price of their product but at the same time companies need to be careful not to compromise with quality of the product and this is possible only when they follow lean principles (Bhim & Singh, 2009). They mentioned five lean principles that an organization can adopt as a survival strategy;

Value – The traditional definition of value is the product that the customer purchases. In the lean model, value is not just the product, but also, the chain of activities that are required in order to produce an end product/end service to be delivered to the customer.

Value stream – Value is identified through value stream mapping (VSM). This stream is comprised of each step that is performed from raw material to product and every step is designed, in order to fulfill customer expectations at minimum price. Every role, functions, and responsibilities are designed to make the delivery mechanism more responsive with minimum resources.

Flow – Flow is the efficiency of the process that transforms raw material into an end product. This involves analyzing every step in the process that touches and does not touch the end product and goal is to provide a continuous flow without any bottlenecks.

Pull – Traditionally, manufacturing companies built inventories and customers bought inventories. The “pull” concept states that nothing should be built until and unless it is pulled by downstream customer. And the end customer must be the driver of the value stream.

Perfection – The improvements in the identification of value, the analysis and flow of the value stream, and the pulled product/service can be felt and seen at all levels of the organization (Jones, 1996).

2.3.1.3 Lean as improvement strategy

Adopting Lean as improvement strategy means using TLC to achieve continuous improvement ("Lean Enterprise Institute", 2010). It involves using Lean tools such as value 5S, Spaghetti, Just in Time, benchmarking, Line Balancing to manage the value chain to ensure that there are no bottlenecks in the production/service provision and also that resources are utilized effectively and efficiently to delight the customer.

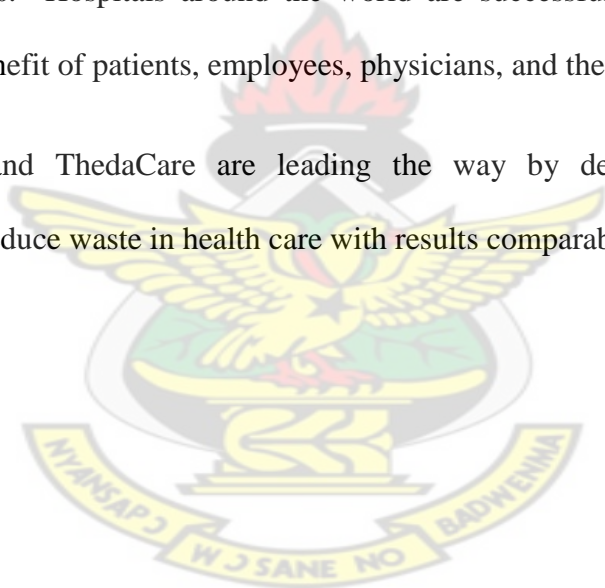
2.4 Importance of Lean

TLC is very important as it helps break down barriers between disconnected department “silos,” allowing different departments to better work together for the benefit of clients.

A lean organization values its employees and encourages their involvement in organizational initiatives that, in turn, sustains quality improvements.

The opportunities for lean in healthcare are limitless (Zidel, 2006). Many organizations have successfully adopted the concept and have reaped enormous benefits. However, there are a number of them who seem not to know about it, and thus are struggling to survive in business. Hospitals around the world are successfully implementing Lean methods for the benefit of patients, employees, physicians, and the hospital organizations.

Virginia Mason and ThedaCare are leading the way by demonstrating that lean management can reduce waste in health care with results comparable to other industries.



Lean creates a better working environment where what is supposed to happen, happens on time, every time. It allows clinicians to spend more of their time caring for patients and improves the quality of care these patients' needs.

Table 1: Example of Lean Implementations in healthcare

Organization	Methodology	Impact
Scotland Cancer Treatment	Lean	Customer waiting times on first appointment reduced from an average 23 to 12 days and improvement of customer flow time for patients by 48 per cent.
Royal Bolton Hospital	Bolton improving care systems (Lean)	Direct savings of £3.1m. Death rate for patients fell by a third. The time taken to process important categories of blood fell from two days to 2 hours.
Nebraska Medical Centre	Lean principles to redesign the work area in the sterile processing center and in the clinical laboratories	Reduced staff walking by 167 miles a year. Reduce laboratory space by 825 square feet and specimen processing turnaround time by 20 percent. Reduced manpower by 11 full-time equivalents, who were redirected to other critical work. Average length of stay decreased from 6.29 days to 5.72 days.
UK Hospital	Application of Lean principles and techniques from general practitioner (GP) to hospital appointment	Implementation of an intranet-based waiting list module brought about greatly reduced waiting times.
The Pittsburgh General Hospital	Lean techniques	Change to the procedure for intravenous line insertion giving a 90per cent drop in the number of infections after just 90 days. The new procedures saved almost \$500,000 a year in intensive-care unit costs

Source: Based on the work of Guthrie (2006). ; Radnor et al. 2006; Wysocki (2004)

2.5 Lean Implementation

Tom, Inge and Richard, strongly agree that lean thinking has the potential to improve health care delivery. At the same time, we need to take into account the methodological and practical considerations. Otherwise, lean implementation will be superficial and will fail, adding to existing resistance and making it more difficult to improve health care in the long term. Consequently, in an interview with Hagood, the Chief Executive Officer (CEO) of Healthcare Performance Partners, he explains a few key elements to a successful Lean implementation that organizations must address. They are:

- Leadership Commitment: Lean must become a way of doing business, not just a program.
- Leadership Education: The organization's leadership is trained in the basic lean principles and embraces the concepts.
- Communication: Enterprise wide communications regarding Lean as a growth strategy positions the organization for the future.
- Identification of internal champions/leaders: the organization must dedicate resources to sustain momentum and drive the necessary cultural change. It is essential that solid and proven outside resources such as Healthcare Performance Partners (HPP) be used to get the organization trained on the right path but it is a must that internal resources be developed for long term success.

- Get Started! Lean is an action-oriented methodology and the best way to learn its potential is to try it. For an organization new to Lean practices, it may be beneficial (as mentioned above) to seek the assistance of a seasoned Lean practitioner to assist with initial Kaizen facilitation and Lean's integration into the organization (Hagood, 2011).

2.5.1 Process of implementation

The Lean Enterprise Institute outlined the five-step thought process for guiding the implementation of lean techniques that is easy to remember but added that it is not always easy to achieve. The steps are:

1. Specify value from the standpoint of the end customer by product family.
2. Identify all the steps in the value stream for each product family, eliminating whenever possible those steps that do not create value.
3. Make the value-creating steps occur in tight sequence so the product will flow smoothly toward the customer.
4. Introduction of a flow, let customers pull value from the next upstream activity.
5. Specifying value ensures that value streams identifies wasted steps and are removed, and flow and pull are introduced, beginning the process again and continuing it until a state of perfection is reached in which perfect value is created with no waste ("Lean Enterprise Institute", 2010).

The Lean Plus concept also outlines the 16 steps-by-step roadmap implementation of lean and indicates that it should take approximately four months to implement it. Below is the image of the road map.

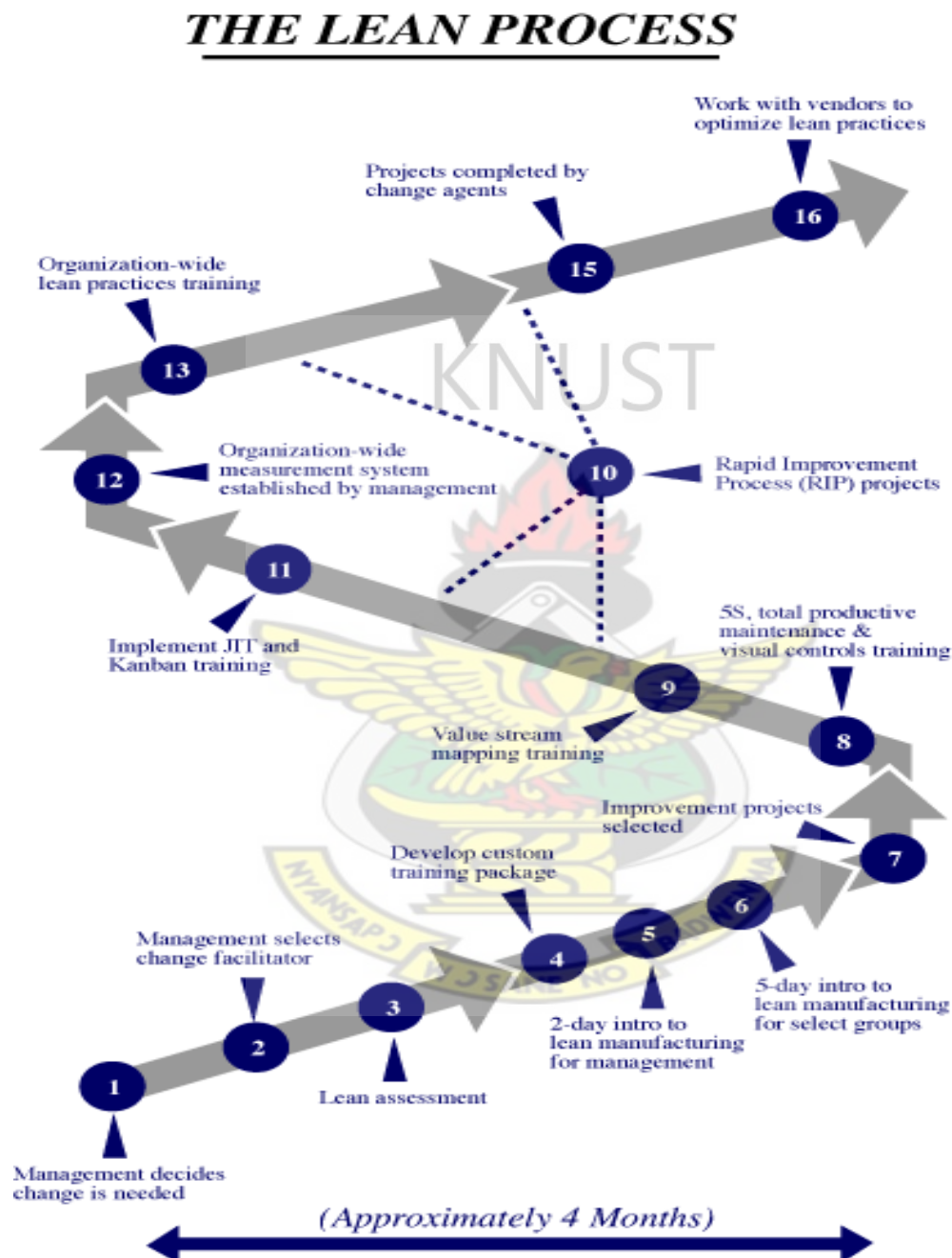


Figure 1 - Lean Process

Source: (Wader, 2011)

According to the above diagram, implementing lean start with management making a decision to change and to select a change facilitator who will champion the implementation of the project. The third step involves thorough lean assessment to identify areas that need change. This will inform the next step of developing a custom training package for a two day workshop to sensitize everyone about lean and to obtain commitment from them. The next step is a 5-day workshop for the lean project team which will equip them to identify the areas of improvement. At step eight (8), some specific lean concept will be introduced to the business alongside the detail training on value stream mapping. During the Rapid Improvement Process (RIP) project, lean concept such as employees will be trained on JIT, Kanban. Management will establish an organization-wide measurement systems which will precede organization wide lean practice training. The last but one step is where Change agents are guided by consultants to complete their lean project. Last step involve working with vendors to optimize the lean practices throughout the organization.

2.5.2 Challenges of Lean Implementation

Many years of observing industries of all shapes and sizes, both industrial and services, as they embark upon a Lean journey, have revealed a number of “truths”. It does not matter if the company is part of the healthcare industry or the manufacturing industry; common truths permeate almost all Lean transformations.

The following are list of truths that describe the transformation that organizations experience as they move from waste ridden non-value added processes and systems to a Lean organization.

- Lean is not easy to do. If it was everyone would have already done it!
- To be successful we should see waste as number one enemy
- Ownership of the process is necessary at all levels of the organization.
- Ultimately, there cannot be an option to not embracing the philosophy.
- Lean will succeed or fail based upon the organizations leadership.
- Lean will highlight the strengths and weaknesses of leadership.
- It is necessary to test leadership's commitment early and often.
- You will make mistakes! If made trying (not negatively affecting patient safety of course), then just try again!
- Ongoing and honest communication is both crucial and a must.
- Most importantly No Half Truths; Lean is ongoing and never ending!

(Hagood, 2011).

2.6 Application of Lean

Since the origin of Lean, the concept applies in all sectors and more especially in the manufacturing industries.

2.6.1 Application of Lean in the provision of Healthcare

Many healthcare providers are struggling to stay afloat with escalating costs and falling profits (Zidel, 2006). They are also under pressure from local employers to improve efficiency, service and patient safety.

"These hospital facilities are cash hogs and unmanageable," McCormick said in a recent interview from his Brookfield office during a stop between road trips. Even with double-digit price increases, he said, they cannot manage a profit (Sneider, 2011). While the terminology among industries may not be the same, waste and the quality of health care are related. Waste in a hospital leads to low patient and employee satisfaction, poor customer service and mistakes in medical care, McCormick said. It is in this light that the concept applies in the healthcare though Lean Healthcare is in its infancy. Healthcare providers worldwide are beginning to adopt Lean Enterprise concepts and in some instances, insurance companies and insurance providers are demanding that the healthcare sector embrace Lean concepts.

The need for a change in healthcare delivery has never been more apparent than it is today. In the United States, Healthcare is the country's largest industry, and is poised for exponential growth as baby boomers reach their sixties, yet external influences make it more and more difficult for hospitals to prosper (Zidel, 2006).

Windsor Hotel-Dieu Grace Hospital in North America decided to adopt lean in view of the perpetual crisis in the emergency center in 2005. According to the CEO, the department that sees about 60,000 patients annually was in turmoil: long waiting times, low morale, and high employee turnover, patients leaving unseen, patients, and families angry to the point that increased security was necessary. Nicki Schmidt, a nurse in Emergency Response Center for twelve (12) years, considered quitting. However, during the three-day workshop, cross-functional teams of participants constructed current-and future-state maps and value stream maps that highlighted gaps that represented the biggest problems or opportunities, and then collectively earmarked kaizen projects to tackle critical issues.

The result after the implementation of the lean was described as ‘worth doing’ because patients were happy, nurses were friendly and motivated to work, profit begun to rise, resources were available for other tasks, patients spent less time in the hospitals.

