

Measuring and Improving the Quality of Service from the Customer's Perspective in an Emergency Room using Lean Thinking

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Abstract — *Lean is a philosophy and a powerful set of tools designed for process improvement by eliminating waste from processes. It also focuses on what adds value in processes from a customer's perspective. The quality of a product or service is best judged by its ability to meet or exceed customers' needs and expectations. The Total Quality Management philosophy of doing business emphasizes lowering costs by reducing waste, helping suppliers provide quality products and satisfying the customer with quality goods and services. Quality of service needs to understand what the customer wants and change your way of doing business based on it. This project seeks to measure the perceived quality of services received by people. To evaluate and improve the services in the Healthcare Systems in Puerto Rico and propose the use of lean philosophy and creating measurable quality standards so that they can implement TQM and continuous improvement.*

Key Terms — *Health Care, Lean Thinking, Quality of Service, Total Quality Management.*

INTRODUCTION

Lean Thinking is a methodology for improving cycle times and quality through the elimination of waste. It is also known as Lean Manufacturing, when used in manufacturing applications [1]. The proliferation of Lean Thinking was facilitated by the publication of Womack, Jones, and Roos in 1990. Lean represents a fundamental break with Western manufacturing traditions. Lean's strength lies in its set of standard solutions to common problems and its focus on the customer.

Total Quality Management (TQM) is defined as "a management philosophy concerned with people and work processes that focuses on

customer satisfaction and improves organizational performance" [2].

In order to implement the principles of TQM and quality management system requirements of the services provided in emergency room, it becomes important to identify how the customer defines value. The critical starting point for lean thinking is value [3]. Defining the term quality in healthcare facilities is hard because of its many aspects. Moreover the quality is a sum of subjective opinions regarding the object. That is why we must also define quality from the customer view.

The healthcare industry is a perfect setting to implement the benefits of Lean, especially when you need a competitive edge. A TQM principle of managerial and medical staff enables the effective use of healthcare potential. Implementing Lean in healthcare facilities will lead to fewer incidents, accidents and mistakes, improved employee morale, increased throughput, reduced costs and higher profits.

In Puerto Rico it is not a very common practice to use Lean Thinking techniques especially in public health systems. So this project seeks to begin implementing lean techniques in the health care environment as a tool for improvement.

LITERATURE REVIEW

Quality Improvement is a formal approach to the analysis of performance and systematic efforts to improve it. There are numerous models used. Some commonly known include: FADE, PDSA, Six Sigma (DMAIC), Continuous Quality Improvement and TQM. These models are all means to get at the same thing: Improvement. They are forms of ongoing effort to make performance

better. For this project we are choosing to use the TQM model.

TQM is an umbrella methodology drawing on a knowledge of the principles and practices of the behavioral sciences, the analysis of quantitative and non-quantitative data, economics theories, and process analysis to continually improve the quality of all processes [4]. TQM describes a management approach to long-term success through customer satisfaction. In a TQM effort, all members of an organization participate in improving processes, products, services, and the culture in which they work. It is an integrative system that uses strategy, data, and effective communications to integrate the quality discipline into the culture and activities of the organization [5]. To do so to achieve “doing things right the first time”.

There are many direct and indirect benefits that may result from TQM. For example: strengthened competitive position, higher productivity and profitability, reduced costs and better cost management among many others [6]. But the one we are looking for primarily is the elimination of waste. Waste is the amount of product that is reprocessed or lost because they do not meet the standards set by the client or the company. It can be viewed as an inefficiency or defect within a process that results in poor performance for a company.

The quality of a product or service cannot be easily defined, because it is a subjective assessment; however we can say that is the perception that the client has. It's a mind-set that assumes consumers under a given product or service that only remains to the point of needing new specifications. Although quality can be simply defined as conformity to customer or user requirements, it has many dimensions. Seven of them are described as: 1) performance, 2) aesthetics, 3) reliability, 4) availability, 5) durability 6) extras or features and 7) serviceability [7]. Unlike a product, services are benefits and experiences rather than objects. It is difficult, therefore, to establish specifications for processing prior to enable standardize quality. Contrary to

what happens in the manufacture of goods, services results cannot be measured, tested and verified for quality before sale. Quality of Service parameters are used to establish a class of service to meet a particular customer's needs.

