



THE IMPACT OF AWARENESS ON SUPPLY CHAIN EFFICIENCY: ANALYZING ORGANIZATIONS IN THE HEALTHCARE SECTOR IN CALI

PROYECTO DE GRADO II

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Resumen

Las instituciones de salud en la región del Valle del Cauca no están abarcando eficientemente las necesidades de la comunidad, lo que hace que la sociedad lo perciba como una prestación de servicios con resultados negativos, por lo tanto, es necesario evaluar el impacto que tiene en la calidad del servicio de salud la conciencia generada sobre la cobertura general de estos servicios tanto en usuarios como en el personal de atención de la red hospitalaria. Este estudio se enfoca en la percepción que tienen los usuarios y el personal de los centros de salud de la calidad del servicio hospitalario.

Los datos cuantitativos extraídos de 196 cuestionarios se analizaron posteriormente utilizando el modelo de las 3A (por sus siglas en inglés) con sus constructos: Asequibilidad, Accesibilidad y Conciencia. Las encuestas se dirigieron aleatoriamente al personal de varios hospitales y centros de salud en el departamento del valle del Cauca. Los hallazgos iniciales indican que en el sector salud de la región, la calidad del servicio ofrecido no es considerado importante para mejorar la eficiencia en la cadena de suministros de este sector, pero el ejercicio de las prácticas realizadas en los centros de salud y su flexibilidad para adaptarse a los cambios en la demanda de los servicios si influye directamente en la cadena de suministros.

Palabras clave: Salud, eficiencia, necesidades, servicio, impacto, región, conciencia, calidad, práctica, flexibilidad.

Abstract

There is a negative perception of the provision of health services in the Valle del Cauca region since the needs of the community are not being met efficiently. It is necessary, therefore, to evaluate the impact on the quality of the health service of the awareness generated about the general coverage of these services both in the users and in the care personnel of the hospital network. This study focuses on the perception that health center users and staff have of the quality of the hospital service.

The quantitative data extracted from the 196 surveys refer to the subsequent use of the 3A model with its constructs (Affordability, Accessibility, and Awareness). The surveys were randomly addressed to the staff of several hospitals and health centers in the department of Valle del Cauca. The initial findings indicate that in the health sector of the region, the quality of the service offered is of little importance in improving the efficiency of the supply chain of this sector, but the exercise of the practices carried out in health centers and their flexibility to adapt to changes in the demand for services directly influences the supply chain.

Keywords: Health, efficiency, needs, service, impact, region, awareness, quality, practice, flexibility.

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Real problem

The Colombian health sector (HS) provides health services to a population of 49,725,034. There are about 1,800 hospitals and clinics, almost 52% of which corresponds to the public sector, and the rest to private institutions, as stated by Juan Carlos Giraldo, executive director of the Association of Clinics and Hospitals of Colombia (*Las Mejores IPS de Colombia en 2016*, 2016). The World Health Organization (WHO) classifies Colombia's health system as number 22 of the 191 countries it reviews. However, the reality is that the health care system in Colombia is in a financial and institutional crisis. Due to this problem, the government is looking for new ways to reform the system and improve the quality of services in medical institutions across the country.

Discussion among politicians and citizens focuses on the fact that the country requires structural reforms and infrastructure interventions that lead to improving the wellbeing of the population. Thus, they have found that the system requires financial intermediation, new studies of different segments of the population, and an overall re-engineering of the structure of health services. It is essential to make improvements to the weak model of financing the public hospitals and remedy the absence of an adequate information system. These factors are identified as the fundamental causes of the crisis (Reforma, doble calzada y jóvenes avivaron debate con candidatos, 2018).

On the other hand, health service users feel they receive little specific information about the general functioning of the system, and the coverage of their health plans is unclear, as is information about the costs of moderator fees and co-payments. This information is not communicated effectively, which generates a feeling of uncertainty for the population that is increased when a specific treatment is denied by their health care provider (*En que se raja la atención en salud en Colombia*, 2010).

Introduction

The objective of this paper is to develop a competitive advantage and provide a framework for continuous improvement in health care. The study focuses mainly on gaining an understanding of the relationship between awareness and its two key dimensions, and its impact on the supply chain (SC) of the health sector.

For the purpose of the study, patient awareness will be deemed as constant while the provider side will reflect the changes. Regarding provider awareness, it is pertinent to state that, in today's globalized world, specialization is a must in order to fulfill medical development and the ever-essential competence needs. Therefore, re-engineering in the SC of the healthcare sector brings advantages like in any business sector as stated by Jarrett, (1998).

Colombia, as mentioned above, is facing a crisis in the HS overall which is one of the main reasons why all of the recent presidential candidates promised to restructure the system and re-engineer the processes involved in the sector. To point out one of the problems, presidential candidate Ivan Duque promised to change the method used to pay the Health Provider Companies (EPS): instead of paying them for the number of affiliates, he proposed paying them according to the quality of the service rendered by them (Duque, 2018). Changes like this one will prompt the EPS to improve the service overall which will increase the amount of patient awareness, improve access to the service, and make it more affordable.

EPS are facing strong pressure to improve the quality of the service provided while maintaining their productivity, primarily due to their affiliates' discontent and the government's focus on resolving the collapsing system. These organizations need to innovate heavily in awareness if they want to stay competitive and still be able to participate as an important player in the market share without having economic penalties imposed by the government.

Solving these awareness problems requires a much broader view involving the collaborative efforts of professionals from different areas of healthcare to improve the informational relationship with patients. Our results provide health personnel with useful insights for examining and selecting effective mechanisms to create awareness in patients and providers. Therefore, the purpose of this research is to get an insight into how the quality and flexibility of the services provided by the healthcare organizations influence the awareness of patients in Colombia and, particularly, in the city of Cali in Valle del Cauca.

The questionnaire used was based on the 3A model designed and tested by Dr. Ricardo Santa in research conducted in Saudi Arabia. A survey was taken among different employees from various private and public hospitals/clinics in the city of Cali located in the Valle del Cauca region of Colombia. The data collected was analyzed using structural equation modeling with the SPSS and AMOS software applications. This research seeks to answer the question: What are the main factors in awareness that positively affect supply chain effectiveness?

Awareness

Patient and provider are the key factors that make up the two awareness dimensions. These dimensions can each be measured by its own items as researcher Emily Jane Kohnke stated: "The provider awareness dimension is measured in training opportunities both practical and conceptual and the duration of these learning opportunities. The patient awareness dimension is measured by items such as the level and type of disease prevention programs, the level of patient education initiatives, and the general publicity of the healthcare facility relevant to the specific service offering" (Kohnke, 2010).

Thus, investigation can be conducted as to whether health institutions offer fellowship opportunities for both local and overseas physicians, whether these fellowship programs are highly attractive and competitive in their respective specialty, and whether physicians are required to contribute to the planning, management, and administration of research and healthcare in their areas of expertise. Similarly, it is important to know if health institutions provide patients with brochures, newsletters, or SMS related to the hospital's services, whether they are engaged with patients through social networks such as Facebook, LinkedIn, or Twitter,

and whether they have a user-friendly website with clear information about their facilities and services. There is a need to provide information about what the health institutions are improving in the short- and long-term, what their strategy is in branding and marketing campaigns to increase patient awareness, and whether they communicate with underserved communities.