One other example of results at ThedaCare after buying into the concept of lean include, \$3.3 million in savings in 2004, \$154,000 savings in the Catheterization Lab supply procurement process, redeployed staff in several areas saving the equivalent of 33 FTEs (full-time equivalents) and many more benefits (Womack, 2005).

Leaders in the application of Lean methods in hospitals include ThedaCare (Wisconsin), Virginia Mason Medical Center (Washington), Park Nicollet Health Services (Minnesota), NHS Bolton Trust (England), Avera McKennan (South Dakota), Florida Hospital (Orlando and Central Florida), and Flinders Medical Centre (Australia) (Garban, 2009).

2.7 Hospitals Operations

Normally the *Out Patient department* (OPD) take-up a large portion of the hospital floor, and opens from 8 am to 5p.m. with a number of doctors ready to see patients who report sick.

New patients have to register at the registration counter on arrival for OPD consultation. They have to deposit registration fees after which they are issued with a registration card and consultation folder. Patients will then queue to the *Triage* with their folder. A nurse at the *Triage* will then take all necessary information (vital signs), record it in the folder and send a batch to a particular consulting room. Patients will then be informed to move to the chamber of the doctor and wait for their turn to be called. After the doctors have seen the patient, the doctor retains the folder for future reference and writes the prescription for treatment and investigations as required.

Old patients produce their registration card to the registration counter, the clerk takes out the old record and pastes revisit ticket on the folder and direct the patient to the consultant's chamber, where he awaits his turn.

If a patient is prescribed with medicine, he/she moves to the pharmacist and drop the prescription list, as he waits for his turn to collect the medicine.

The pharmacist will pick-up the lists, look for the drugs and cost them. The patient will then be given the total cost to go and pay and return with a receipt to pick up the medicine. If laboratory test is required, he will go to the lab before picking up the medicine.

In cases, where there is a necessity for referral, a letter is written by the doctor in consultation with the patient and handed over to the patient to go to the agreed referred hospital. The next page shows a diagram of the general process of patient flow for OPD services.

General Process Flow Diagram

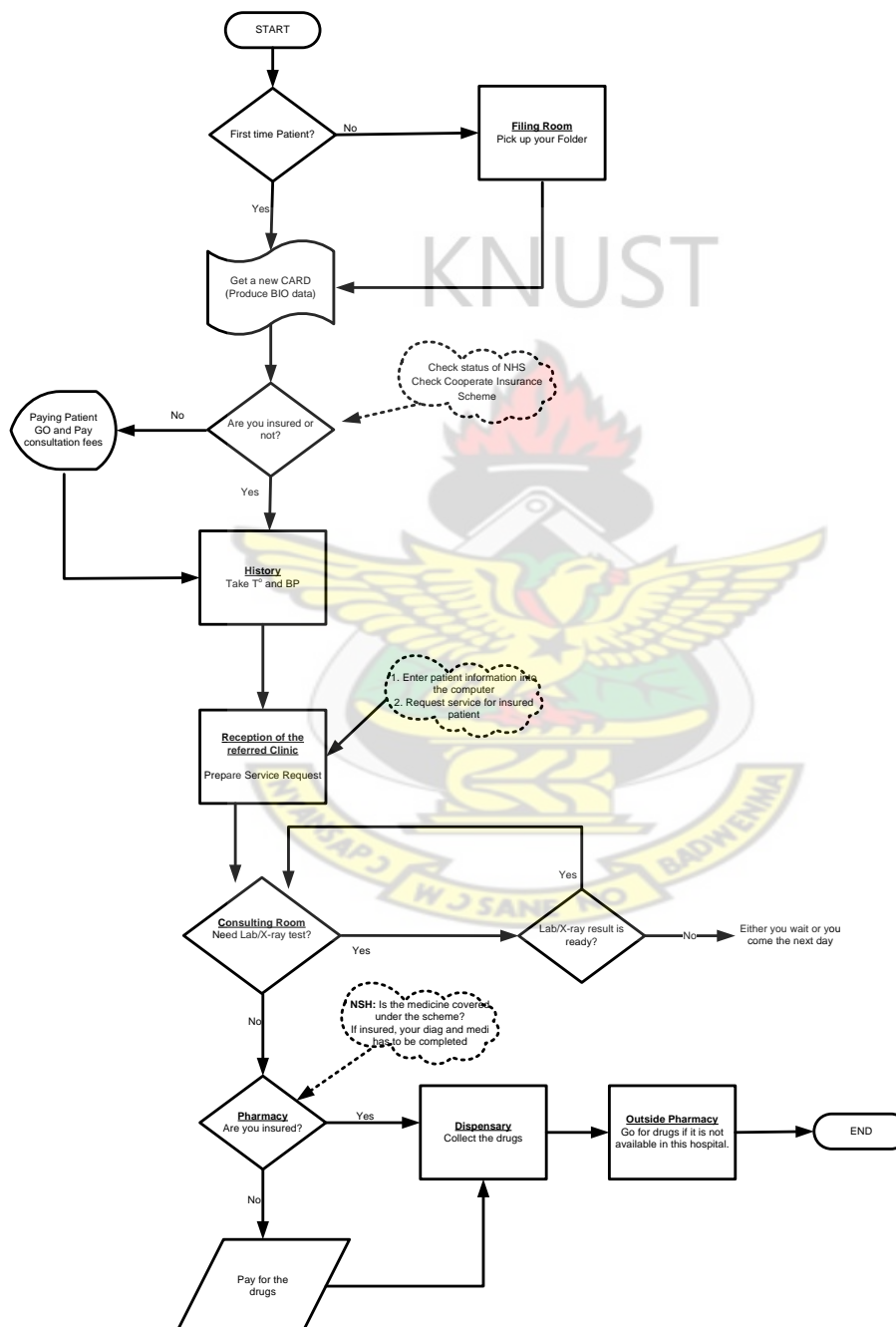


Figure 2 : General Process Flow of Patient

Source: Researcher Observation, September, 2011.

2.7.1 Flaws in the process

Hospitals do many wonderful things, but an administrator at a prestigious university hospital lamented that *‘we have world-class doctors, world-class treatment, and completely broken processes.’* This statement thus suggests that there are some flaws in the process.

2.7.1.1 Short-term consequences of flaws in service delivery

Flaws in the process result in problems such as;

- a. Deliveries from suppliers delayed because of improper ordering, mix-up in getting suppliers
- b. Items returned by other departments because they were not made correctly
- c. Employees have difficulty in handling new-type of equipment
- d. Limited storage space (linen and supplies) not properly used
- e. Safe equipment not being used
- f. Minor injuries or illnesses not reported
- g. Correct procedures not followed
- h. Employees pass the buck – let the other person do it

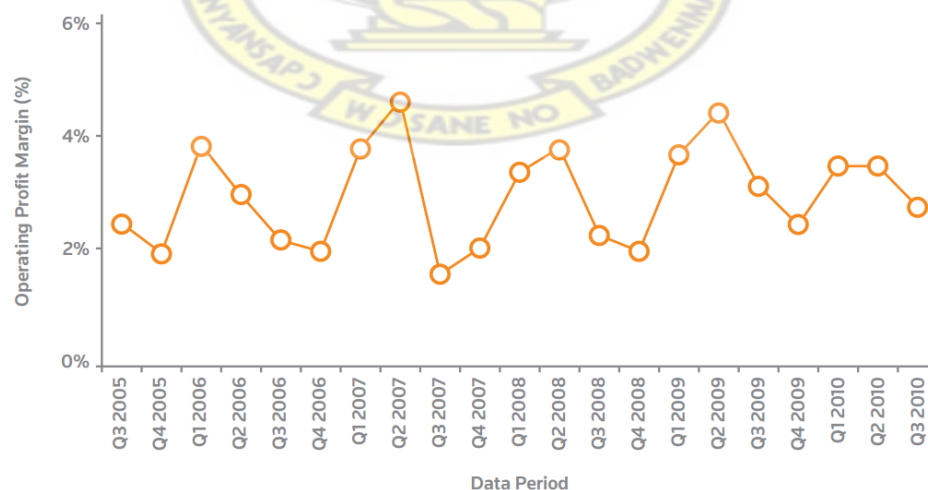
2.7.2 Long term consequence of flaws in the service delivery

Low efficiency: Delnor Hospital in Illinois was able to use Lean redesign to eliminate the need for a planned \$80 million expansion. This is not an uncommon story when hospitals really start thinking Lean. Instead of the old mind-set of “give me more,” hospitals find that they aren’t using the space they already have

as efficiently as they could. Or they find, like Delnor did, that “better flow” is the answer instead of “more rooms” (Gradan 2009).

Revenue and profitability of hospitals: Hospitals around the world are struggling to stay afloat amid the recession, although many have had financial problems for years, often blaming it on Medicare, Medicaid and other government health programs that don't fully cover the costs of care for millions of patients. Numerous hospitals have filed for bankruptcy, including Charlotte-based Hospital Partners of America, which operates four hospitals; Michael Reese Medical Centre in Chicago and Associated Healthcare Systems Inc., which has four rural hospitals in the South; and North Oakland Medical Centres in Pontiac, Mich.

Although hospital operating margins have remained steady over the last several years, following a cyclic pattern of increases in the first half of the year and decreases in the second half (Figure 1), they did fall slightly in the most recent year studied, from 3.3 to 2.8 percent between the third quarters of 2009 and 2010.



Source: ("Thomson Reuters", 2011)

2.8 Application of Lean in Ghana

In spite of the benefit of Lean, TCL has not been applied extensively in Ghana. In the banking sector, a researcher, Samuel Obeng studied how lean management replicates in Ghanaian rural banks with the help of both primary and secondary data, which included numerous published articles and web-based sources and textbooks easily available at his fingertips.

His study focused on lean management applicability in Ghanaian rural banks, by looking at areas of waste generation and suggesting ways of eliminating them to add value to the customers while maximizing shareholders returns to embed a culture of continuous improvement in the banks. In this research, observation and interview was used to collect the data for analysis. A detailed process map was analyzed and a future value stream was proposed. Though TLC was not implemented, the research mentioned some lean concepts that can be implemented to reduce waiting time on opening accounts and withdrawing money from the bank (Obeng, 2009).

In the construction industry, Evans Zoya Kpamma did a research with the objective of identifying the extent of practice of lean thinking, and the limitations to the practice of lean construction in Ghanaian construction. The main tools for the collection of primary data included administration of questionnaires, conducting interviews and personal observation. The target population for the data collection included consultants and contractors in the construction industry. Statistical Package for Social Scientists, version 11 (SPSS Version 11) and Microsoft excel were then used to analyze the data.

Inadequate familiarity on the part of construction firms with the concept of lean thinking was among a number of limitations identified in the possible application of the concept to the Ghanaian construction industry. The possible transfer of knowledge in the application of the concept from foreign construction firms operating in Ghana was one of the opportunities identified for the practice of lean thinking in the Ghanaian construction industry.

Evans recommended among other things that those consultants in the Ghanaian construction industry should become abreast with lean thinking through professional and academic training programs (Kpamma, 2009).

2.9 Conceptual Definitions and Framework

2.9.1 Benchmarking

Benchmarking refers to comparing one's current performance against the world leader in any particular area (Compton, 1992). The comparison, according to McCaffer & Harris (2001) may be with similar internal units in the same organization or with external competitors operating in a different industry.

The primary objective of benchmarking is to achieve 'best practice' principally by measuring effectiveness against quality of end product or service to the customer, productivity, cost level, safety and delivery time criteria (McCaffer & Harris, 2001).

2.9.2 Just in Time

The driving idea in the Just-in-Time approach is reduction or elimination of inventories (work in progress). This, in turn, leads to other techniques that are forced responses to coping with fewer inventories: lot size reduction, layout reconfiguration, supplier cooperation, and set-up time reduction. It is a production control method (pull type), where production initiatives by actual demand rather than by plans that base on forecasts

(Huovila & Koskela, 1997). Elimination of waste is identified as a cornerstone in the implementation of just in time. Waste was recognized as being made up of overproduction, waiting, transporting, too much machining (over processing), inventories, moving, making defective parts and products (Shingo, 1988).

2.9.3 Line Balancing

A great weapon against waste is Line Balancing. It has to do with preventing work pile on one worker or a particular section while other workers or sections are idle. In the case of the health sector, it will ensure that patient queues move smoothly with the work evenly distributed among the professional staff and various departments.

2.9.4 Value Management

Value based management refers to conceptualized and clearly articulated value as the basis for competing (Carothers & Adams, 1991). Firms driven by value-based strategies, just like lean thinking, are customer oriented, in contrast to competitor-oriented firms. Continuous improvement to increase customer value is also one essential characteristic of value-based management.

2.9.5 5S

One of the most effective tools of continuous improvement is the 5S, which is the basis for an effective lean company. The 5S is a first, modular step toward serious waste reduction. 5S consists of Japanese words Seire (**Sort**), Seiton (**Straighten**), Seiso (**Sweep and Clean**), Seiketsu (**Systemize**) and Shitsuke (**Standardize**). The underlying concept behind 5S is to look for waste and then try to eliminate it. Waste could be in the form of scrap, defects, excess raw materials, unneeded items, old broken tools, and obsolete jigs and fixtures (Moden, 1998).

Seire (Sort) deals with moving those items that are currently unused on a continuous basis (e.g. items that are unused for the next month or so) away from those that are used. Moving those items and tossing away needless items will make materials flow smoothly, and workers move and work easily.

Seiton (Straighten) has to do with having the right items in the right area. Items that do not belong to a given area must not be in that area. For a given workplace, area tools must be marked and arranged as belonging in that area. This will make it easier to move those items that are unlabeled from that area.

Seiso (Sweep and Clean) also deals with cleaning and sweeping the work place methodically. The workplace should look neat, clean, and ready to use by the next shift. There should be maintenance in the workplace on a regular basis. All tools and items should be in the right place and nothing should be missing. A well-maintained workplace creates a healthy environment to work with.

Seiketsu (Systemize) is maintaining a high standard of housekeeping and workplace arrangement where every activity have people assigned to it and everyone has a responsibility to maintain a high standard of housekeeping and cleaning.

Shitsuke (Standardize) is management's accountability to train people to follow housekeeping rules. Management should implement the housekeeping rules in a practice fashion so that their people can buy into it. Management should walk the shop floor, explain what they want from people, reward those who follow, and instruct those who do not. Standardization also ensures that each job is organized and carried out in the most effective manner. This ensures the same level of quality derived irrespective of who performs the job.

The above concept can also help in ensuring that the value activities are done with efficiency i.e. Full utilization of activities that adds value from the customers' perspective.

The figure below shows a pictorial view of the 5S.