We will describe these seven dimensions of quality:

- ✓ Performance: service that performs its intended function well scores high on this dimension of quality.
- ✓ Aesthetics: service that has a favorable appearance, sound, taste, or smell is perceived to be good quality.
- ✓ Reliability: how dependably it performs.
- ✓ Availability: service that is there when you need it.
- ✓ Durability: the amount of use one gets from a product before it no longer functions properly and replacement seems more feasible than constant repair.
- ✓ Extras: features or characteristics about a service that supplements its basic functioning.
- ✓ Serviceability: speed, courtesy, competence, and ease of repair are all important quality factors [7].

From patients' perspective the quality of service compared to other service industries is less than desirable, and the response to emergency or urgent care is poor. Patients waste a lot of time in queues waiting to get comprehensive care, being passed from one health care stakeholder to another [8].

The health care system must be integrated with all of its parts functioning together and well to provide high quality, reliable treatment without unnecessary delays and to exceed patient expectations.

Lean thinking analyzes business processes systematically by identifying and removing wastes. Waste takes many forms and can be found at any time and in any place. It may be found hidden in policies, procedures, production process, product designs, and in other operations [8]. Waste consumes resources but does not add any value to

the product [3]. There are seven types of wastes, which are accepted commonly in manufacturing industry: 1) overproduction, 2) waiting, 3) transportation, 4) inappropriate processing, 5) unnecessary inventory, 6) unnecessary movement and 7) defects [9].

The waste of waiting occurs when time is not being used effectively [9]. Time is one of the scarcest resources in any organization and, nevertheless, one of the most frequently wasted. Time is the only unrecoverable asset that is common to all companies regardless of their size. It is the most critical and valuable resource of any company. Although this resource is extremely critical and valuable, it is one of the assets that in most companies is handled with less care and this may be because time is not on the balance sheet or income statement, as that is not tangible, because it seems free.

RESEARCH STATEMENT

This project seeks to measure the perceived quality of services received by people using emergency room services in Puerto Rico.

METHODOLOGY

The approach of this investigation was a theoretical and inductive one. Data was collected in interviews to quality experts and with a service quality survey to Puerto Ricans citizen that has received services in an emergency room in a time scale of 10 years or less.

Questionnaires were delivered to 91 persons, males and females customers between the ages of 17-79 years old. They were surveyed in 34 of 78 towns in Puerto Rico. Information and data were obtained and, using the literature review as a base, the data was analyzed. The study was conducted on a random sample. It was prepared a survey instrument through a nonreactive with a scale inventory

For the survey two scales were used. A basic reason for the age and time client visited the

emergency room and the other was a non-comparative Likert scale.

The objective of this survey was measuring the quality of service in an emergency room in Puerto Rico. This way can define value from the customer perspective. The idea was to understand what the customer wants and change the way of service to add value.

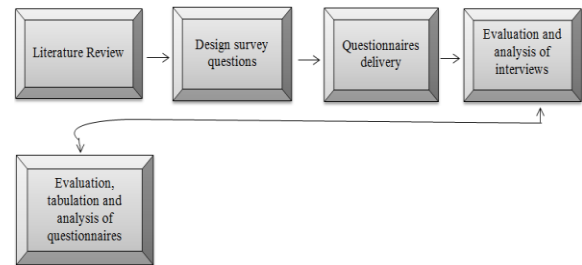


Figure 1
Methodology Process

RESULTS AND DISCUSSION

It is important to highlight that the survey instrument was not prepared for the purpose of generalizing to any population because the sample was for disposal. Results were evaluated from four qualifying criteria as well: Totally Satisfied, Satisfied, Unsatisfied and Totally Unsatisfied. Or by a scale of yes or no answer.

The survey was conducted with 91 people from 34 towns of Puerto Rico. Among them were 34 men and 57 women.

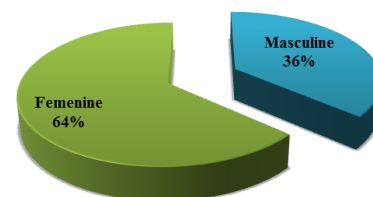


Figure 2
Client Survey Chart

The range of ages was as follows: 71 % of respondents were between the ages of 17-29 years old, 16 % between 30-39 years old, 6% between 40-49 years, between 50-59 years 4% and 6 % between 60-69 years.