The Significance of the 3As in the Supply Chain

The construction of awareness is represented as the understanding of a group of aspects that are important in a healthcare environment, such as the patient's knowledge of the symptoms of a disease and access to medical care for treatments. It also refers to the knowledge of the medical staff of the measures and procedures necessary to provide the patient with a treatment or timely prevention of his disease, which, in turn, are provided by the supply chain. The analysis of the construction of awareness in this environment is essential because it is not enough for the patient to have access to the health system and be able to pay for the treatment of a condition of any kind. In addition to this, the staff must possess the skills and knowledge necessary to respond to their requirements effectively.

In marginalized sectors, people with very few resources who do not have the same ease of access to information are not aware of the availability of medical treatments. This makes the development of information and knowledge systems vitally important for the provision of the service, especially in these sectors. Therefore, this is represented as a set of strategies that make up the development of medical attention for all sectors including those of marginalized populations that do not have the service and that are not being served. The development systems are composed of the patient's awareness of the symptoms, the doctor's awareness of the available treatment options and the availability of training for the doctors.

Awareness is positively related to access

Access to healthcare services is a fundamental human right as has been stated in many international treaties and recognized by governments around the world (Abdullahi Hassan, 2018). Nonetheless, this fundamental right of access to the healthcare services cannot be completely fulfilled when there is a lack of awareness of health care and long-term care (LTC).

Provider awareness has to be linked with access because, to get the desired results and effective treatment of patients, interventions or specific treatments can only be provided when the necessary supplies, equipment, and modern physical infrastructure are available (Xenia Scheil-Adlung, 2012). Otherwise, the actual delivery of health care and LTC will not be successful since any other circumstances will affect the ability of the staff to properly use their knowledge and positively deliver the service expected by the patient and advertised by the provider (patient awareness). The real delivery of care is a central issue, both for health and LTC. In a study recognized by European governments and their European Commission that issued the *Green Paper on the European Workforce for Health*, the ongoing deficit of the health workforce in European countries is fatal when the health sector is trying to deliver optimal service with a focus on the provider awareness and access capabilities (Xenia Scheil-Adlung, 2012). Therefore, many of the daily functions and operations of the care facilities (FC) are based on the activities carried out by properly trained and qualified personnel with the sophisticated communication

technologies found at the time of need, thus providing the patient with the correct and assertive information they require. As stated above the “hospital information system (HIS) plays an important role in the healthcare industry. HIS allows healthcare institutions to record all clinical procedures done on patients as well as their medical records. Such a system then makes it possible to generate, transmit, analyze, and store data in one hospital or clinic” (Lo, 2009), thus making the service cheaper, as this generates better access for the population.

Lastly, the business environment for the healthcare sector can be very unpredictable. Sometimes government regulations make it hard for the system to provide the coverage necessary for the general population. Also, it is pertinent to mention that economic meltdown or financial crisis affects the providers’ capabilities to supply wider access possibilities to many potential clients.

Principal effects of low provider awareness

Low awareness on the part of the provider has diverse effects on health care and LTC and, of course, it reflects negatively on patient awareness. Yet in many cases, such as the ones found in developing nations, it is viewed as a secondary problem that can wait in order to be dealt with. For example, failing to comply with the Standard Treatment Guidelines (STG) can lead to failing to follow the correct procedure for prescription, resulting in erroneous authorization of a medicine that may have undesirable side effects or even be fatal to a patient (Abdullahi Hassan, 2018). Therefore, following these STG can result positively in provider awareness as stated by the World Health Organization “for health care providers, it actually provides standardized guidance to practitioners; encourages high-quality care by directing practitioners to the most appropriate medicines for specific conditions; encourages the best quality of care since patients are receiving optimal therapy” (World Health Organization). As a result, it will positively correlate with patient awareness.

Also, failing to diversify with greater specialization, and not increasing expertise, can lead to a decline in staff efficiency resulting in neglect of the core competencies in the healthcare setting. For example, not using modern IT/software will decrease the effectivity in between functions found in the SC that will end up disrupting all coordination and control of information (Journal compilation, 2009).

In order to increase provider awareness, the following questions should be asked, answered, and consequently acted upon:

- Do the tasks assigned to the staff correlate with their knowledge or expertise?
- How often are the staff trained in the new procedures for a specific task?
- Is the communication flowing according to the appropriate standards?
- Is the new technology being implemented? Or in many cases, is there any new technology being used for better results?
- Is the coordination of communication effective and appropriate for the individual cases?
- Is the right amount of human and capital resources provided? If not, how and when can they be provided?
- What are the alternatives if the above questions cannot be dealt with?

Practical

There are different modes of integration in the SC, including the integration and coordination of the flow of information, planning processes, internal and inter-institutional processes, the integration of the market approach and the integration of market development. These modes of integration are intended for the operational areas that imply the presence of the information flow, and the areas linked to the creation of value in the supplies. The main purpose of this integration is to improve the results of the services of the clinic/hospital, and, as a consequence of the value creation, the efficiency is enhanced and costs are reduced.

The approach is to coordinate the operational processes that encompass the provision of physical products and services for patients in such a way that they improve the management and performance of the SC. The information technology and the development of the company in this area are linked to the coordination and integration of operational processes just as in any other functional area. The provision of the physical products, as well as the service provided to the patients, brings together the efficiency and integration of technology in the hospital/clinic field. Information technology contributes positively to the improvement of practices in the supply chain by making the process of orders speed up its response time, be planned, and thus generate cost reduction.

The argument stated above is described by Reza Baradaran kazemzadeh (2018): “The supply chain, currently, has become a glass pipe where information about an order is completely visible, from supplier to manufacturer to distribution center to transporter to customer. A fully computerized inventory will let the hospital run the SC management at the speed of thought.”

In addition, studies confirm that the organizational culture, the absence of strong leadership and mandatory authority, as well as the relationships of power and interest among stakeholders, could seriously hamper the integration and coordination of processes along the supply chain of health care (McCutcheon and Stuart, 2000).

On the other hand, the use of social networks and a website increases the level of awareness of the users of the health system as they use these means to inform and update themselves. For this reason, the implementation of a virtual pedagogy that displays information brochures, virtual assistance, and training in the use of resources offered by the health service, provides more information to the user, and helps to improve the efficiency in the provision of these services; however, these tools do not have the maximum scope desired, since there is a segment of the population that is not impacted by the implementation of these technologies. Marginalized groups and less favored families do not have the necessary tools or the adequate education to access this information channel. For these groups, other communication mechanisms are established that provide them with information and do not adversely affect the performance of the operational processes of the supply chain.

Flexibility

Flexibility includes an organization’s ability and the extent to which it can adjust (what it does, how it does and when it does) to changes to respond to customers (Slack, 1991). For example, the fact that home LTC can be delivered directly to the patient’s residence by professionals gives

us an idea of the need to innovate when it comes to providing a healthcare service. In many European countries, this is a common practice taken into consideration, especially for the elderly, as mentioned by Xenia Scheil-Adlung (2012). Flexibility also includes the capacity to produce a wider range of services and products that respond to any seasonal demand factors, meet shorter lead times, and cope with customers' specification changes during the process (Hill, 2005).

Also, the speed with which an organization can provide new products or service development is an important capability because the environment is constantly changing (Tidd and Bessant, 2009). In the same way, "tomorrow's supply chain management will be completely a virtual organization with the advent of rapid implementation of internet biotechnologies, integrated through effective sharing of data and cost saving at every point" (Reza Baradaran kazemzadeh, 2018). Furthermore, a business acquires a competitive advantage when it can perform faster than their competition, thus the importance of having a fully integrated IT in the healthcare sector. However, as mentioned by Jamieson and Hyland (2004), there is a very high rate of failure in the implementation of large innovative technological projects as they do not always succeed in delivering the promised outcomes. This phenomenon usually happens when the organizations do not have a strategic plan of how to implement the new technology, leading to certain failure.