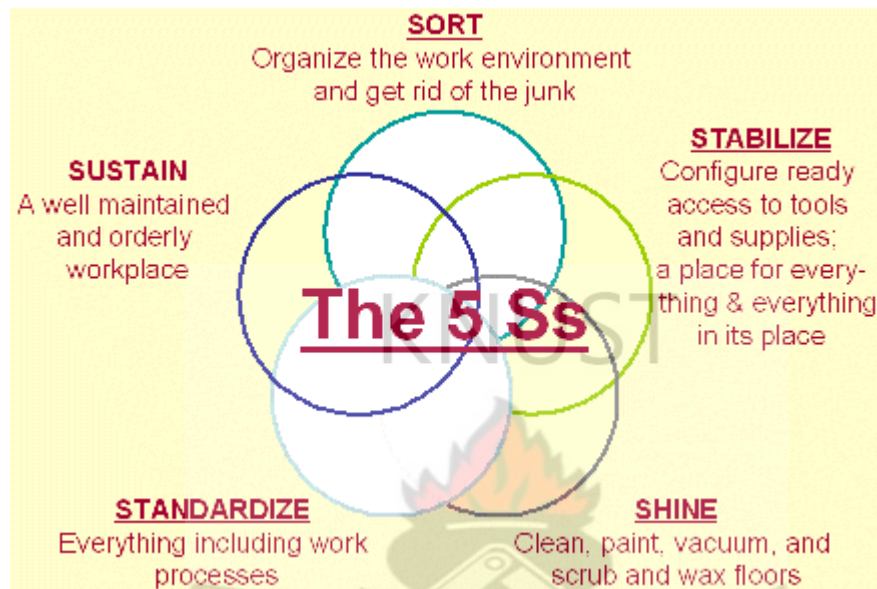


Figure 4 - 5S

Source: (Williams, 2007).

2.9.6 Spaghetti Diagram

The Spaghetti diagram, aptly named so because the line movements drawn on this diagram come to resemble a pile of tangled noodles, it is a movement path diagram by a more appetizing name. The spaghetti diagram is a great waste observation tool even for people taking their very first steps at kaizen and lean management, and one that serves even the most seasoned lean practitioners faithfully. A spaghetti diagram is a visual representation using a continuous flow line tracing the path of an item or activity through a process. The continuous flow line enables process teams to identify redundancies in the workflow and opportunities to expedite process flow.

Map showing movement of people, products or materials and can show total distance traveled and can show multiple people.

They track using:

☐ Product Flow ☐ Paper Flow and ☐ People Flow

Below is a an example of spaghetti diagram

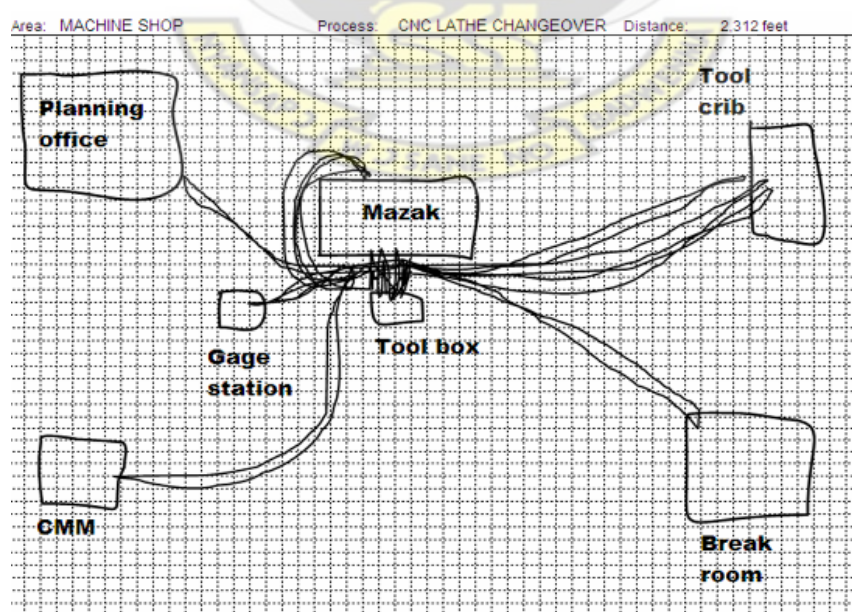


Figure 5 – Sample of Spaghetti diagram A

Source: (Williams, 2007).

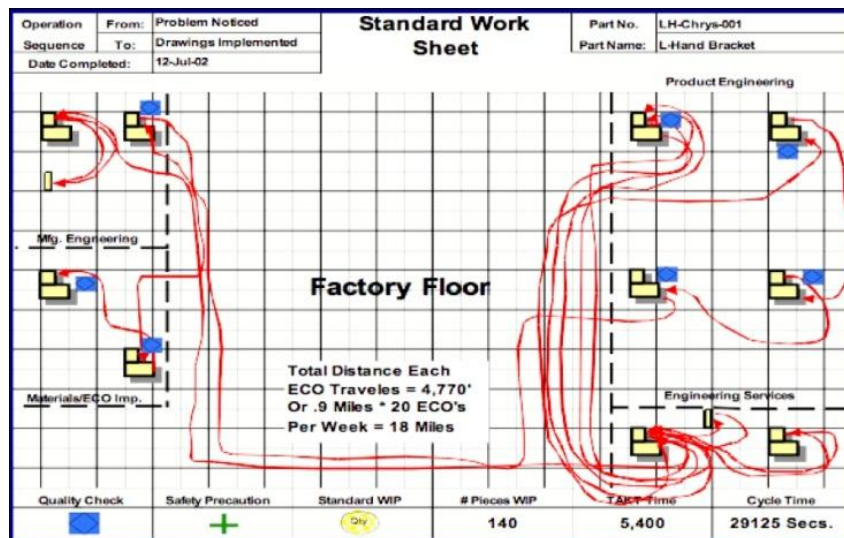


Figure 6 - Sample of Spaghetti diagram B

Source: (Williams, 2007).

2.9.7 Philosophy of Lean

- ‘To create the most value while using the fewest resources’
- Value is defined by the customer.
- Keep “it” simple and Do “it” right the first time.
- Look at “it” from the customer’s perspective.
- Create value in “it” based on customers’ needs and wants.
- Eliminate or minimize that which does not create value.
- Waste is anything other than the minimum amount of equipment, materials, parts, space, and worker’s time which are absolutely necessary to add value to the product.
- Value Stream Mapping (VSM) is a practical and visual tool that:
 - allows you to identify the steps, procedures, or protocols that create value in “it”, while allowing you to identify the non-value-added activities, tasks, steps, processes in “it”.

Chapter 3 - Methodology

3.1 Research Strategy

The strategy was a mix approach. Where we are using both quantitative and qualitative research approaches. Quantitative in the sense that to achieve the first objective we try to elicit the level of awareness among respondents using structured questionnaires and thus the analysis was crunching of numbers (Saunders, 2007). Conversely, qualitative since we further, seek the views and here we were interested in the opinions of respondents on issues such as applicability of lean in the process. In the qualitative sense we employed interviews and observations.

3.2 Research Design

A diagnostic research approach was chosen since this study is to provide insight into the business process of the OPD Department of the Regional Hospital, Sunyani. This type of research design has the advantage of being more flexible and dynamic, providing details where a small amount of documented information exists and has the capacity to narrow down the scope of investigation. As stated in chapter one, the main purpose of this study was to investigate the possibility of the healthcare service adopting TLC so as to make them effective and efficient, given the limited resources available, a case was adopted and diagnosed with the tools of lean to ascertain its applicability to the health sector.

3.3 Sampling Technique and Size

To further, support the strategy of mix approach, the sampling combined both probabilistic and non-probabilistic techniques in this study. A combination of purposive and quota sampling techniques, twenty (20) respondents were selected for the studies while ten (10) health professionals where interviewed.

Diagnostic Research of this nature does not involve every worker but involves the key people that know the business process and why things take a particular procedure. In this regards, we chose only ten health professionals via the purposive sampling technique for the interview. As per the objectives, a good observation was enough to obtain all the data that was required.

In addition, the Stratified Random Sampling was used to select twenty (20) health professionals to answer the questionnaires. In addition, there was not enough funds and time available to include all health professional in the hospital.

A pre-test was done to make sure that questions were easily understood and are meaningful to the study.

The interviewees were selected based on purposive sampling.

Table 2 - Table Interview Participant

Department	Sample size
Emergency Department – Nurse	1
Information Office	1
Laboratory	1
Doctors	1
Librarian	1
Total Sample size	5

Source: Survey instruments, September, 2011.

3.4 Data Collection techniques

Triangulation was the methods of primary data collection used in this project to collect data. Since much social research is founded on the use of a single research method and as such may suffer from limitations associated with that method or from the specific application of it, triangulation offers the prospect of enhanced confidence (Bryman, 2004).

3.4.1 Interviews

In order to gather firsthand information from the hospital, key informant interviews were used to collect data from the hospital's authorities. In line with this, those who are supposedly knowledgeable about the business process of the hospital and willing to communicate about them were contacted (Kumar, 2010).

3.4.2 Participant Observation

Participant observation began at the latter part of the month of September 2011. The researcher observed the business process by following patients from the OPD (where patient first report) to the Pharmacy (where they collect their medicine) to when they leave the hospital. The use of participation can bring out information that would otherwise be unavailable and through the viewpoint of 'insiders' (Yin, 2002).

Through daily interactions with key hospital authorities and patients, the researcher was able to obtain, among other observations, a general understanding of the business process of the hospital. The observable events also helped the researcher to design the questionnaires for the study.

3.4.3 Questionnaire

Data collection began mid-September 2011. Semi - structured questionnaires were administered for the collection of the data. Questionnaires are one of the most widely used instruments for collecting data in research. Bryman (2004) suggests that the utilization of questionnaire partly stems from its cheapness and quickness in terms of administration, the absence of the interviewer effect and its convenience for correspondence. This makes the questionnaire an indispensable tool in gathering primary data about people, their behavior, attitudes, opinions and awareness of specific issues.

The questionnaire was developed to cover an aspect of the objectives of the study, which is to investigate the knowledge of Lean and possible challenges of change management.

The Questionnaire was, therefore, seen as an appropriate tool which allowed the researcher to collect standardized information across participating respondents with regard to the variables of interest. The instrument was divided into appropriate sections to allow for the systematic collection of data from the hospital.

The questionnaires were semi-structured that contained open-ended and closed-ended questions. The closed-ended questions required the respondents to make choices from alternative responses while the open-ended questions provided spaces for them to give their own answers to questions.

3.5 Analysis of Data

Questionnaires, interviews, field observation and documentary sources were used for gathering all the necessary information for the study. After cleaning up the data from the survey and correcting the few mistakes that were detected in the filing of the questionnaires, the data was coded and fed into a Statistical Package for Social Scientist (SPSS 11) software.

Frequencies were run from the Statistical Package for Social Scientist (SPSS) to explore the characteristics of the data by identifying the percentages and other markers portraying the general description of the respondents and their responses. A cross-tabulation analysis was also applied to understand how sections of respondents, based on the demographic variables, responded to the questionnaire. Tables and graphs and charts are used to represent these characteristics.

The data from interviews conducted with all other categories of respondents were analyzed by identifying the major themes that emerged from the respondents and supporting them with quotations, where necessary.

3.6 Limitations

First, there are several department/sections in any hospital and each of these sections has quite a number of business processes.

This study considered only one of the main sections that is the **Out-Patient Department** (OPD) of the Regional Hospital, Sunyani with more emphasis being placed on '*seeing a doctor for the first and subsequent times*'. This thus limits the generalization of the study.

Further, as a new concept, respondents had little contribution to this study and so the study will dwell more on observation leading to little contextualization of the work in Ghana.

KNUST



Chapter 4 – Data Presentation, Analysis and Discussion

4.1 Introduction

This chapter seeks to discuss in detail the findings of the research with respect to the objectives.

4.2 Demographic Information

Out of the twenty (20) respondents, 55% were between the ages of 31-40 years while only 10% were above the ages of 41 years.

All the respondents were Ghanaian, twelve (12) of them were females while the remaining eight (8) were males. The table below show the gender who respondents to the questions.

Table 3 - Gender Distribution of Respondents

	Frequency	Percent
Male	8	40.0
Female	12	60.0
Total	20	100.0

Source: Survey instruments, September, 2011.

Of all the respondents, seventeen (17) were permanent workers while three (3) were casual workers.

In order to obtain a diverse view of the concept under study, respondents were selected from various units of the hospital. Below is the bar graph of number of respondents and the unit in which they work.

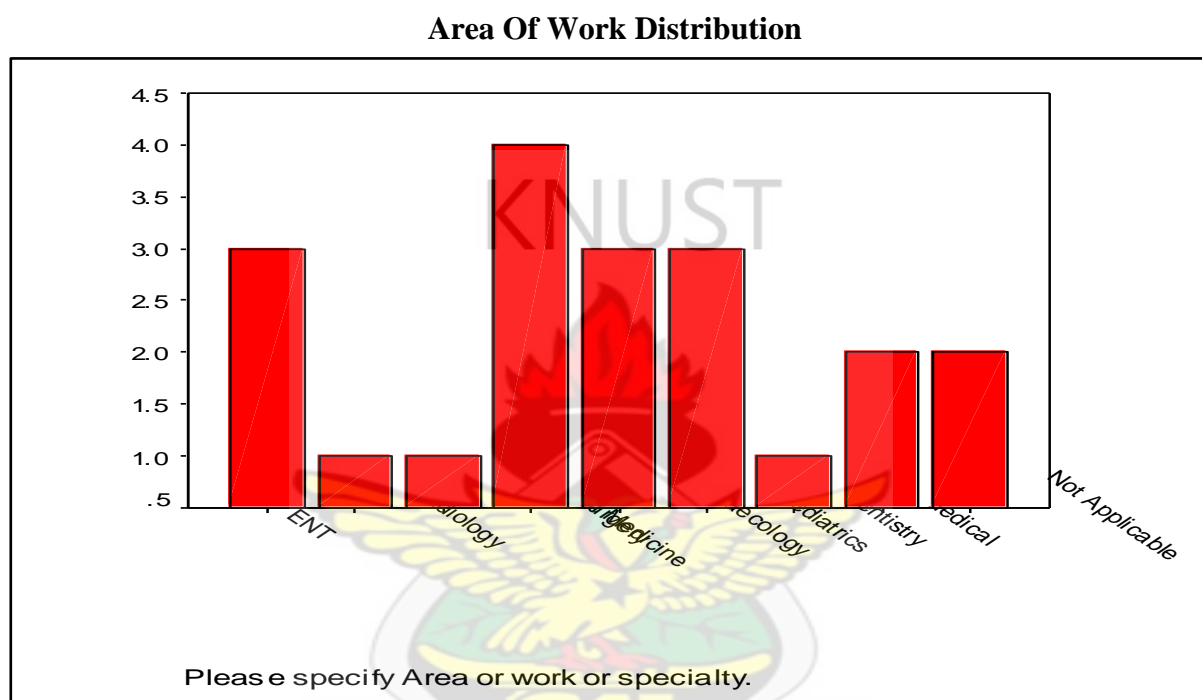


Figure 7 - S Area Of Work Distribution Table

Source: Survey instruments, September, 2011.