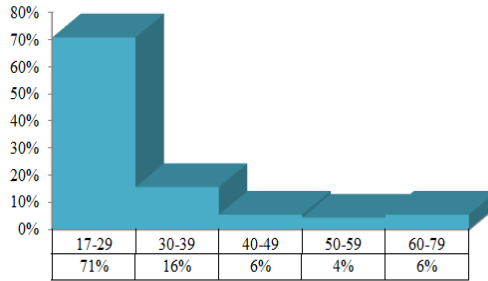


Figure 3
Age Range Chart

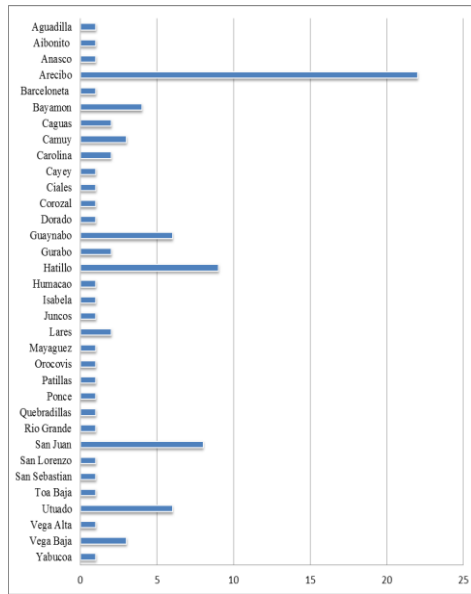


Figure 4
Town Surveyed Chart

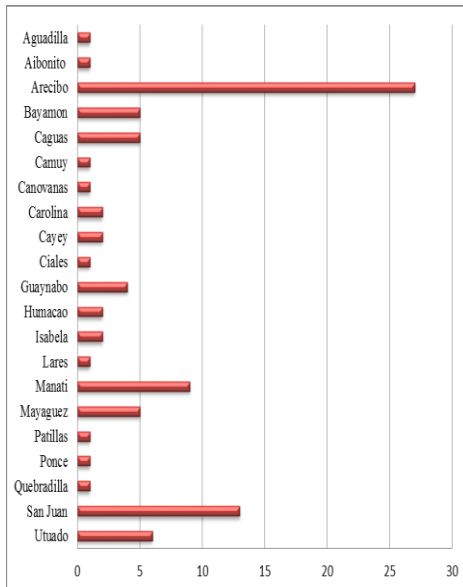


Figure 5
Emergency Room Town Location Chart

On a scale of 1 to 10 a 14% of respondents said they had a pain level 10. While 23 % reported having pain Level 8. 22 % reported having pain level 7 and only 2 % reported having level 1 pain. The highest percent of respondents said they had pain between levels 5 to 10. (See figure 6)

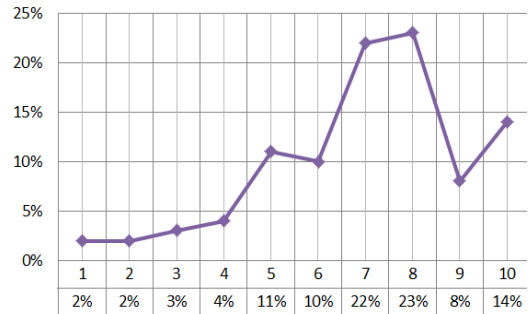


Figure 6
Level Pain Graph

Only 2% of respondents answered that when they arrived at the emergency room had no seats available.



Figure 7
Seats Availability Chart

Clients perceived that staff who treated them in the emergency room was willing to help. As you can see in Figure 8, there are 86 % of respondents who agrees with this statement. This concurs with the 73 % of customers that said they were satisfied with the staff who attended them (see Table 1).