Another definition found for flexibility is that this is the ability of a system to adapt to external changes while maintaining satisfactory system performance (Singh and Sharma, 2014). The more flexibility an organization exhibits the better and more prepared it will find itself with the ever-changing and challenging environment. According to Patela (2012), flexibility mediates the relationship between an environmental uncertainty and a firm's performance, hence the reason why the HS needs to outperform possible economic crises and government inability to provide good health care for its population.

The companies that have a better understanding of the needs of their clients are those that are able to coordinate, structure, and manage strategic alliances with their partners in a network leading to a higher commitment, and closer, better, and more flexible relationships with their customers (Christopher, 2000). Thus, the importance of the HS to maintain a flexible system that can respond with ease to a challenging environment like the one present in Colombia.

In conclusion, flexibility in the SC can be described as a continuous reconfiguring process which involves restructuring the supply base, infrastructure, strategic alliances, contracts, operations, processes, and service supports (Lee and Whang, 2005).

Quality

Most of the factors that affect the efficiency of the supply chain of the health sector in the Cali region also influence the quality of service of hospitals, health centers, and medical institutions in general. Quality has emerged as a strategic criterion, making quality management principles a necessity for overall operational effectiveness and global competence (Desai, 2008).

There are different definitions of quality portrayed in the literature to fit different circumstances (Corbett 2008; Reeves and Bednar, 1994). For example, the manufacturing literature refers to quality as the conformance to standards (Elshennawy, 2004). In a synthetic way, quality means

product quality. More specifically, quality is quality of work, quality of service, quality of information, quality of process, quality of people, quality of the system, quality of the company, quality of objectives, etc. (Ishikawa, 1986). In addition, quality is viewed as a consistent provision of products and services that satisfy customers, rather than only minimizing defects and conforming to specifications without any clear market-orientated continuous improvement (Russell and Taylor, 2008). Improving quality provides organizations with the opportunity to bridge the gap between what they can offer and what customers demand (Hill, 2005). There are, however, two extremes to the problem of measuring quality. At one end, the use of too many indicators leads to a loss of control through bureaucratic and complex structures. At the other end lies a lack of knowledge or awareness of quality due to the absence of measurement or the measurement of the wrong things (Prajogo and Goh, 2007). The presence of these two shortcomings interfere in the continuous improvement of the processes that provide the services offered, and that aim to increase competitiveness and performance in the supply chain of the health sector.

Quality is compliance with the requirements. The requirements have to be clearly established so that there are no misunderstandings, the measurements must be taken continuously to determine compliance with those requirements, and the non-conformity detected is an absence of quality (Crosby, 1988). Quality refers not only to finished products or services but also to the quality of the processes that are related to said products or services. Quality goes through all the phases of the company's activity, that is, through all the processes of development, design, production, sale, and maintenance of the products or services (Imai, 1998, p.10).

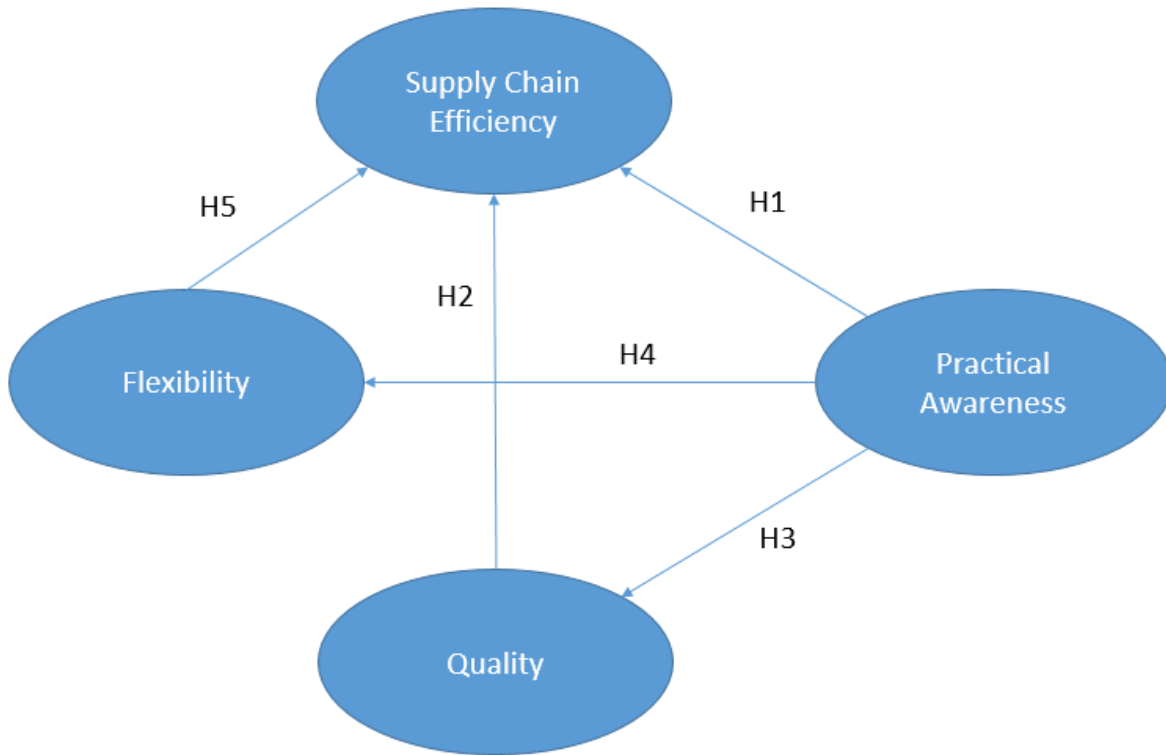
On the other hand, the concept of quality involves two trends: objective quality and subjective quality. The objective quality is focused on production and the subjective quality on consumption of goods or services, in this case, those of the hospital sector. According to Vázquez et al. (1996), the objective quality is an internal vision of the quality, since it is seen from a production approach. What is sought mainly in the objective quality is efficiency and therefore it is used in its activities of statistical control. In the same way, Vázquez et al. speak of subjective quality as an external vision, insofar as said quality is obtained through the resolution and the fulfillment of the needs and expectations of the clients. Unlike quality in products, which can be measured objectively through indicators such as duration or number of defects, the quality of services is something fleeting that can be difficult to measure (Parasuraman et al., 1988). The intangibility of services causes them to be perceived to a large extent in a subjective way (Grönroos, 1994, p.37).

In conclusion, evaluations of the quality factor refer both to the results and to the processes of the provision of the hospital services. In addition, the assessment by the client of the quality of the service is based on a comparison between expectations and results. The latter are focused on the provision of the service per se—the quality is evaluated depending on whether the service has covered or not the needs and expectations of the patient.