Table 4 - Area or work or specialty

	Frequency	Percent
ENT	3	15.0
Radiology	1	5.0
Internal Medicine	1	5.0
Surgery	4	20.0
Gynecology	3	15.0
Pediatrics	3	15.0
Dentistry	1	5.0
Medical	2	10.0
Not Applicable	2	10.0
Total	20	100.0

Source: Survey instruments, September, 2011.

4.3 Knowledge of TLC in the delivery of health care

Data gathered from the field indicated that majority of the health professional have not heard about lean neither have they been part of any lean implementation project. Only three (3) of the respondents indicated that they have heard about lean, however none of them have been part of the implementation of lean and thus could not give any more details as to how the concept can be adopted to improve service delivery.

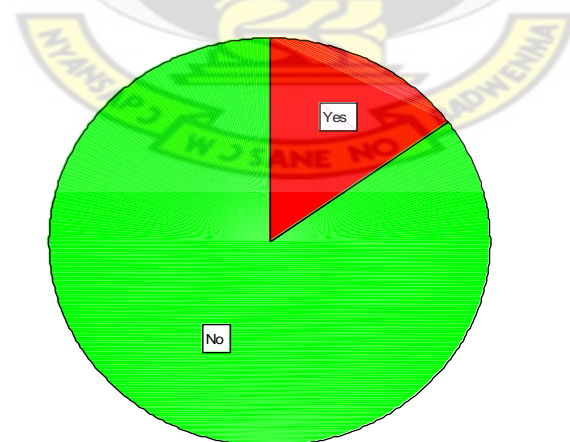


Figure 8 – Pie Chart of Knowledge of Lean

Source: Survey instruments, September, 2011.

The Pie Chart indicates the large number of health professionals (85%) who have not heard of TLC. However, of the three that had heard of the concept, one (1) got to know about it from Magazines/Journals while the other two (2) go to know about it from the internet. To validate the knowledge of Lean among the health workers, the question ‘*Do you think the lean concept is well known among health workers*’ was asked and all respondents indicated ‘No’. This therefore affirms that the concept is not known to the health workers.

With respect to the ten (10) interviewees, only one (1) had heard about TLC and how it has been used to improve the delivery of health care. The rest of them acknowledged that they do not know about lean and have not read about it. One respondent however indicated that she is knowledgeable about TLC though she has not been part of any lean implementation. Below is a table showing the percentage of respondent’s knowledge level about lean.

Knowledge Level of Lean Graph

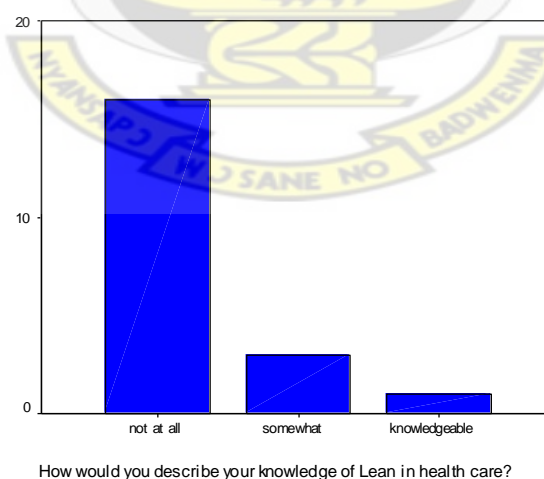


Figure 9 - Knowledge Level of Lean Graph

Source: Survey instruments, September, 2011.

In order to ascertain the extent of knowledge on Lean, the question ‘what is lean?’ was asked. Though options were given for respondents to choose from, only four (4) got it right. Fifteen (15) respondents however did not respond to the question at all, this supports the initial assertion that 85percent have not heard of lean. The table below shows respondents’ response to the question, what is lean?

In your opinion, what is Lean? (Check as many as applicable/possible)

Table 5 - Validate what Lean is-Table A

	Frequency	Percent
Keeping the process flow – eliminate bottlenecks	1	5.0
Eliminating waste in the system technologies	3	15.0
Reducing the number of workers in the hospital	1	5.0
No Response	15	75.0
Total	20	100.0

Source: Survey instruments, September, 2011.

A follow-up question ‘In your opinion what is lean?’ also indicated the same pattern of response. Options were provided however respondents who chose the options ‘Reduce work force’ and ‘All the above’ got it wrong as lean is not about the options provided.

The table below shows the response to the question ‘In your opinion what is lean?’

Table 6 - Validate what Lean is - Table B

	Frequency	Percent
Build more facilities	1	5.0
Look for ways to utilize existing resources	2	10.0
Reduce the workforce	1	5.0
All of the above	1	5.0
No Response	15	75.0
Total	20	100.0

Source: Survey instruments, September, 2011.

From the questionnaire, 80 percent of respondents do not know any lean concept that can be adopted while 20% indicated that they know some concepts that can be adopted. Of the 20 respondents, only 5% indicated that TLC could be implemented soon, while two (2) indicated that it could be implemented Very Soon. The remaining twelve (12) could not tell when it will be implemented. This is not strange because lean is not known among health workers, and management has not been part of any lean implementation thus there is no way it would be in the pipeline for adoption and implementation.

Going further to investigate why one responded that the concept will be implemented soon, the researcher noticed that she knows much about the concept and is of the view that this is the time to implement such a concept to solve the emerging challenges of the hospital.

The 20 percent who indicated that lean concept can be adopted stated value adding activities, Line Balancing, 5s, Elimination of waste as some of TLCs that can be adopted to improve the delivery of health service in the Regional Hospital, Sunyani.

The tables below indicate the response to what concept can be apply.

Table 7 - Area of Lean Applicability

	Frequency	Percent
Not Applicable	16	80.0
Eliminate Waste and Rework	4	20.0
Total	20	100.0

Source: Survey instruments, September, 2011.

Table 8 - Type Of Lean Concept To Adopt

	Frequency	Percent
Value adding activities	2	10.0
Line Balancing	1	5.0
5s	1	5.0
No Response	16	80.0
Total	20	100.0

Source: Survey instruments, September, 2011.

4.4 Applicability of TLC

As per the response from the questionnaire and the interviews, the researcher is optimistic that Lean can be adopted to improve health care delivery. The next section will throw more light on some areas where lean can be used to improve the process. Appendix i, show a broad representation of Service Points. Both the Laboratory and the X-ray departments are not places that patients go all the time, as it is determined by the Doctor where further examination is required. In addition to this, is Figure 11 at Appendix ii, which shows a brief high-level process flow of patient movement in the hospital.

From observation, the patient reports at the OPD section to check his health status and then proceeds to the filing room to pick his folder. Upon obtaining the folder, he proceeds to the History section to check his Blood Pressure and Temperature and then to see the Doctor. During examination, the Doctor may request for Diagnostic services. The patient is expected to come back to the Doctor with the report for further diagnosis after which medications are prescribed. The patient will proceed to the pharmacy to purchase or collect the drugs before exiting the hospital. Though this movement looks simple by description looking at it on the spaghetti diagram reveals a little complexity especially as the service points are not in one room or Hall and thus the patient has to do a lot of walking, sitting and queuing to access the health facilities.

Figure 12, at Appendix iii, shows the Spaghetti movement of a patient who went through the Main OPD and other service point but need not visit the Lab or X-ray. The light-red lines represent the movement of the patients. Another example is the movement of one patient through the service point and the time accessing service at the Laboratory and X-ray departments. This is shown in Figure 13 at Appendix iv. The Spaghetti Diagram, shows instance where the patient was asked to go for Laboratory test and X-ray after seeing the Doctor.

The third Scenario is where a patient has to go to the Dental Clinic after taking the History records has been taken. Though he is a new patient and does not go to the filing room to pick his/her folder, he will do a lot of walking in view of the locations of the facilities. Figure 14 at Appendix v the third scenario.

One interesting fact about this movement and queuing is that it adds up to the non-value time spent at the hospital. A Value Stream Map was used to capture the movement and the time spent walking, queuing and receiving services at each of the Service Points. Figure 15 at Appendix vi shows the current value stream map of an old patient who report to the hospital to request for medical services.

Below is a table of the result of the timing that was taken at three different times – 7am to 9am, 9am to 11am and then 11am to 1pm.

Table 9 - Value and Non-Value Added Time Table

Activity/Timing	1st Observation						2nd Observation						3rd Observation					
	7am to 9am						9am to 11am						11am-1pm					
	min	sec	min	total min	total hrs		min	sec	min	total min	total hrs		min	sec	min	total min	total hrs	
Queuing to check Insurance Status	46	21	0.4	46.4	0.8		35	10	0.2	35.2	0.6		20	39	0.7	20.7	0.3	
Filling Room services	20	43	0.7	20.7	0.3		22	56	0.9	22.9	0.4		15	13	0.2	15.2	0.3	
Walking and queuing for OPD	63	18	0.3	63.3	1.1		92	9	0.2	92.2	1.5		30	10	0.2	30.2	0.5	
Main OPD Services	3	43	0.7	3.7	0.1		2	6	0.1	2.1	0.0		2	43	0.7	2.7	0.0	
Walking and queuing to check BP/T	15	12	0.2	15.2	0.3		39	12	0.2	39.2	0.7		50	30	0.5	50.5	0.8	
History Service Point	3	13	0.2	3.2	0.1		2	59	1.0	3.0	0.0		3	10	0.2	3.2	0.1	
Walking and queuing to reception	1	19	0.3	1.3	0.0		1	18	0.3	1.3	0.0		0	50	0.8	0.8	0.0	
Clinic Reception	1	40	0.7	1.7	0.0		2	0	0.0	2.0	0.0		1	15	0.3	1.3	0.0	
Queuing in chairs to see the Doctor	35	39	0.7	35.7	0.6		84	10	0.2	84.2	1.4		156	21	0.4	156.4	2.6	
Consulting Room - Time with the Doctor	14	6	0.1	14.1	0.2		13	10	0.2	13.2	0.2		16	21	0.4	16.4	0.3	
Queuing to X-ray	1	32	0.5	1.5	0.0		12	11	0.2	12.2	0.2		30	1	0.0	30.0	0.5	
X-Ray Services	22	41	0.7	22.7	0.4		23	54	0.9	23.9	0.4		22	38	0.6	22.6	0.4	
Walking and Queuing to NSH Drugs checked	1	4	0.1	1.1	0.0		2	0	0.0	2.0	0.0		1	45	0.8	1.8	0.0	
NSH Desk	1	40	0.7	1.7	0.0		2	0	0.0	2.0	0.0		1	15	0.3	1.3	0.0	
Queuing in chairs to for drugs	10	32	0.5	10.5	0.2		15	11	0.2	15.2	0.3		38	1	0.0	38.0	0.6	
Pharmacy Services	5	2	0.0	5.0	0.1		4	2	0.0	4.0	0.1		3	43	0.7	3.7	0.1	
Total (Waiting+Value) min/sec	241	405	6.75	247.75	4.13		350	268	4.5	354.5	5.9		388	395	6.58	394.58	6.58	
Total Waiting Time	172	177	2.95	175.0	2.9		280	81	1.4	281.4	4.7		325	197	3.28	328.28	5.47	
Total Value Time	69	228	3.8	72.8	1.2		70	187	3.1	73.1	1.2		63	198	3.30	66.30	1.11	

Source: Survey instruments, September, 2011.

The table above indicates that, a patient could spend 4.13hours, 5.9hours or 6.59hours depending on the time he reports at the hospital. Thus on the average, 5.54hours is spend at the Regional Hospital, Sunyani to receive healthcare. Interestingly, on the average, the total value added activities is only 1.2hours while the non-value activities is 4.4hours.





An interview with one patient he mentioned that he spends about 5hours just to receive malaria treatment and that this is highly unacceptable. He lamented *'if not because of the National Health Insurance Scheme, I would have walked into a pharmacy purchase a drug and go home'*.

This kind of non-value added time according to Lean as mentioned in the literature review falls under motion/movement waste and should be eliminated. For example, there could be a facility re-arrangement to ensure that the walking distance between the Filing Room and the History section are removed. This will go a long way to reduce the hours spent at the hospital, and also to save/reserve energy for the patient seeking medication attention.



The case of a new patient is slightly different in that he/she does not go back to the filing room to pick a folder but might spend around the same time in getting a new folder.

The table below shows a comparison of the patient at a service point at two different times. The idea is to show the movement of patient in the hospitals during its operating hours.

Table 10 – Picture Story Table – Timing at Service point

7am – 8am	Observation/Comment	10am - 11am
	OPD Between 7-8am in the morning, the OPD is full to its capacity such that patients have to either stand or queue from outside. Though from 10am going, the pressure reduces significantly.	
	Filing Room This place is equally choked with patients waiting to take their file. At 10-11am, there are a handful of people there.	

	<p>History</p> <p>Though in the morning there are few patients there, the queue becomes very long from about 9am to 10.40am</p>	
	<p>Clinic</p> <p>Before 8am, there were very few people at most of the clinics but the number increase and stay stable for a very long time after 9am.</p>	
	<p>Laboratory</p> <p>Since it receive patient from all over the hospital the place is general busy with long queue most of the time</p>	

	<p>Pharmacy</p> <p>There was nobody at the pharmacy but the number increase slightly towards 10am.</p>	
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Source: Researcher Observation, September, 2011.

Though the above shows clearly the movement of patient along the service point, there was no observation of health workers moving along with them to help reduce the workload.

4.5 Change Management

In order to ascertain how flexible management can be with respect to change and to bring to light some of the possible challenges of implementing TLC a couple of questions were asked about change management.

60% of the respondents indicated that management has a favorable attitude to change. Though 30% could not tell whether management is favourable or Unfavourable towards change, the remaining 10% are of the view that management is not favorable to change.

What is the attitude of the management of your hospital towards Lean/any improvement concept?

Table 11 - Attitude of management towards change

	Frequency	Percent
Favourable	12	60.0
Unfavourable	2	10.0
Can't Tell	6	30.0
Total	20	100.0

Source: Survey instruments, September, 2011.