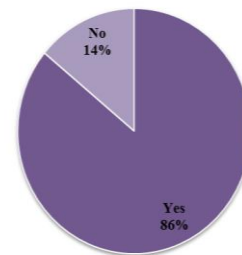


Figure 8
Staff willing to help Chart

Table 1
How Client felt about the Staff

<i>Totally Satisfied</i>	<i>Satisfied</i>	<i>Unsatisfied</i>	<i>Totally Unsatisfied</i>
16%	73%	11%	0%

Furthermore we can see that 86 % of customers perceived the staff who treated them as one fully qualified.

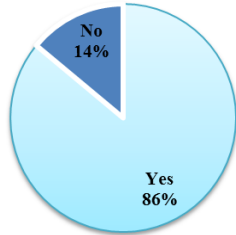


Figure 9
Staff gives the Image of being Fully Qualified

When asked customers if service gives quick response to their needs and problems, 34% said no and 66 % said yes. (see Figure 10)

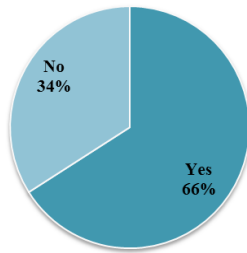


Figure 10
Quick Response to Service

The quality of hospital services depends on the investments in the infrastructure. This is why we also asked customers how they felt about the physical appearance of the facility. 75% indicates that they were satisfied versus 10% that were unsatisfied.

Table 2
How Client felt about the Physical Appearance of the Facilities

<i>Totally Satisfied</i>	<i>Satisfied</i>	<i>Unsatisfied</i>	<i>Totally Unsatisfied</i>
14%	75%	10%	1%

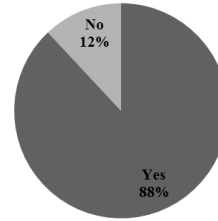


Figure 11
Physical Structures in Good Condition

When we asked if the facility at which the client attended offered parking availability to customers 87% answered yes. Only 13% indicated that they didn't have parking availability. (see Figure 11) We asked to this 13% how they felt about the lack of parking. 67% felt unsatisfied, 25% totally unsatisfied only 8% was satisfied. (See Table 3) Moreover we asked those who had parking availability if this had a payment rate or fee. 63% indicate yes and 37% no. To the 63 % who said yes we asked how they felt about having to pay a fee for the parking. 30% indicated that felt totally satisfied, 38% satisfied, 27% unsatisfied and 5% totally unsatisfied. (See Table 4)

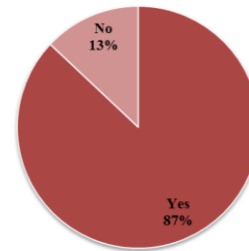


Figure 12
Parking Availability Chart

Table 3
How Client felt about the Lack of Parking Availability

<i>Totally Satisfied</i>	<i>Satisfied</i>	<i>Unsatisfied</i>	<i>Totally Unsatisfied</i>
0%	8%	67%	25%

About the waiting time in the emergency room 40 % of customers felt satisfied. Moreover 38 % of customers were dissatisfied. 7% felt fully satisfied while 15 % felt totally dissatisfied.

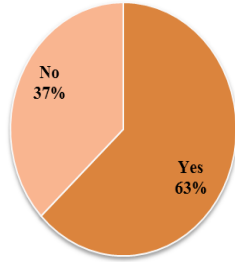


Figure 13
Parking Fee Payment

Table 4
How Client felt about the Parking Fee

<i>Totally Satisfied</i>	<i>Satisfied</i>	<i>Unsatisfied</i>	<i>Totally Unsatisfied</i>
30%	38%	27%	5%

When asked about the medical equipment used 14% of the clients felt totally satisfied with it, 78% felt satisfied and only 8% felt unsatisfied. (See table 5)

Table 5
How the Client felt about the Medical Equipment Used

<i>Totally Satisfied</i>	<i>Satisfied</i>	<i>Unsatisfied</i>	<i>Totally Unsatisfied</i>
14%	78%	8%	0%

There are several things that impact how long a person perceives the amount of time they have spent waiting. 40% of respondents indicates they were satisfied. 38% unsatisfied, 15% totally unsatisfied. (See Table 6)

Table 6
How Customer felt about the Waiting Time in the Emergency Room

<i>Totally Satisfied</i>	<i>Satisfied</i>	<i>Unsatisfied</i>	<i>Totally Unsatisfied</i>
7%	40%	38%	15%

The clients were satisfied with the time attended by the doctor. 12% of the clients were totally satisfied, 63% satisfied, 21% unsatisfied and 4% totally unsatisfied (See Table 7).