Table 1 - Hypothesized Model - Awareness

| Hypothesized Model Awareness | |
|------------------------------|---|
| Hypothesis 1 | There is a predictive influence of Practical Awareness on Supply Chain Efficiency |
| Hypothesis 2 | There is a predictive influence of Quality on Supply Chain Efficiency |
| Hypothesis 3 | There is a predictive influence of Practical Awareness on Quality |
| Hypothesis 4 | There is a predictive influence of Practical Awareness on Flexibility |
| Hypothesis 5 | There is a predictive influence of Flexibility on Supply Chain Efficiency |

Figure 1 - Theoretical Framework and Hypothesis



Methodology

This exploratory research is made with the purpose of demonstrating with a scientific study the impact that some constructs have on the efficiency of the HS supply chain. There is no evidence of an investigation of this type having been previously conducted in Colombia, that is, an analysis that investigates how the practices carried out in hospital services impact the consciousness of their users. An exploratory study is carried out when there is a lack of

understanding of the problem, which leads to an unstructured problem design (Hair, J.F. et al., 2010). The research also focuses on studying the impact of user Awareness and hospital staff Awareness of the Quality, Flexibility, and Operational Effectiveness of the Supply Chain in the HS. The purpose of this confirmatory-correlational research is to explain, quantify, and determine the relationship between variables and causes of different phenomena (Kaplan, 2004; Yin, 2013). To test the hypotheses, the survey instrument, measurement constructs, and best fit model were developed according to guidelines established by Hair et al (2010).

To achieve this purpose, quantitative data were collected through a physical and virtual questionnaire self-administered by the administrative areas of the hospitals visited and supplied to private and public centers of the Valle del Cauca HS in order to collect more general data. The questionnaire was addressed to managers and other officials of different levels in the organization who are involved in the application of supply chains to obtain different angles and perceptions about the administration of the entity.

The survey format consisted of a demographic section (hospital type, hospital capacity, and functional area and organizational role of the interviewed people) followed by a theorized set of variables and constructs to shape a model that was tested using both descriptive and inferential statistical analysis once the data was gathered. A five-point Likert-type scale (Strongly Agree - Strongly Disagree) was used to rate statements that describe the operationalization of the model's variables. Thanks to the support and viability of online surveys (J.R. Evans, 2005) an electronic survey was developed and shared with potential respondents through email. Of the 196 surveys distributed among organizations in the health sector, 196 were returned (100% response rate).

For this research, the sample is important, since the variety of data collected in hospitals with different characteristics such as size or acquired character (public, private, public-private), makes the data more reliable and the sample is not skewed. As shown by the Demographic Data presented in the graphs below, from 196 surveys distributed, 144 were completed in private centers, 44 in public centers and 8 in other types of institutions such as public-private (see Table 2).

According to the data, 130 of the 196 respondents work in hospitals with more than 500 available beds, 20 work in hospitals with 200 to 500 beds, 4 work in hospitals with 100 to 200 beds, and 42 work in hospitals with less than 100 beds available (see Table 3). Regarding the Functional Area of the respondents, 46 were in medical care, 10 were in nursing, 74 were in administration, 38 were in pharmacy and 28 were in other administrative functional areas (see Table 4). Considering the Organizational Role, the demographic data shows that of all the respondents, 71 were administrative personnel, 11 were managers, 30 were directors, 8 were vice-presidents and 76 were of another organizational role (see Table 5).

Demographic Data

Table 2 - Hospital Type

| | | Hospital Type | | | |
|-------|---------|---------------|------------|------------------|------------------------|
| | | Frequency | Percentage | Percentage valid | Percentage accumulated |
| Valid | Public | 44 | 22,4 | 22,4 | 22,4 |
| | Private | 144 | 73,5 | 73,5 | 95,9 |
| | Other | 8 | 4,1 | 4,1 | 100,0 |
| | Total | 196 | 100,0 | 100,0 | |

Figure 2 - Hospital Type distribution

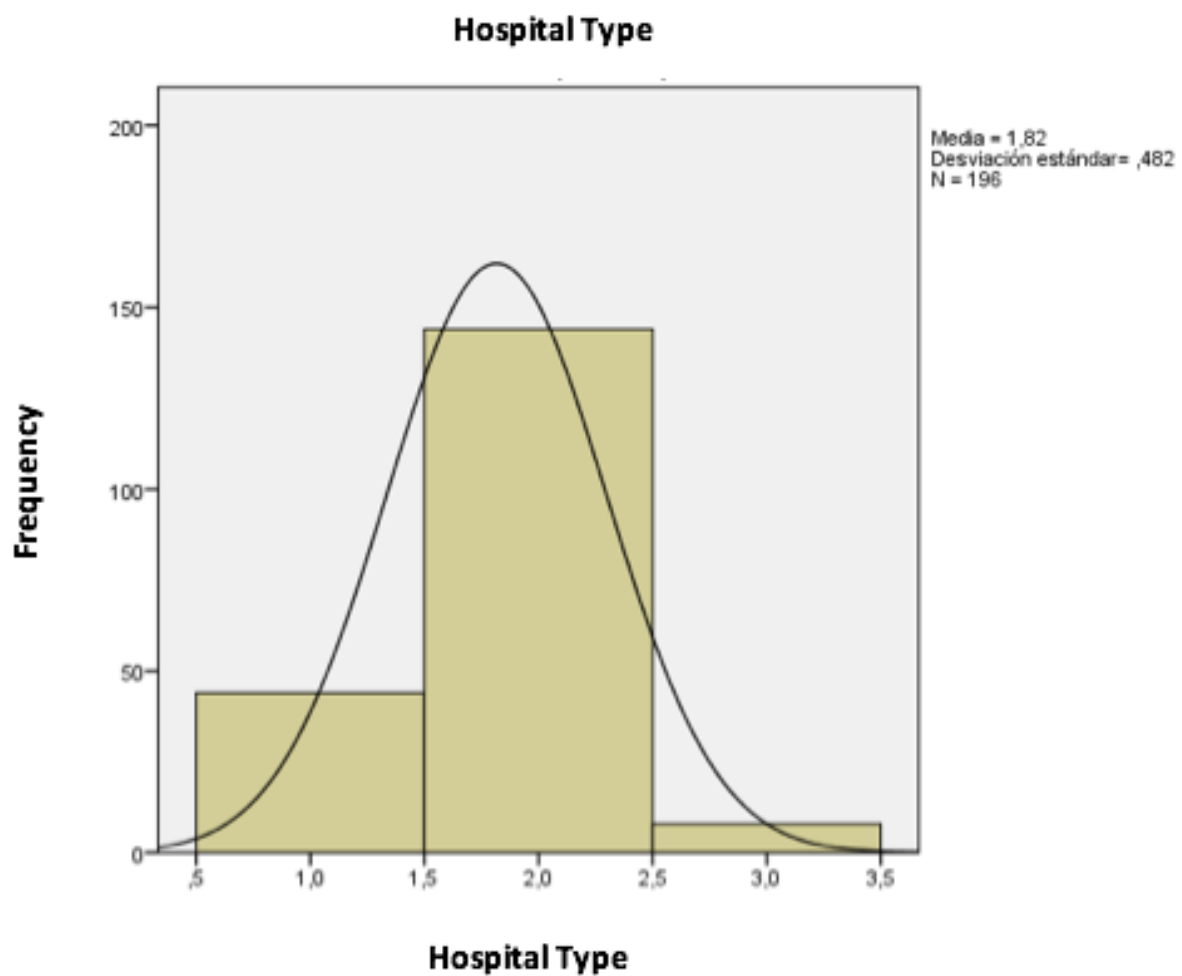


Table 3 - Capacity

| Capacity | | | | | |
|----------|---------------|------------|--------------|------------------|------------------------|
| | | Frequency | Percentage | Percentage valid | Percentage accumulated |
| Valid | Less than 100 | 42 | 21,4 | 21,4 | 21,4 |
| | 100-200 | 4 | 2,0 | 2,0 | 23,5 |
| | 200-500 | 20 | 10,2 | 10,2 | 33,7 |
| | + 500 | 130 | 66,3 | 66,3 | 100,0 |
| | Total | 196 | 100,0 | 100,0 | |