In an interview with one senior member of the hospital's management, he indicated that there will be some challenges and difficulties in the implementation of lean due to the organizational structure and the current decision model. Though 60% respondents did not respond to what difficulties we will face in the implementation of lean, 35% indicated that there will be difficulties without management support and 5% indicated that if we ignored management in the decision, the implementation will fail.

How difficult will it be to implement what you have suggested in response to question 21?

Table 12 - Difficult in Lean Implementation

	Frequency	Percent
No Response	12	60.0
Little Difficult without management support	7	35.0
Management Involvement in making decisions	1	5.0
Total	20	100.0

Source: Survey instruments, September, 2011.

Though three (3) respondents did not tell what challenges could arise in the implementation of the lean, the remaining seventeen (17) stated quite a number of reasons.

Reasons included management support, resource availability, training, education, awareness, monitoring, evaluation, etc. The table on the next page shows the details of the response;

In your own words, what will be the challenge should we implement Lean in this hospital?

Table 13 – Possible Challenges of Lean Implementation

	Frequency	Percent
Full Management Support and Resource Availability	6	30.0
Training/Education/Awareness	5	25.0
Monitoring & Evaluation	1	5.0
Ignorance and Lack of Expertise	1	5.0
Some Staff does not want change	1	5.0
Change management	3	15.0
No Response	3	15.0
Total	20	100.0

Source: Survey instruments, September, 2011.

Respondents did not only indicate challenges but also advised the Lean Implementation Team on some key issues such as management and stakeholder's involvement, staff motivation and commitment etc. Some of the feedbacks are illustrated in the table below;

Table 14 - Advice on Lean

	Frequency	Percent
Management Support	5	25.0
Staff Commitment	3	15.0
Stakeholder Involvement	5	25.0
Staff Motivation and Assurance	4	20.0
No Response	3	15.0
Total	20	100.0

Source: Survey instruments, September, 2011.

Respondents also advise the team that attainment of objective, understanding of the process and staff motivation constitute success factors.

Table 15 - Success Factors/Indicators

	Frequency	Percent
Attainment of Objective	2	10.0
Understanding of the entire process	8	40.0
Staff Motivation	1	5.0
No Response	9	45.0
Total	20	100.0

Source: Survey instruments, September, 2011.

Starting the project and leaving it halfway, lack of awareness and lack of education are some of the views that will constitute failure factors during and after implementation.

Table 16 - Failure Factors/Indicators

	Frequency	Percent
Should Start and Leave it Halfway	2	10.0
Lack of awareness	5	25.0
Education of staff and Nurse	3	15.0
Staff not interest - Lack of interest	1	5.0
No Response	9	45.0
Total	20	100.0

Source: Survey instruments, September, 2011.

4.6 Operational Activities of the Hospital

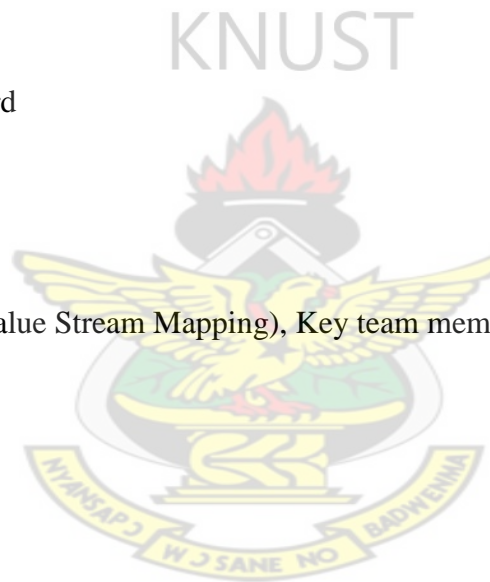
The operational activities of the hospital from the perspective of the patient start from the Main OPD through the Filing Room, History, Consulting Room, Laboratory/X-ray to the pharmacy. Though these can be said to be the Service Points of the hospital, one might not need to go through all the places depending on his/he needs. Figure 16, at Appendix vii shows a high-level diagram of the various service points and the directions of flow of both old and new patients. The old patient does everything that the new patient does, except that the new patient does not go to the filing room.

4.7 Framework for the application of lean

4.7.1 The Framework

Based on the findings and information obtained from the findings, the following shall be the proposed framework for the application of lean in any public hospital in Ghana with specific reference to Regional Hospital, Sunyani. Thus if the management of the Regional Hospital, Sunyani wants to implement any of TLCs, it is recommended that this framework be used as a guide to increase the change of success.

1. Leadership and Strategic Management Vision
2. Resource commitment
3. Consultant selection and Possible Contract Award
4. Training and Awareness of TLC
5. Formation of a Lean Project Team
6. Identification of Areas of improvement (As Is Value Stream Mapping), Key team members taking up projects.
 - a. Mapping the Process
 - b. Determining Capacity & Patient Demand
 - c. Identifying the waste
 - i. Processing: Doing more work than is necessary
 - ii. Waiting: Any non-work time waiting for information, suppliers, or equipment
 - iii. Correction: Repair of Reworks
 - iv. Motion: Any wasted motion in picking up or placing and wasted time in walking from one service point to the other.



- v. Overproduction: Moving the service providers to where and when needed
 - vi. Inventory: Maintaining excess inventory throughout all processes.
 - d. Working on Demand and Eliminating Disruptions & Abnormalities
 - e. Improving flow and shortening the Lead-time
 - f. Aggressively eliminating remaining waste.
7. Detailed Documentation of ‘*To Be Value Stream Mapping*’/ Baseline Data and Project Proposal with Charters.
8. Management Reviewing and Approving Project
- a. Prioritization
 - b. Approval
 - c. Provision of resources
9. Implementation of project
10. Monitoring and Evaluation – Baseline Data Assessment
- a. **Plan Do Check Act**



4.7.2 Success Factors/Matrix

It is also recommended that the lean project team as well as management keep a close eye of this Success factors/Matrix. Below is a list of challenges and success factors that must be reviewed before and during the implementation of the lean project;

Table 17 – Challenge and Success Factors

Issue	Challenge	Success Factors
Resources	Insufficient resources (technical, financial, human)	Sufficient resources
Management	Lack of management awareness and support	Management commitment
Link to Strategy	Misalignment	Alignment
Staff	Poor selection of Lean project team	Presence of improvement champion and dedicated staff
Time plan	Slow pace of change	Realistic timescales for changes
Change management	No change management	Change management Team

Competence building	Inadequate training and education	Comprehensive training and education
Culture	Need for cultural change	Supportive organizational culture
Dominant mindset	Silo thinking	Whole systems thinking
Rewards	No rewards/recognition from participating in lean	Department gets a share of the benefits from lean
Communication	Poor communication	Effective communication

Source: (Joubert, 2010).



4.7.3 Lean Assessment

In reviewing the above, team management should ask these questions,

1. Are these issues at all?
2. What are we going to do about these challenges
3. What can we do to maintain these success factors?

Answers to these questions should be inculcated into the risk assessment and should be reviewed periodically to increase the project chance of success.

In addition to the above, to ensure that the change that is made and sustained, it is recommended that the checklist below be observed.

Table 18 – Make Change Stick Checklist

CHANGE CONTROL CHECKLISTS		
System Leverage Points	Complete	Actions
Vision		
Has the vision of the new way been shared and understood?		
Has the vision of what it will take to sustain the change been communicated?		
Accountability		
Is the process owner being held accountable for sustaining the change?		
Are the other key stakeholders being held accountable for sustaining the change?		
Right People		
Are the key stakeholders committed to the new way and sustaining the change?		
Skills Development		
Do you need to incorporate the skills into the company's induction programme?		
Do you need to update existing training material/ job cards / job instructions?		
Do you need to update training plans with new skills required?		
Rewards and Recognition		
Do you need to update performance bonus criteria?		
Do visual workplace boards need to be updated?		
Measures, Process & Policies		
Do standard operating procedures need to be update?		
Have new processes been developed that require a new process owner?		
Do new measures need to be added to existing scorecards?		
Do organisational charts need to be updated?		

Source: (Joubert, 2010).

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Chapter 5 – Summary of Findings, Recommendations and Conclusions

5.1 Introduction

After carefully studying the operations of the Regional Hospital, Sunyani, as pertains service provision and how to eliminate waste and improve effectiveness and efficiency using TLC, this chapter seeks to present the researcher's conclusions and recommendations on the findings.

5.2 Summary of findings

In summary, TLC which can be adopted as an improvement strategy to help eliminate waste and utilize existing resources effectively thereby providing efficient healthcare is not well known among health practitioner. Findings clearly show that both hospital management and staff have very little knowledge about TLC and its methodologies and thus are not in a better position to adopt and implement it.

Furthermore, most of the respondents have not even heard about TLC at all. Lean concept such as Spagethic Diagram, Process Map, Value Stream map, and 5s are some of the basic lean concept that can be adopted to improve healthcare in the Regional Hospital, Sunyani. One outstanding finding was the time patients spend the hospital to receive/access healthcare. About 70% of this time was either patient waiting in queue or walking. These activities all falls under non-value activities and thus Lean concept can be applied to reduce it if not eliminated completely. Consequently, TLC is very much applicable in the Regional Hospital, Sunyani as well as any other Ghanaian public hospitals.

With the value stream mapping concept of lean, the OPD department operational processes was broadly documented for analysis and future state map was proposed out of it. These also show clearly the various movements and the time spent at each service point in the process of accessing healthcare.

The fact that the concept is not well known among the health workers does not mean that the concept cannot be adopted or implemented but then it will pose as a challenge which needs prior attention. Thus, before the implementation of TLC, challenges such as lack of knowledge or low level knowledge on TLC, effective communication, resource allocation etc. must be addressed. In this regards, the proposed framework should be used as a guide for Lean Concept Readiness assessment.

5.3 Recommendation

Service Start Time: It was observe that the Clinics start at about 9am. In other words, the Doctors starts giving medical attention at about 9am, but by this time over 100 patients have already reported to the clinic and have started the process. Thus, these 100 people will still be a backlog and will increase the time spent at the hospital for anybody that comes later. It is therefore recommended that to keep the process flowing, the clinic should start at 7.20am (i.e. 20min after the start of the main OPD). By this time, the first patient would have reported for medical attention. This will go a long way to decrease the waste in terms of waiting – time spent at the hospital.

Service providers must move with the service receivers: Service providers (i.e. health professionals – Nurse Doctors etc.) must move with the queue. Thus, as the queue grows in a particular Service Point, health workers from less busy Service Points must move into this area to assist increase in the flow.

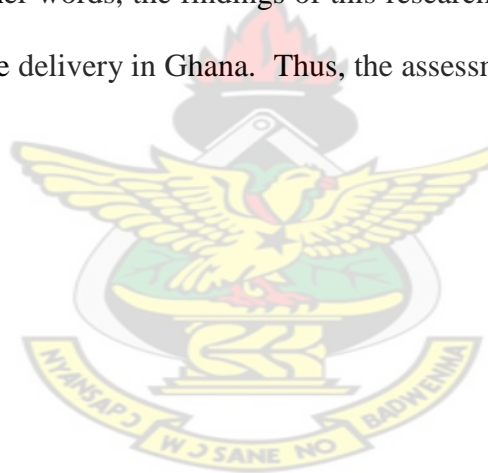
In that case, the bottleneck will still be the doctors and thus there will be the need to bring doctors from nearby clinics to help for some few hours.

Visual Aid to Keep the Process Flowing and to reduce re-work: Though there are information desks to assist patients on what to do and where to go next, there should be signage as to what queue one is in. This will go a long way to help avoid patients being in the wrong queue for hours. For example at the Main OPD Reception, there are four different queues that look like one and it's difficult to know which is to join.

Training and Awareness: Since none of the respondents and interviewees has been part of any lean implementation, the awareness and education of the concept should take a different approach. All professional staff of the hospital should be taken through the basic concept of lean training. This training must include practical approach to enable trainees obtain lean basic tools which will have the tendency to influence their culture and way of doing things. This will go a long way to help health professionals identify areas of improvement and possibly implement small changes to increase the flow.

5.4 Conclusions

In conclusion, it is obvious that TLC is applicable in the delivery of healthcare in Ghana, despite the fact that the management as well as the staff of the Regional Hospital, Sunyani, does not have extensive knowledge on the concept of lean. Due to the lack of knowledge about Lean, we can say that the hospital is not ready to adopt and implement lean. The study continue to show in detail some basic Lean Concept that can be adopted in the delivery of healthcare, the challenges that can arise during adoption and implementation and subsequently the framework to guide an organization in its implementation process. In other words, the findings of this research has undoubtedly shows that TLC can be adopted and implemented to improves the efficiency of healthcare delivery in Ghana. Thus, the assessment shows that the Concept of Lean can improves the efficiency of healthcare delivery in Ghana.