The customer felt satisfied about the time of waiting their results (See table 8).

Table 7
How Client felt about the Time was attended by the Doctor

<i>Totally Satisfied</i>	<i>Satisfied</i>	<i>Unsatisfied</i>	<i>Totally Unsatisfied</i>
12%	63%	21%	4%

Table 8
How Customer felt about the Time that the Results of Laboratory Analyzes were Ready

<i>Totally Satisfied</i>	<i>Satisfied</i>	<i>Unsatisfied</i>	<i>Totally Unsatisfied</i>
4%	55%	33%	8%

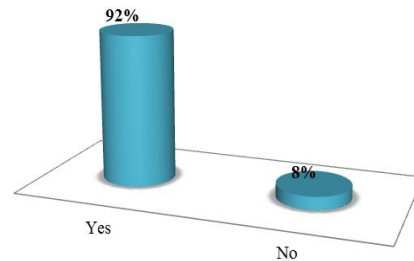


Figure 14
Client explained about the Diagnosis and Treatment

The expectation of service in an emergency room in Puerto Rico as a result of the survey is to get a good, fast and professional service. That gives an empathetic and humane treatment for the patient. It should be effective, resulting in a relieved of pain for the patient. The emergency room should have enough employees to serve their population of patients and doctors available to help the customer.

CONCLUSION

The use of lean philosophy and creating measurable quality standards to be implemented TQM and continuous improvement is a health care environment in Puerto Rico is an innovative initiative. Unlike what people may think this survey has shown that most of the respondents are satisfied with the support provided in the emergency service. This survey has been useful to know that the focus on the quality of health services should not necessarily be the service provided to the patient's arrival. It is suggested to

continue using quality measuring instrument and lean thinking methods to establish the focus of attention to those areas that needs improvement. It is worth remembering quality improvement is a process, not a program.

RECOMMENDATIONS

It is recommended for an upcoming project evaluating the quality of diagnosis in conjunction with the quality of the healthcare services and the customer satisfaction. Also it is recommended in futures investigations verify whether any standardization of procedures when offering health services. If not you can propose one in order to apply lean thinking methods and establish operational procedures and the effort of standardizing. Another topic to analyze is if whether the patient were hospitalized and still as satisfied for the period of hospitalization.

REFERENCES

- [1] P. Keller. (2016, January). Lean Thinking [Online]. Available: http://qualityamerica.com/LSS-Knowledge-Center/leansixsigma/lean_thinking.php
- [2] E. Sadikoglu and H. Olcay, "The effects of total quality management practices on performance and the reasons of and the barriers to TQM practices in Turkey", in *Advances in Decision Sciences*, Vol. 2014, pp. 1-17, March. 2014.
- [3] J. P. Womack, & D.T. Jones, *Lean Thinking: banish waste and create wealth in your corporation*, Second Edition, New York: Free Press, 1996.
- [4] R. T. Westcott, *The Certified Manager of Quality/Organizational Excellence Handbook*, Third Edition. Milwaukee, Wisconsin: Quality Press, 2006.
- [5] R. T. Westcott, *The Certified Manager of Quality/Organizational Excellence Handbook*, Third Edition. Milwaukee, Wisconsin: ASQ Quality Press, 2005.
- [6] J. F. Cox III & J. G. Schleier, Jr, *Theory of Vonstraits Handbook*, New York: Mc Graw-Hill Education, 2010.
- [7] J. D. Bronzino, *The Biomedical Engineering Handbook: Medical Devices and Systems*, Third edition. Boca Raton, Florida: CRS Press, 2006.
- [8] D. Seth & V. Gupta, "Application of value stream mapping for lean operations and cycle time reduction: an Indian case study", in *Production Planning & Control:*

The Management of Operations, Volume 16, Issue 1, 2005.

- [9] I. M. Belova & Y. Zhu, "Value Stream Mapping for Waste Reduction in Playing System Components Flow: Leaning the Value Stream of Origo family components at HAGS Aneby AB," MS Thesis Jönköping International Business School, Torpa, Suecia, 2008.