Figure 3 - Capacity of Hospitals distribution

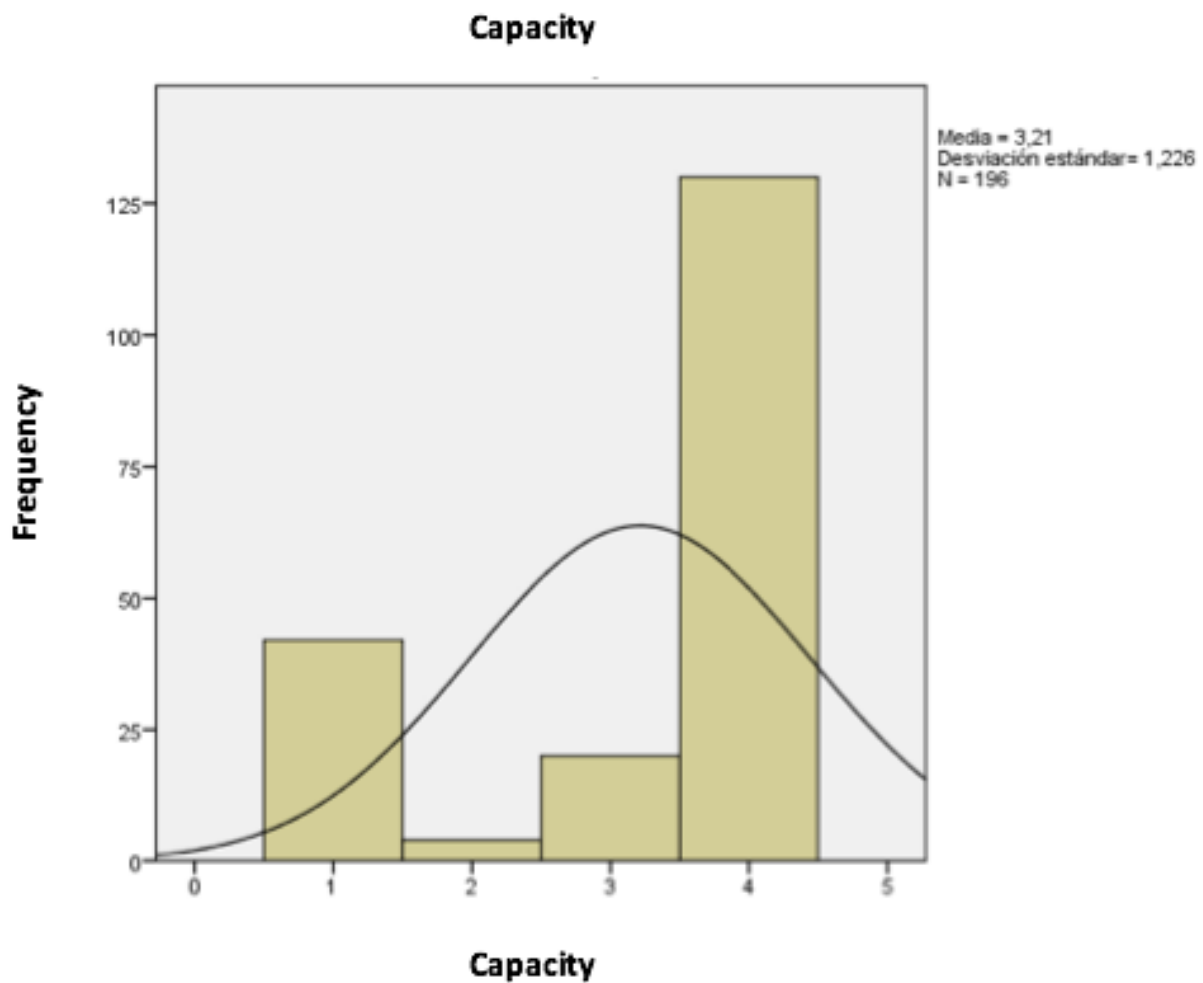


Table 4 - Functional Area

| | | Functional Area | | | |
|-------|----------------|-----------------|------------|------------------|------------------------|
| | | Frecuency | Percentage | Percentage valid | Percentage accumulated |
| Valid | Care - Medics | 46 | 23,5 | 23,5 | 23,5 |
| | Nursing | 10 | 5,1 | 5,1 | 28,6 |
| | Administration | 74 | 37,8 | 37,8 | 66,3 |
| | Pharmacy | 38 | 19,4 | 19,4 | 85,7 |
| | Other | 28 | 14,3 | 14,3 | 100 |
| | Total | 196 | 100 | 100 | |