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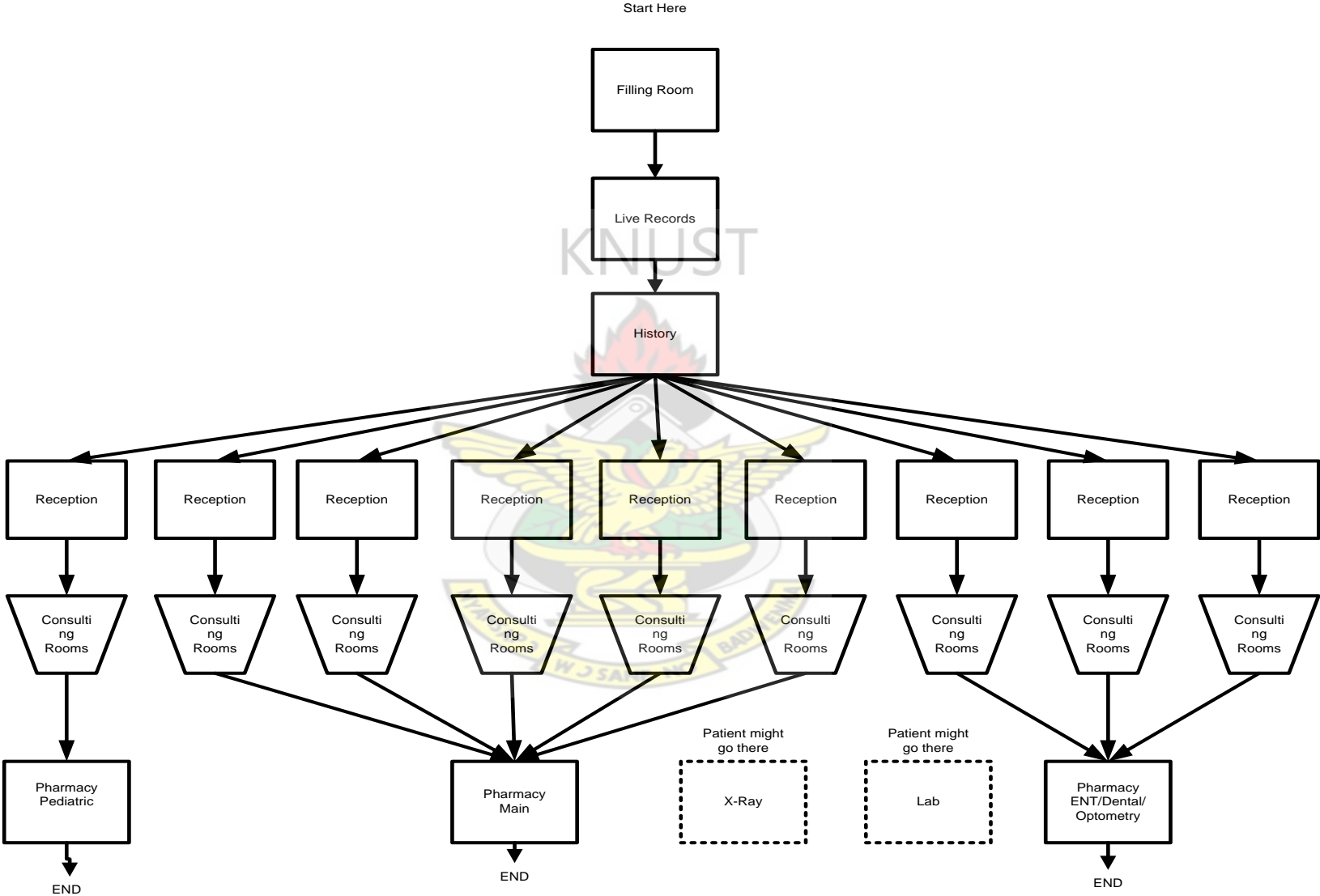
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Figure 10 – Service Points diagram

Source: Researcher Observation, September 2011

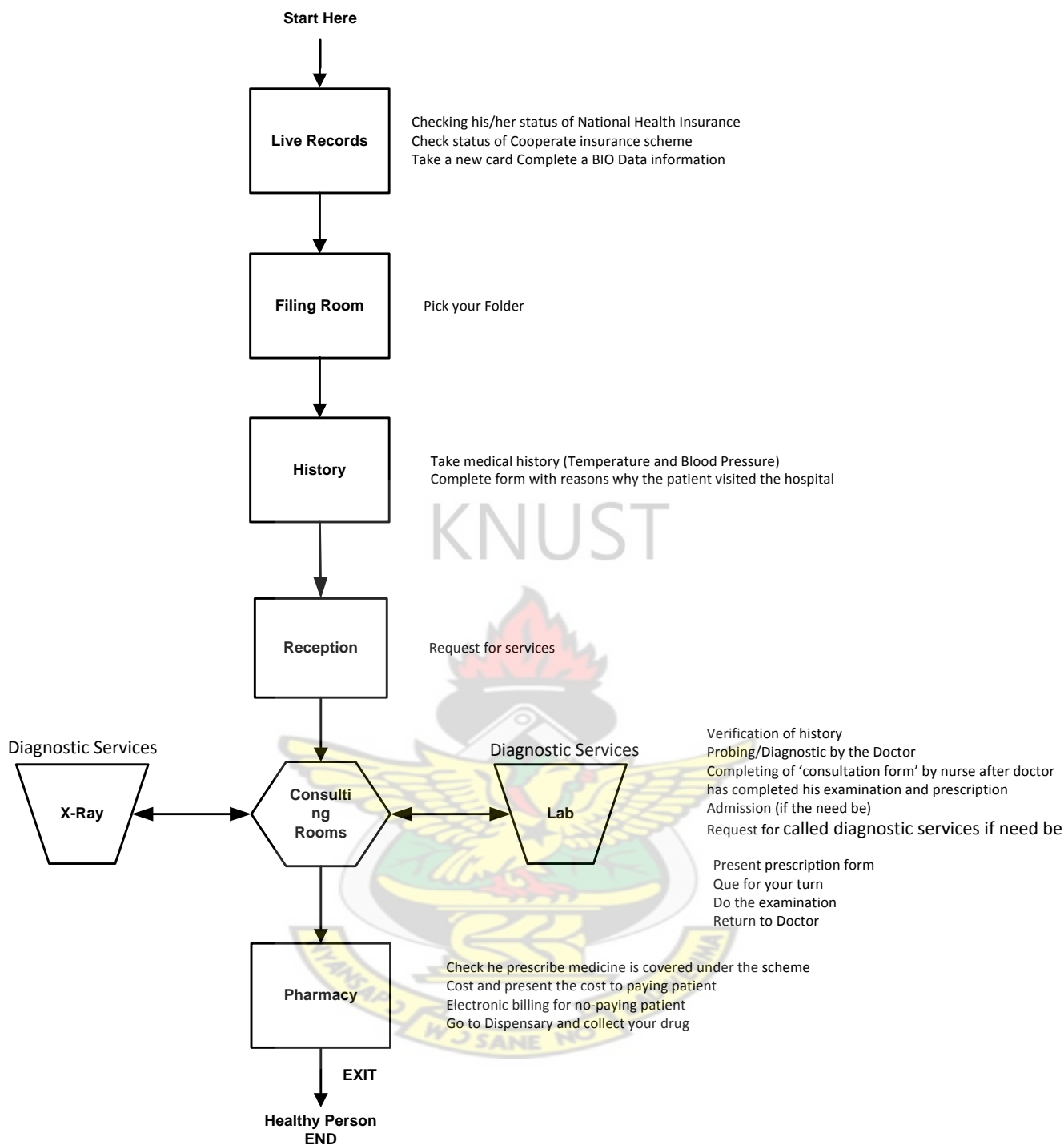


Figure 11 - High Level Process Flow

Source: Researcher Observation

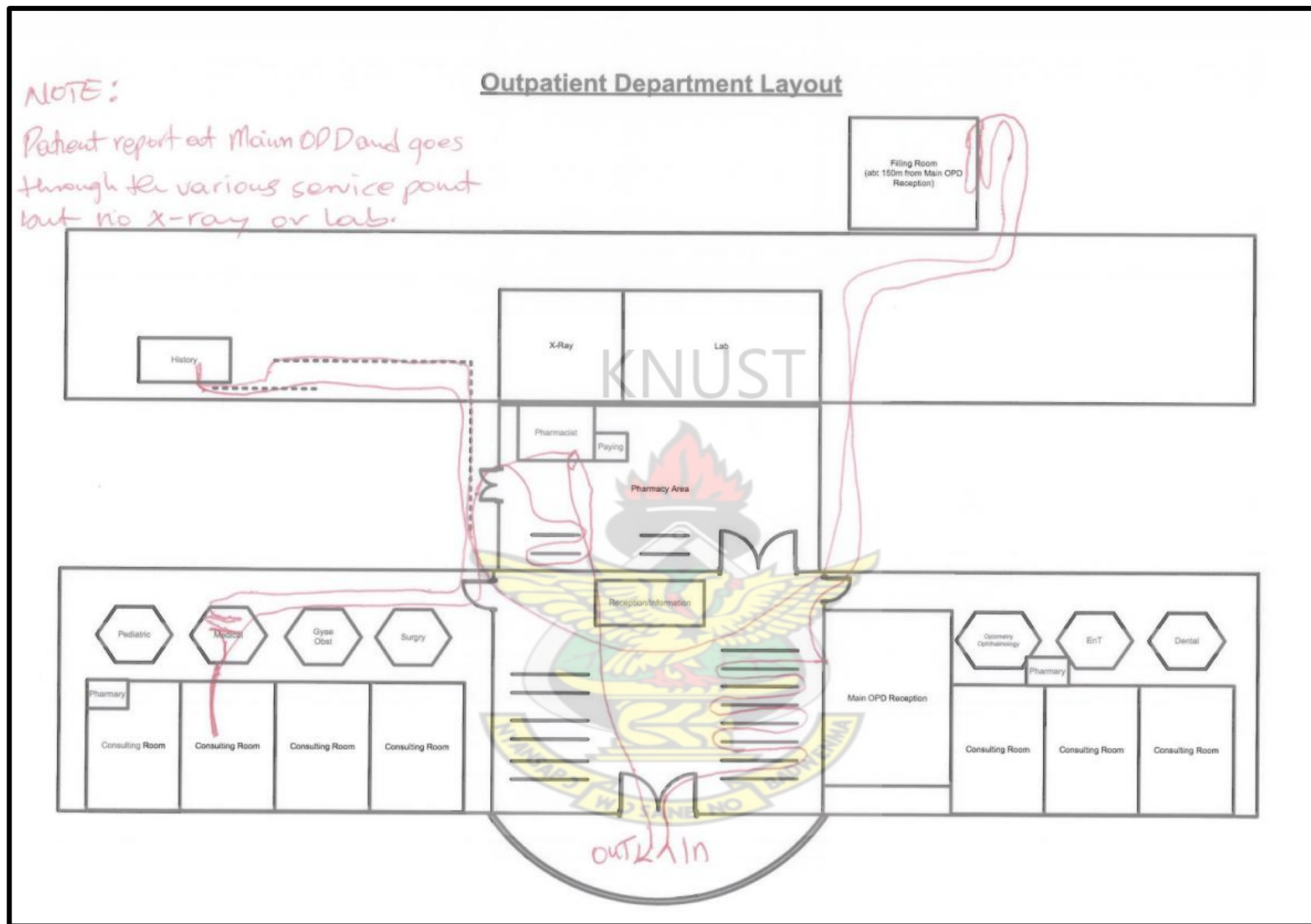


Figure 10 - Spaghetti Diagram A

Source: Researcher Observation, September, 2011.

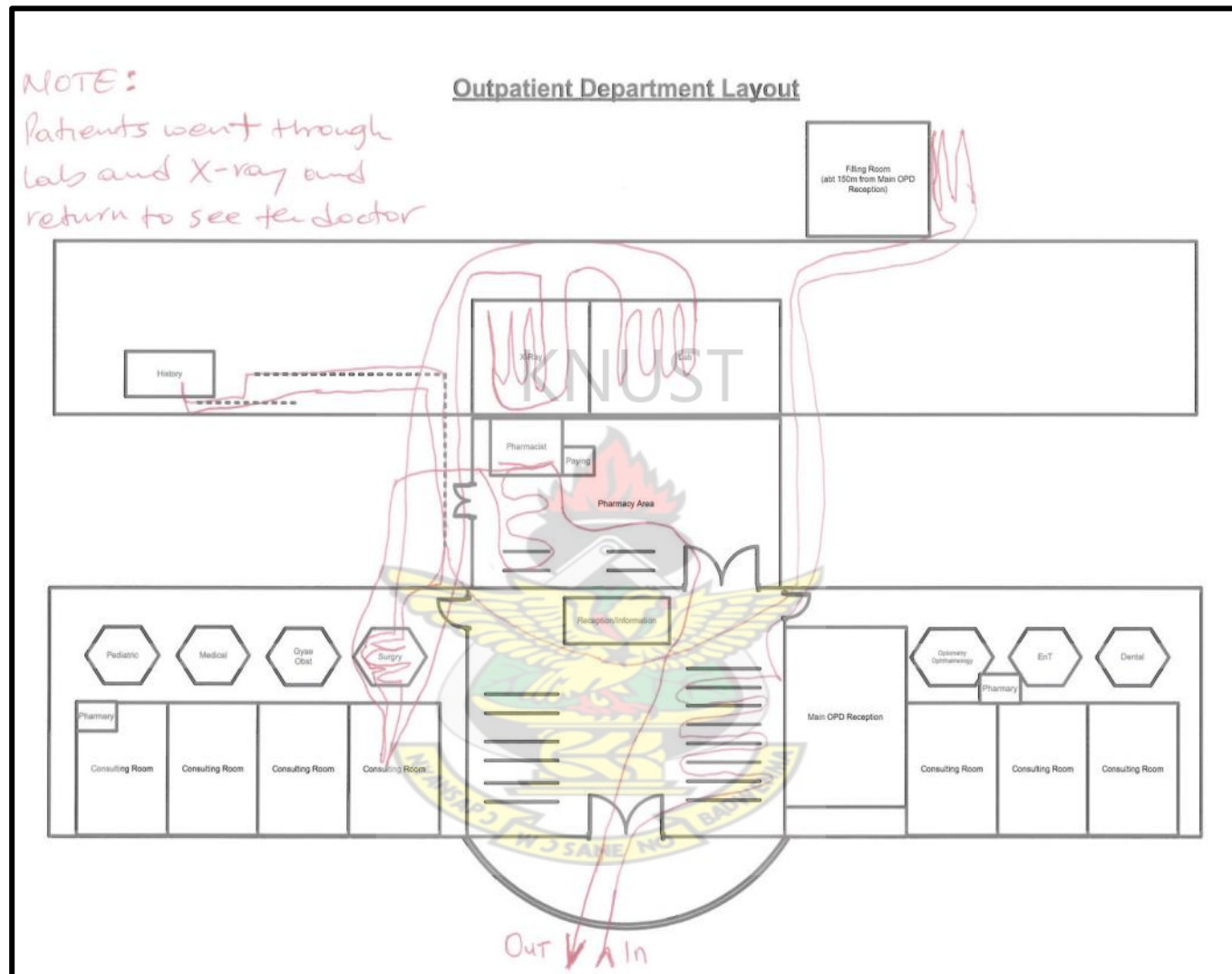


Figure 11 - Spaghetti Diagram B

Source: Researcher Observation, September, 2011.

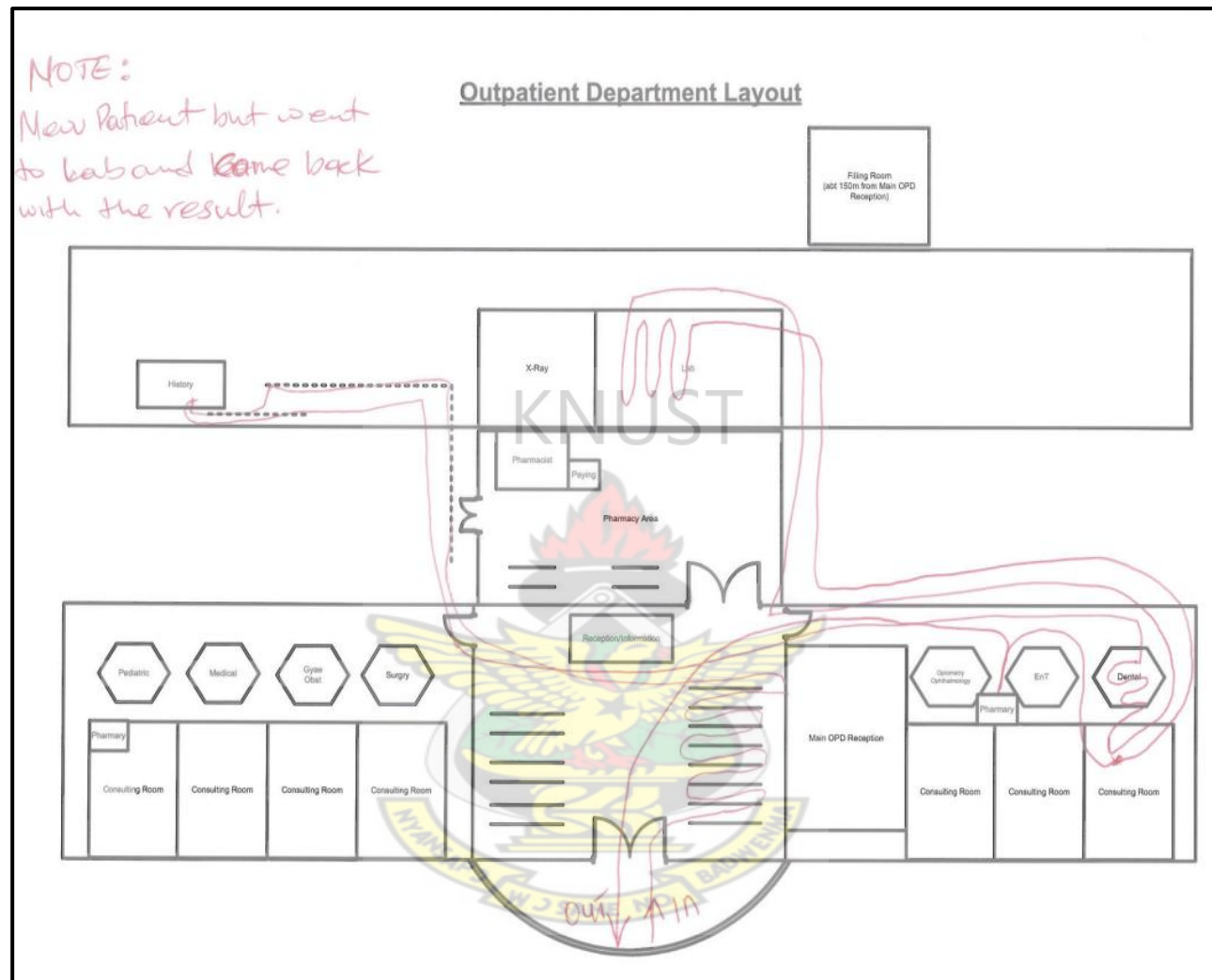


Figure 1412 - Spaghetti Diagram C

Source: Researcher Observation, September, 2011.

Current Value Stream – Old Patient

NOTE:

1st Time was done from 7am-9am
 2nd Time was done from 9am-11am
 3rd Time was done 11am-1pm

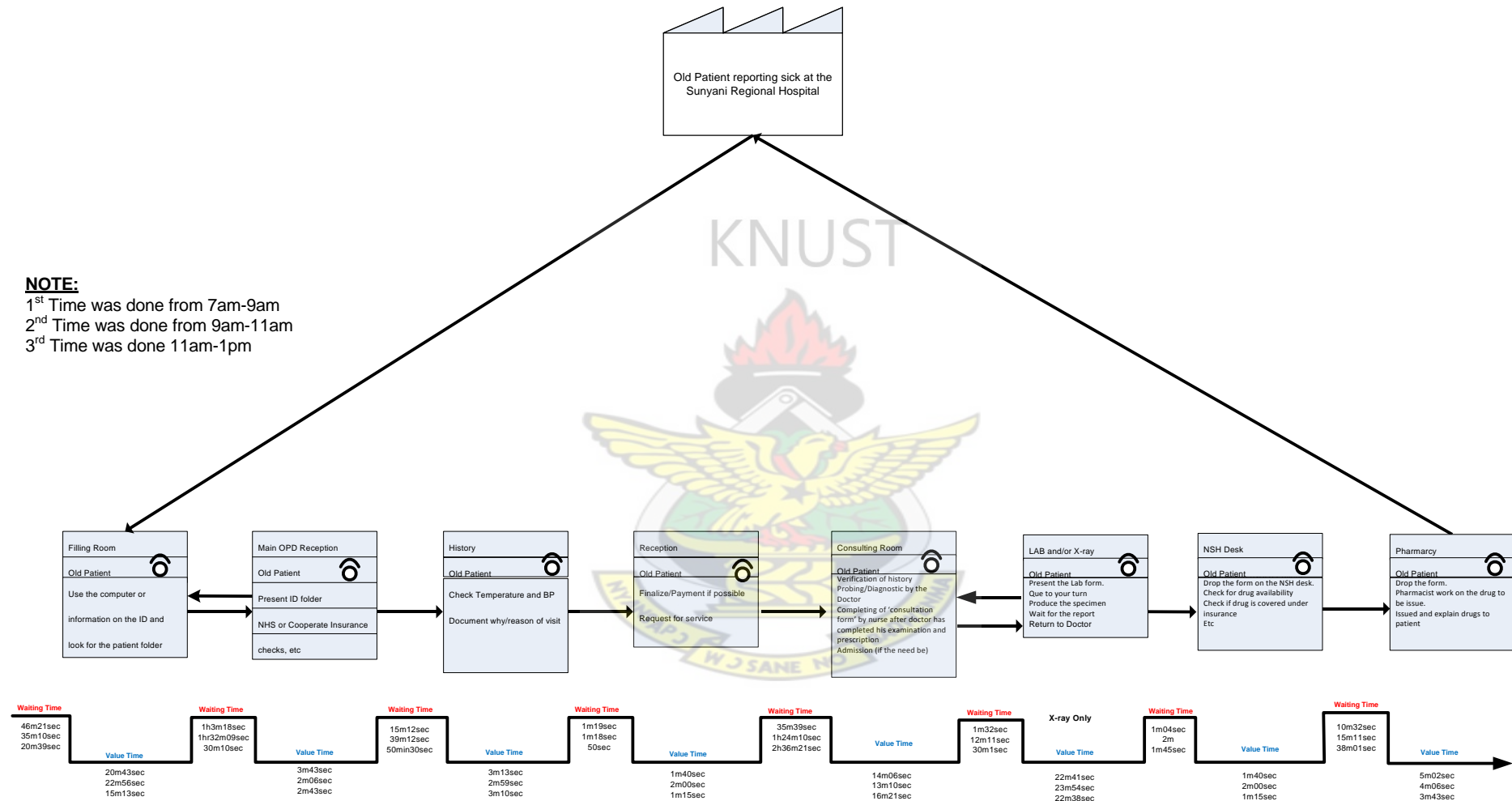


Figure 13 - Current Value Stream Mapping (Old Patient)

Source: Survey instruments, September, 2011.

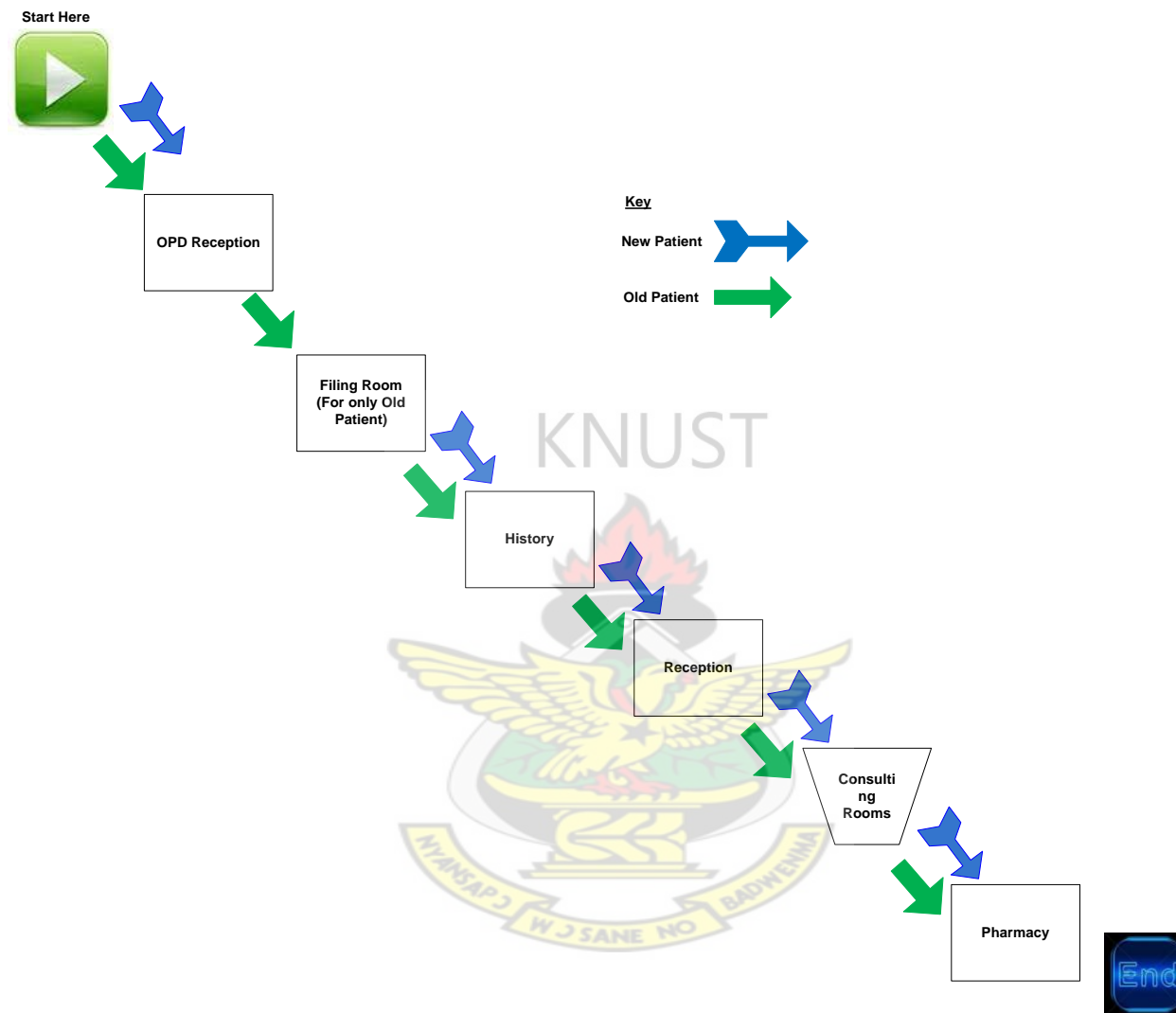


Figure 14 - High Level Service Point of the Main OPD

Source: Researcher Observation, September, 2011.

SPSS Image of the Variable

Add_Lean_Sunyani Reg Hospital - SPSS Data Editor										
File Edit View Data Transform Analyze Graphs Utilities Window Help										
	Name	Type	Width	Dec	Label	Values	Missing	Colu	Align	Measur
1	id	Numeric	8	0	Questionnaire Identification Number	None	None	8	Rig	Scale
2	age	Numeric	2	0	Age	{1, 20-30years}...	None	12	Right	Nominal
3	sex	Numeric	6	0	Sex	{1, Male}...	None	21	Right	Nominal
4	msatus	String	6	0	Marital Status	{1, Married/Co-haitting}...	None	8	Left	Nominal
5	national	Numeric	8	0	Nationality	{1, Ghanaian}...	None	8	Right	Scale
6	empstatu	Numeric	8	0	Employment status	{1, Permanent}...	None	8	Right	Scale
7	tmedprac	Numeric	8	0	Type of medical practitioner	{1, Consultant /Specialist}...	None	8	Right	Scale
8	conspeci	Numeric	8	0	Please specify Area or work or specialty.	{1, ENT}...	None	15	Right	Scale
9	knowalea	Numeric	8	0	Have you ever heard about Lean?	{1, Yes}...	None	8	Right	Scale
10	wherelea	Numeric	8	0	If yes, where did you hear it from?	{1, Television documentary and ne	None	16	Right	Scale
11	deslean	Numeric	8	0	How would you describe your knowledge of	{1, not at all}...	None	8	Right	Scale
12	wlean1	Numeric	8	0	In your opinion, what is Lean? (Check as ma	{1, Keeping the process flow – elim	None	16	Right	Scale
13	wlean2	Numeric	8	0	In your opinion, what is Lean? (Check as ma	{1, Keeping the process flow – elim	None	15	Right	Scale
14	uselean	Numeric	8	0	Have you ever used any or been part of the a	{1, Yes}...	None	8	Right	Scale
15	leanconc	Numeric	8	0	If yes to question 12, please specify the lea	{1, Not Applicable}...	None	8	Right	Scale
16	leanplac	Numeric	8	0	If yes to question 12, please specify place	{1, Not Applicable}...	None	8	Right	Scale
17	leandept	Numeric	8	0	If yes to question 12, please specify depart	{1, Not Applicable}...	None	8	Right	Scale
18	attmagt	Numeric	8	0	What is the attitude of the management of y	{1, Favourable}...	None	15	Right	Scale
19	leanwell	Numeric	8	0	Do you think the Lean concept is well know	{1, Yes}...	None	8	Right	Scale
20	adoplean	Numeric	8	0	How soon do you think this regional hospital	{1, Not Now}...	None	8	Right	Scale
21	knleacon	Numeric	8	0	Do you know any Lean concept that will imp	{1, Yes}...	None	8	Right	Scale
22	areimpro	Numeric	8	0	If yes to question 18, which area can Lean b	{1, Not Applicable}...	None	8	Right	Scale
23	wconcept	Numeric	8	0	If yes to question 18, which concept can be	{1, Value adding activities}...	None	8	Right	Scale
24	othconce	Numeric	8	0	If yes to question 18, which concept can be	{1, No Response}...	None	8	Right	Scale
25	explacon	Numeric	8	0	Can you explain how the concept you have	{1, No Response}...	None	8	Right	Scale
26	diffimpl	Numeric	8	0	How difficult will it be to implement what you	{1, No Response}...	None	8	Right	Scale
27	challeng1	Numeric	8	0	In your own words, what will be the challeng	{1, Full Management Support and	None	8	Right	Scale
28	challeng2	Numeric	8	0	In your own words, what will be the challeng	{1, Full Management Support and	None	8	Right	Scale
29	challg3	Numeric	8	0	In your own words, what will be the challeng	{1, Full Management Support and	None	8	Right	Scale
30	advice1	Numeric	8	0	If any of the concept of Lean is to be applied	{1, Management Support}...	None	8	Right	Scale
31	adice2	Numeric	8	0	If any of the concept of Lean is to be applied	{1, Management Support}...	None	8	Right	Scale
32	advice3	Numeric	8	0	If any of the concept of Lean is to be applied	{1, Management Support}...	None	8	Right	Scale
33	anyconcp	Numeric	8	0	Is there any concept that has been impleme	{1, Automation of Medical Records	None	8	Right	Scale
34	succfact	Numeric	8	0	What will constitute the success factors sho	{1, Attainment of Objective}...	None	8	Right	Scale
35	failfac1	Numeric	8	0	What will constitute the failure factors factor	{1, Should Start and Leave it Halfw	None	11	Right	Scale
36	failfac2	Numeric	8	0	What will constitute the failure factors shoul	{1, Should Start and Leave it Halfw	None	8	Right	Scale
37										
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Data View of SPSS Software