Figure 4 - Functional Area distribution

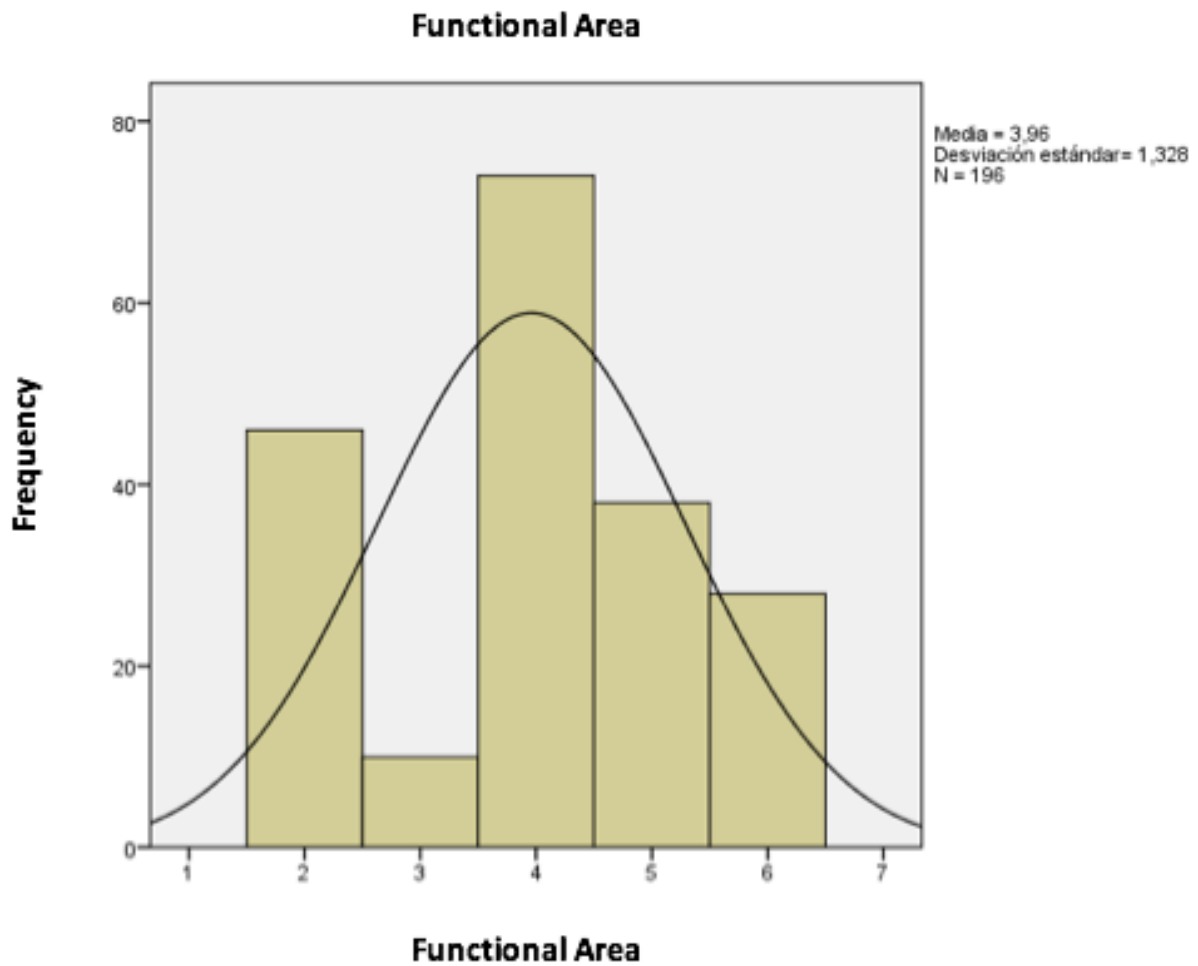
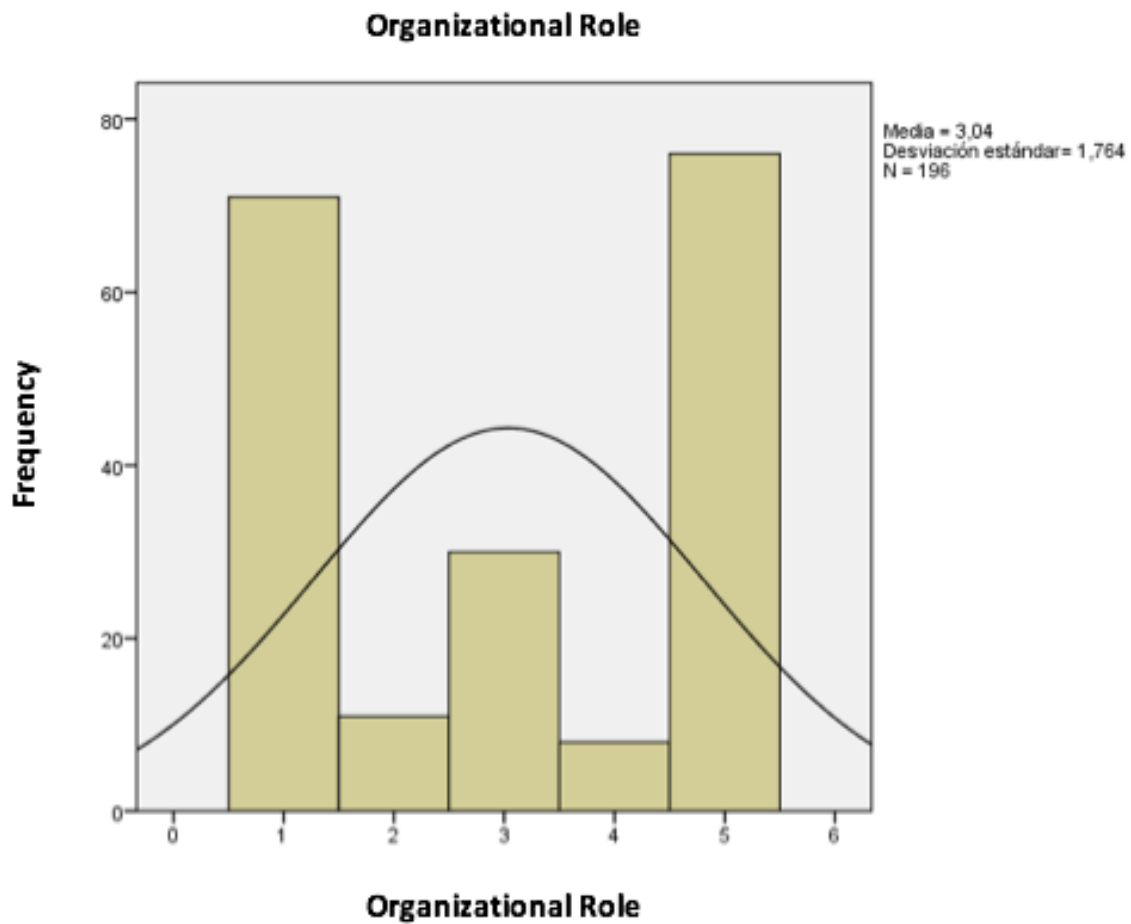


Table 5 - Organizational Role

| Organizational Role | | | | | |
|---------------------|--------------------------|-----------|------------|------------------|------------------------|
| | | Frecuency | Percentage | Percentage valid | Percentage accumulated |
| Valid | Administrative Personnel | 71 | 36,2 | 36,2 | 36,2 |
| | Manager | 11 | 5,6 | 5,6 | 41,8 |
| | Director | 30 | 15,3 | 15,3 | 57,1 |
| | Vice-President | 8 | 4,1 | 4,1 | 61,2 |
| | Other | 76 | 38,8 | 38,8 | 100 |
| | Total | 196 | 100 | 100 | |

Figure 5 - Organizational Role distribution



To carry out multivariate data investigations we used two statistical software programs—SPSS V21 (SSPS Inc and IBM Company, Chicago, Ill, USA) and AMOS V21.0.0 (AMOS Development Corporation, Spring House, Penn., USA)—for the analysis of structure moments. These were used in order to confirm the proposed model shown in Figure 1, estimating the predictive relationship of the construct variables, the fit index of the model, and determining the confidence level. Confirmatory factor analysis (CFA) was used to study the relationships between observed and continuous latent variables, and to determine the measurement model’s overall fit (Cooksey, 2007; Hair, J. et al., 2010). Table 5 summarizes the constructs’ coefficient values. All constructs have values greater than 0.7 of the cut-off level set for basic research (Nunnally, 1978). Moreover, confirmatory factor analysis (CFA) was conducted to test the construct validity used. Cronbach’s alpha coefficient and the items-to-total correlation were used to assess Internal reliability. The data were loaded on each variable and later were estimated together with the items loaded on only one construct of the survey, and finally, the constructs chosen were correlated.

Table 5 - Cronbach’s Alpha

| Variable | Number of Items | Alpha (α) |
|--------------------------------|------------------------|------------------------------------|
| Practical Awareness | 5 | .842 |
| Quality | 4 | .873 |
| Flexibility | 3 | .782 |
| Supply Chain Efficiency | 3 | .803 |

The baseline comparisons indices suggest that the hypothesized model fits the observed variance-covariance matrix well relative to the null or independence model (see Table 6).

Table 6 - Baseline Comparisons

| Model | NFI Delta 1 | RFI Rho 1 | IFI Delta2 | TLI Rho2 | CFI |
|---------------------------|----------------------------|--------------------------|-----------------------|---------------------|------------|
| Default model | .895 | .830 | .940 | .898 | .932 |
| Saturated model | 1.000 | | 1.000 | | |
| Independence model | .000 | .000 | .000 | .000 | |

To support the model, goodness-of-fit indices (GFI) were utilized: the model shows 78 distinct sample moments, with 2987 distinct parameters to be estimated. The Chi-square equals 1715,422

with 474 degrees of freedom, with a CMIN/DF of 3,619 and a 0.000 probability level. Note that Wheaton et al. (1977) suggested a ratio of approximately five or less as a reasonable criterion, Marsh and Hocevar (1985) recommended using ratios as low as two or as high as five, and Carmines and McIver (1981) suggested ratios in the range of 2:1 or 3:1 as indicatives of an acceptable fit between the hypothetical model and the sample data. The CFI value above 0.9 supports the model, with a result of 0.925 (Bentler, 1990). In addition, the reliability of each of the constructs in the model was evaluated using several fit statistics, the root means square error of approximation (RMSEA) was acceptable as the model had a value of 0.087, and the Vlu lower than 1.00 is considered acceptable (Bentler, 1990; Jöreskog and Sörbom, 1982).

Results

Table 7 - Regression Weights: (Group number 1 - Default model)

| | | | Estimate | S.E. | C.R. | P | Label |
|--------------------|------|-------------|----------|------|-------|------|-------|
| Flexibility | <--- | Awareness | ,405 | ,067 | 6,089 | *** | |
| Quality | <--- | Awareness | ,318 | ,046 | 6,974 | *** | |
| SCE | <--- | Awareness | ,200 | ,055 | 3,641 | *** | |
| SCE | <--- | Quality | ,253 | ,077 | 3,278 | ,001 | |
| SCE | <--- | Flexibility | ,499 | ,069 | 7,211 | *** | |

The results of the study show that there is a low and positive impact of practical awareness on supply chain efficiency ($b=0.29$, $p < 0.001$), which suggests that organizations with a greater perception of awareness of their services delivered, will have higher levels of supply chain efficiency and partially confirming hypothesis H1. Additionally, there is a low and insignificant impact of the quality of the services delivered by the healthcare organizations on supply chain efficiency ($b=0.22$, $p < 0.005$), which rejects hypothesis H2. This finding suggests that the service delivered by the healthcare sector in the sample selected for this study is of low quality. Results also show that there is a strong and positive impact of awareness on quality ($b=0.54$, $p < 0.001$), indicating the importance of the awareness initiatives to the quality of the services delivered by the participating organizations, and confirming hypothesis H3. The strong positive and significant impact of awareness on the flexibility of the operations ($b=0.29$, $p < 0.001$), indicates the importance of being flexible and adapting the processes to the needs of the customers or patients in the healthcare sector, confirming hypothesis H4. Finally, the flexibility of the operations impacts the efficiency of the supply chain in a strong and positive way ($b=0.59$, $p < 0.001$), confirming hypothesis H5.

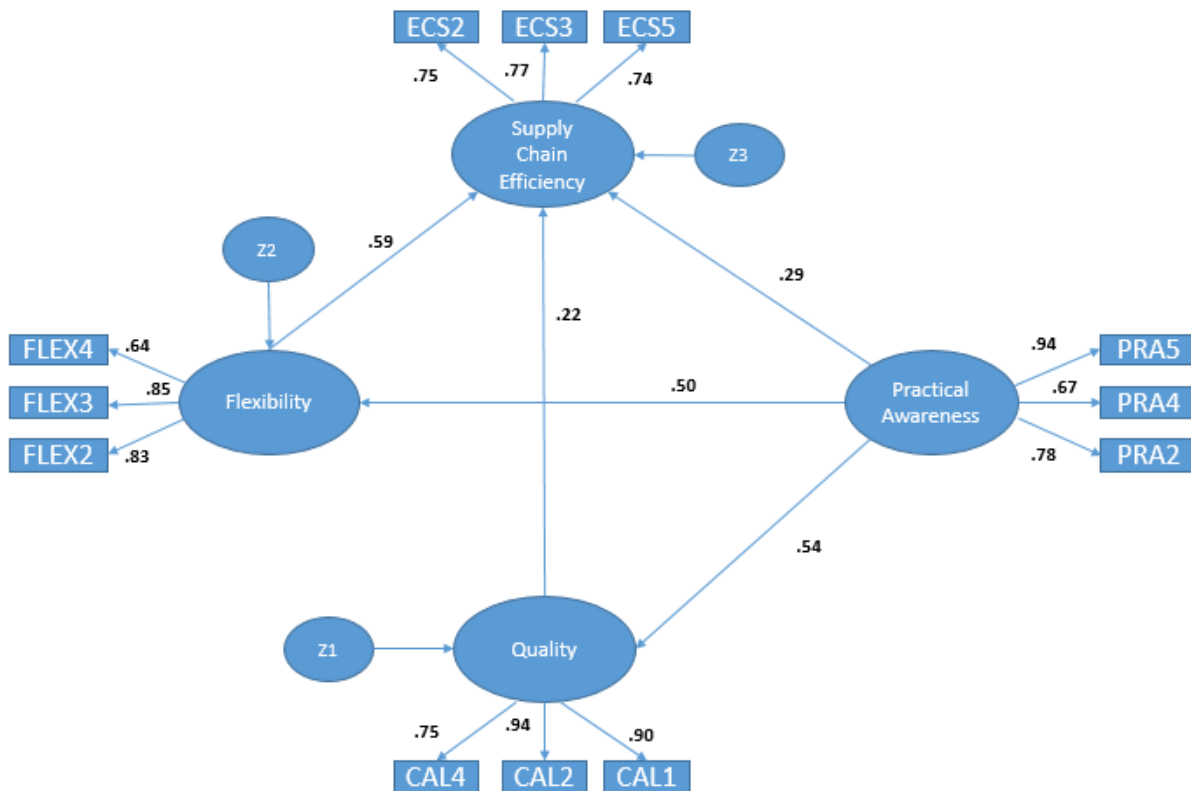
The following Table 8 summarizes the evaluation of the hypotheses:

Table 8 - Hypothesis Results

| Hypothesized Model Awareness | | |
|------------------------------|---|---------------------|
| Hypothesis 1 | There is a predictive influence of Practical Awareness on Supply Chain Efficiency | Partially Confirmed |
| Hypothesis 2 | There is a predictive influence of Quality on Supply Chain Efficiency | Rejected |
| Hypothesis 3 | There is a predictive influence of Practical Awareness on Quality | Confirmed |
| Hypothesis 4 | There is a predictive influence of Practical Awareness on Flexibility | Confirmed |
| Hypothesis 5 | There is a predictive influence of Flexibility on Supply Chain Efficiency | Confirmed |

The structure model results show the importance practical awareness has on quality, as well as on flexibility, hence the reason why flexibility exhibits a strong correlation with supply chain efficiency. Practical awareness also impacts supply chain efficiency, though it does so to a small degree. As a negative surprise quality does not have the impact one would expect it to have on the supply chain efficiency.

Figure 6 - Structure Model Results



Conclusions

As stated in the introduction, the question that we seek to answer is “What are the main factors in awareness that positively affect supply chain effectiveness?” The research findings from this study led us to discover that flexibility has a strong and positive influence on the SCE. Therefore, the contribution of this research to the Colombian healthcare services is that the system seems to adapt to the ever-changing conditions as it also improves the technological development it needs to offer for the betterment of the system overall. However, our most valuable finding is that the quality of the service has little impact on the SCE, which is inconsistent with what a patient should expect from a robust and well-organized healthcare system. Therefore, one can say it fails to acknowledge the vision of Russell and Taylor (2008), due to the fact that quality seems not to comply with continuous improvement and customer satisfaction.

Another important finding is that the awareness practices have no relevant impact on the supply chain efficiency. The impact of awareness on supply chain efficiency is indirect by achieving services of high quality and flexible practices. This is one of the reasons why the communication techniques and platforms used still do not positively impact marginalized groups and less favored families that do not have the necessary tools or the adequate education to access the information channels.

Also, the results denoted the fact that SCE is achieved through the awareness practices that impact on the quality of the services delivered and the flexibility in the processes.

Finally, the research findings indicate that the health sector needs to implement practices that improve the quality of the service, as well as to make the administrative staff aware of the impact that the quality of the service offered has on the efficiency of the supply chain.