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	id	age	sex	msatus	national	empstatu	trnedprac	conspesi	knowalea	wherelea	deslean	wlean1	wlean2	uselean	leanconc	leanplac	le...
1	1	20-30years	Male	Married/	Ghanaia	Permane	Others	Not Appl	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
2	2	31-40years	Female	Married/	Ghanaia	Permane	General	ENT	Yes	Magazin	somewh	Eliminati	Look for ways to uti	No	Not Appl	Not Appl	Not
3	3	31-40years	Female	Married/	Ghanaia	Permane	Others	Surgery	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
4	4	31-40years	Female	Single	Ghanaia	Casual	Consulta	Internal	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
5	5	20-30years	Female	Single	Ghanaia	Permane	Others	Paediatric	No	Not Appl	somewh	No Resp	No Response	No	Not Appl	Not Appl	Not
6	6	41-50years	Female	Married/	Ghanaia	Permane	General	Gynaeco	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
7	7	41-50years	Male	Married/	Ghanaia	Permane	General	Radiolog	No	Not Appl	not at all	Reducin	Build more facilities	No	Not Appl	Not Appl	Not
8	8	31-40years	Female	Married/	Ghanaia	Permane	Others	Dentistry	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
9	9	31-40years	Male	Single	Ghanaia	Casual	Consulta	Medical	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
10	10	20-30years	Female	Single	Ghanaia	Permane	Others	Paediatric	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
11	11	20-30years	Female	Married/	Ghanaia	Permane	General	Gynaeco	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
12	12	31-40years	Female	Married/	Ghanaia	Permane	General	Medical	Yes	Internet	knowled	Keeping	Look for ways to uti	No	Not Appl	Not Appl	Not
13	13	31-40years	Female	Single	Ghanaia	Permane	Others	Surgery	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
14	14	20-30years	Male	Married/	Ghanaia	Permane	Others	Not Appl	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
15	15	31-40years	Female	Married/	Ghanaia	Casual	General	ENT	Yes	Internet	somewh	Eliminati	All of the above	No	Not Appl	Not Appl	Not
16	16	31-40years	Male	Single	Ghanaia	Permane	Others	Surgery	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
17	17	20-30years	Female	Single	Ghanaia	Permane	Others	Paediatric	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
18	18	20-30years	Male	Married/	Ghanaia	Permane	General	Gynaeco	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
19	19	31-40years	Male	Married/	Ghanaia	Permane	General	ENT	No	Not Appl	not at all	Eliminati	Reduce the workfor	No	Not Appl	Not Appl	Not
20	20	31-40years	Male	Single	Ghanaia	Permane	Others	Surgery	No	Not Appl	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not
21																	

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32 : national															
	deslean	wlean1	wlean2	uselean	leanconc	leanplac	leandep	attmagt	leanwell	adoplean	knleacon	areimpro	wconcept	othconce	explacon
1	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Favourable	No	I do not	No	Not Appl	No Resp	No Resp	No Resp
2	somewh	Eliminati	Look for ways to uti	No	Not Appl	Not Appl	Not Appl	Favourable	No	Not Now	Yes	Elimate	5s	No Resp	Should b
3	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Favourable	No	Not Now	No	Not Appl	No Resp	No Resp	No Resp
4	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Can't Tell	No	Very So	No	Not Appl	No Resp	No Resp	No Resp
5	somewh	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Can't Tell	No	I do not	No	Not Appl	No Resp	No Resp	No Resp
6	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Unfavourable	No	I do not	No	Not Appl	No Resp	No Resp	No Resp
7	not at all	Reducin	Build more facilities	No	Not Appl	Not Appl	Not Appl	Favourable	No	I do not	Yes	Elimate	Line Bal	No Resp	Should b
8	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Favourable	No	I do not	No	Not Appl	No Resp	No Resp	No Resp
9	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Can't Tell	No	I do not	No	Not Appl	No Resp	No Resp	No Resp
10	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Can't Tell	No	I do not	No	Not Appl	No Resp	No Resp	No Resp
11	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Can't Tell	No	I do not	No	Not Appl	No Resp	No Resp	No Resp
12	knowled	Keeping	Look for ways to uti	No	Not Appl	Not Appl	Not Appl	Favourable	No	Not Now	Yes	Elimate	Value ad	No Resp	Filling R
13	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Favourable	No	I do not	No	Not Appl	No Resp	No Resp	No Resp
14	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Favourable	No	I do not	No	Not Appl	No Resp	No Resp	No Resp
15	somewh	Eliminati	All of the above	No	Not Appl	Not Appl	Not Appl	Favourable	No	I do not	Yes	Elimate	Value ad	No Resp	Should b
16	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Favourable	No	Not Now	No	Not Appl	No Resp	No Resp	No Resp
17	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Can't Tell	No	I do not	No	Not Appl	No Resp	No Resp	No Resp
18	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Unfavourable	No	Not Now	No	Not Appl	No Resp	No Resp	No Resp
19	not at all	Eliminati	Reduce the workfor	No	Not Appl	Not Appl	Not Appl	Favourable	No	Soon	No	Not Appl	No Resp	No Resp	Should b
20	not at all	No Resp	No Response	No	Not Appl	Not Appl	Not Appl	Favourable	No	Soon	No	Not Appl	No Resp	No Resp	No Resp

Add_Leam_Sunyani Reg Hospital - SPSS Data Editor												
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32 : national												
	explacon	diffimpl	challeng1	challeng2	challeng3	advice1	advice2	advice3	anyconcp	succfact	failfac1	failfac2
1	No Resp	No Resp	Full Man	Training/	Monitori	Manage	Staff Co	Monitor	Automati	Attainme	Should Start	No Resp
2	Should b	Little Diff	Training/	No Resp	No Resp	Stakehol	No Resp	No Resp	No idea	Understa	Lack of awar	Educatio
3	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Response	No Resp
4	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Response	No Resp
5	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Resp	No Response	No Resp
6	No Resp	Little Diff	Full Man	No Resp	No Resp	Manage	No Resp	Manage	Compute	Understa	Education of	Lack of
7	Should b	Little Diff	Training/	No Resp	No Resp	Stakehol	No Resp	No Resp	No idea	Understa	Lack of awar	Educatio
8	No Resp	No Resp	Some St	No Resp	No Resp	Staff Mot	No Resp	No Resp	No Resp	No Resp	No Response	No Resp
9	No Resp	No Resp	Monitori	No Resp	No Resp	Staff Mot	No Resp	No Resp	No Resp	No Resp	No Response	No Resp
10	No Resp	No Resp	Change	No Resp	No Resp	Staff Co	No Resp	No Resp	No Resp	No Resp	No Response	No Resp
11	No Resp	Little Diff	Full Man	No Resp	No Resp	Manage	No Resp	Manage	Compute	Understa	Education of	Lack of
12	Filling R	Little Diff	Training/	No Resp	No Resp	Stakehol	No Resp	No Resp	e-Health	Understa	Lack of awar	Educatio
13	No Resp	No Resp	Change	No Resp	No Resp	Staff Co	No Resp	No Resp	No idea	No Resp	No Response	No Resp
14	No Resp	No Resp	Full Man	Training/	Monitori	Manage	Staff Co	Monitor	Automati	Attainme	Should Start	No Resp
15	Should b	Manage	Full Man	No Resp	No Resp	Stakehol	No Resp	No Resp	No idea	Understa	Lack of awar	Educatio
16	No Resp	No Resp	Ignoranc	No Resp	No Resp	Staff Mot	No Resp	No Resp	e-Health	No Resp	No Response	No Resp
17	No Resp	No Resp	Change	No Resp	No Resp	Staff Co	No Resp	No Resp	Governm	No Resp	No Response	No Resp
18	No Resp	Little Diff	Full Man	No Resp	No Resp	Manage	No Resp	Manage	Compute	Understa	Education of	Lack of
19	Should b	Little Diff	Training/	No Resp	No Resp	Stakehol	No Resp	No Resp	No idea	Understa	Lack of awar	Educatio
20	No Resp	No Resp	Training/	Ignoranc	Full Man	Staff Mot	No Resp	No Resp	Governm	Staff Mot	Staff not inter	Educatio
21												

Interview Guide

The group should be made up of Administrator, OPD, nurse, Doctor, Pharmacy, LAB technician and Account.

Introduction to 1st Discussion: Explain in details what Lean is all about.

The objective is to document the current process map in detail

Exploration

1. Where does patients go first upon reporting to the hospital?
2. What information is collected at each stage?
3. How is the information collected and documented?
4. How does the information get to the next person?
5. Talk to each of the professionals that need to have contact with the patient and document in detail what happens
6. Explain to the interviewee which lean concept you think can be applied here.
7. What should be the guide to implementation?
8. What are some of the some challenges in implementation and the associated risk + mitigation.

OUTCOME: A detail value stream map – ***As Is Process***

AND

OUTCOME: A detail Future State Map

**APPLICATION OF LEAN CONCEPT IN THE DELIVERY OF HEALTH CARE, A CASE STUDY OF SUNYANI
REGIONAL HOSPITAL IN GHANA**

QUANTITATIVE QUESTIONNAIRE

Lean Questionnaire

Important definitions for the Questionnaire

Lean: Is a concept that originated from the Toyota industry directed towards efficiency and effectiveness in production. For the purpose of our study Lean concept stand for the following tools/techniques/concepts/principles - Value adding activities, TQM, Benchmarking, Just In Time, Line Balancing, Value Management, 5S(Sorting, Setting, Shining, Standardizing and Sustaining. These concepts have been adopted in the delivery of health service in other parts of the world and the results make it wealth adopting it in this Regional Hospital. The objective of this research is therefore to assess how lean concept can be use to improve the efficiency of healthcare delivery in Ghana.

Questionnaire ID Number: _____

PERSONAL INFORMATION

Please tick appropriate box of the right option or write where necessary

- 1) Age (years): a. 21-30 [] b. 31-40 []
c. 41-50 [] d. Over 50 []
- 2) Sex: a. Male [] b. Female []
- 3) Marital Status: a. Married/Co-habiting []
b. Single [] c. Divorced [] d. Windowed []
- 4) Nationality a. Ghanaian [] b. Non-Ghanaian []
- 5) Employment status a. Permanent [] b. Casual [] b.
National Service []
- 6) Type of Medical practitioner? a. Consultant /Specialist []
b. General Practitioner [] c. Others [] (Please
Specify.....
- 7) If a Consultant/specialist, please specify specialty (If not a specialist
move to Question 8)
a. ENT [] b. Radiology [] c. Internal Medicine [] d.
Neurology [] e. Orthopaedics [] f. Surgery []
g. Urology [] h. Gynaecology [] i. Public Health []
j. Paediatrics [] k. Dermatology [] l. Ophthalmology [] m. Dentistry []
n. Others

KNOWLEDGE LEVEL OF LEAN

Please indicate by marking or writing in the appropriate box how much you know about **lean**.

- 8) Have you ever heard about Lean? (If No, please move to question 15)
- a. Yes [] b. No []
- 9) If yes, where did you hear it from?
- a. Television documentary and news []
- b. Magazines and Journals []
- c. Reports []
- d. Lectures/Health Workshop []
- e. Internet []
- f. Others specify
- 10) How would you describe your knowledge of Lean in health care?
- [] not at all [] somewhat [] knowledgeable
- [] Very Knowledgeable
- 11) In your opinion, what is Lean? (Check as many as applicable/possible)
- a. Keeping the process flow - eliminate bottlenecks []
- b. Eliminating waste in the system technologies []
- c. Remove non-value added activities from the process []
- d. Have a standard and a clear process of doing things []
- e. Reducing the number of workers in the hospital []
- f. Build more facilities []
- g. Look for ways to utilize existing resources []
- h. Reduce the workforce []
- i. All of the above []
- j. None of the above []
- 12) Have you ever used any or been part of the adaptation of any of the Lean concept?
- a. Yes [] b. No []

13) If yes to question 12, please specify the lean concept that was applied?

14) If yes to question 12, please specify place and department

Place - _____

Department - _____

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APPLICABILITY OF THE LEAN CONCEPT

15) What is the attitude of the management of your hospital towards Lean/any improvement concept?

a. Favourable [] b. Unfavourable []

c. Can't Tell []

16) Do you think the Lean concept is well known among health workers?

a. Yes [] b. No []

17) How soon do you think this regional hospital will consider adopting Lean into its healthcare activities?

a. Not Now [] b. Soon []

c. Very soon [] d. I do not know []

18) Do you know any Lean concept that will improve the delivery of health care in this hospital? a. Yes [] b. No []

19) If yes to question 18, which area can Lean be used to improve?

Please specify _____

20) If yes to question 18, which concept can be applied?

a. Value adding activities []

b. Benchmarking []

c. Just In Time []

d. Line Balancing []

e. 5S []

Others _____

21) Can you explain how the concept you have chosen in question 20 be used to improve the activities of this hospital?

22) How difficult will it be to implement what you have suggested in response to question 21?

23) In your own words, what will be the challenge should we implement Lean in this hospital?

24) If any of the concept of Lean is to be applied in this hospital what will be your advice?

25) Is there any concept that has been implemented here to improve the hospital activities?

26) What will constitute the success factors should we implement Lean in this hospital?

27) What will constitute the failure factors should we implement Lean in this hospital?

Thank you for making some time off your busy schedule to complete this questionnaire.

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