References

- Abdullahi Hassan, G. A. (2018). Assessing prescriber’s awareness of essential medicine list, hospital drug formulary and utilization of standard treatment guidelines in a tertiary healthcare facility in North-Central Nigeria. *Alexandria Journal of Medicine*, 81-83.
- Christopher, M. (2000). “The agile supply chain: competing in volatile markets”, *Ind. Mark. Man*, Vol. 29, No. 1, pp.37–44.
- Cooksey, R. (2007) *Illustrating statistical procedures for business, behavioural & social science research*, Tilde University Press, Australia.
- Corbett, L. M. (2008). “Quality Management in Operations.” In *Operations Management: An Integrated Approach*, edited by D. Samson and P. J. Singh, 78–89. Cambridge: Melbourne.

- Crosby, P.B. (1988). *La organización permanece exitosa*. México: McGraw-Hill Interamericana S.A. de C.V.
- Desai, D. A. (2008). "Cost of Quality in Small- and Medium-sized Enterprises: Case of an Indian Engineering Company." *Production Planning & Control* 19 (1): 25–34.
- Dinero: Las mejores IPS de Colombia en 2016. (2016, October). Retrieved July 31, 2018, from <https://www.dinero.com/edicion-impresa/informe-especial/articulo/las-mejores-ips-de-colombia-en-2016/238782>
- Duque, I. (2018, April 23). *Portafolio*. Retrieved from Portafolio Web site: <http://www.portafolio.co/economia/las-propuestas-en-salud-de-ivan-duque-516396>
- Elshennawy, A. (2004). "Quality in the New Age and the Body of Knowledge for Quality Engineers." *Total Quality Management* 15 (5–6): 603–614.
- Evans, J. R. (2005). The value of online surveys. *Internet Research*, 15(2), 195-219. doi:10.1108/10662240510590360
- Grönroos, C. (1978). A Service Oriented Approach to Marketing of Services. *European Journal of Marketing*, 12(8), 588-601.
- Hair, J., Black, W.C., Babin, B. and Anderson, R.E. (2010) *Multivariate data analysis: A global perspective* Seventh edn., Pearson, Upper Saddle River, New Jersey.
- Hair, J.F., Black, W.C. and Babin, B.J. (2010) *Multivariate Data Analysis: A Global Perspective.*, Pearson Education.
- Hill, T. (2005). *Operations Management*. New York, NY: Palgrave Macmillan.
- Imai, M. (1998). *Cómo implementar el kaizen en el sitio de trabajo (Gemba)*. Bogotá: McGraw-Hill Interamericana.
- Ishikawa, K. (1986). *¿Qué es control total de la calidad?* Bogotá: Editorial Norma.
- Jamieson, K., and P. Hyland. (2004). "IS Failure: Just too much Information?" Paper presented to 8th World Multiconference on Systemics, Cybernetics and Informatics, Orlando, USA, July 18–21.
- Jarrett, P. (1998), "Logistics in the healthcare industry", *International Journal of Physical Distribution & Logistics Management*, Vol. 28 Nos 9/10, pp. 741-72.
- Journal compilation. (2009). *Paper Versus Electronic Medical Records: The Effects of Access on Physicians' Decisions to Use Complex Information Technologies*. Decision Sciences Institute, 213-241.
- Kohnke, E. J. (2010, August). *Health Care Supply Chain Design for Emerging Economies*. Ann Arbor, Minnesota, United States of America: ProQuest.

- Lee, H.L. and Whang, S. (2005). “Higher supply chain security with lower cost: lessons from total quality management”, *International Journal of Production Economics*, Vol. 96, No. 3, pp.289–300.
- Lo, W.-S. (2009). “A practical framework of industry-university for supply chain management of healthcare industry with using distance healthcare ICT platform”. *International Journal of Electronic Business Management*, 241-246.
- McCutcheon, D. and Stuart, F.I. (2000). “Issues in the choice of supplier alliance partners”, *Journal of Operations Management*, Vol. 18 No. 3, pp. 279-303.
- Nunnally, J.C. (1978) *Psychometric Theory*, 2nd edition. New York, NY: McGraw-Hill. Olson, E.M., Slater, S.F., and Hult, T.M. (2005) 'The performance implications of fit among business strategy, marketing, organization structure, and strategic behaviour', *Journal of Marketing*, Vol 69, No., pp 49-65.
- Patela, P., Terjesenb, S. and Li, D. (2012). “Enhancing effects of manufacturing flexibility through operational absorptive capacity and operational ambidexterity”, *Journal of Operations Management*, Vol. 30, No. 3, pp.201–220.
- Prajogo, D. I., and M. Goh. (2007). “Operations Management Activities and Operational Performance in Service Firms.” *International Journal of Services Technology and Management* 8 (6): 478–490.
- Parasuraman, A., Zeithaml, V., & Berry, L. (1985). A Conceptual Model of Service Quality and its Implications for Future Research. *Journal of Marketing*, 49(4), 41-50.
- Reeves, C. A., and D. A. Bednar. (1994). “Defining Quality: Alternatives and Implications.” *Academy of Management Review* 19 (3): 419–445.
- El Tiempo: Reforma, doble calzada y jóvenes avivaron debate con candidatos. (2018, Mayo). Retrieved July 31, 2018, from <http://www.eltiempo.com/colombia/cali/reforma-doble-calzada-y-jovenes-avivaron-debate-con-candidatos-217922>
- Reza Baradaran kazemzadeh, M. m. (2018, May 10). Design and Analysis of a Healthcare Supply Chain Management. Retrieved from https://www.academia.edu/5055316/Design_and_Analysis_of_a_Health_Care_Supply_Chain_Management
- Russell, R. S., and B. W. Taylor. (2008). *Operations Management – Quality and Competitiveness in a Global Environment*. 5th ed. London: John Wiley & Sons.
- Santa, R., Hyland, P., and Ferrer, M. (2014) 'Technological innovation and operational effectiveness: their role in achieving performance improvements', *Production Planning & Control: The Management of Operations Management*, Vol 25, No. 12, pp 969-979.

Semana: En que se raja la atención en salud en Colombia. (2010, August). Retrieved July 31, 2018, from <https://www.semana.com/nacion/articulo/en-que-raja-atencion-salud-colombia/121237-3>

Singh, R. and Sharma, M. (2014). “Prioritising the alternatives for flexibility in supply chains”, *Production Planning & Control*, Vol. 25, No. 2, pp.176–192.

Slack, N. (1991). *The Manufacturing Advantage*. London: Mercury Books.

Tidd, J., and J. Bessant. (2009). *Managing Innovation*. Hoboken, NJ: John Wiley & Sons.

Tidd, J., Bessant, J. and Pavitt, K. (2013) *Managing Innovation – Integrating Technological, Market and Organizational Change*, 5 edn., John Wiley & Sons., New York.

Vázquez, R., Rodríguez, I. & Díaz, M. (1996).

Estructura multidimensional de la calidad de servicio en cadenas de supermercados: desarrollo y validación de la escala CALSUPER. Documento de Trabajo 119/ 96, Facultad de Ciencias Económicas y Empresariales, Universidad de Oviedo.

World Health Organization. (n.d.). www.who.int. Retrieved from [www.who.int](http://www.who.int/medicines/technical_briefing/tbs/10-PG_Standard-Treatment-Guidelines_final-08.pdf): http://www.who.int/medicines/technical_briefing/tbs/10-PG_Standard-Treatment-Guidelines_final-08.pdf

Xenia Scheil-Adlung, J. B. (2012). *Can the European elderly afford the financial burden of health and long-term care?* Geneva: International Labour Office-Social Security Department.

Yin, R. K. (2013). *Case Study Research: Design and Methods*: SAGE Publications.