

manage decisions at different management levels and time horizons, with the aim of pursuing the common goal of chain's profitability optimization. Finally, **Incentive alignment** is the process of sharing cost, risk, and benefits among participants. The above allows partners to act consistently with objectives and make appropriate decisions.

Considering the visibility, it is necessary to clarify that the actor of the supply chain cannot be considered as independent elements. Organizations must ensure an adequate coordination and integration within the supply chain, so the actors will be prepared and competent in demanding and dynamic markets (Ageron, Gunasekaran, & Spalanzani, 2013). Companies must collaborate strategically with partners within the supply chain, in order to achieve an effective and efficient flow of products and services, information, money, and decisions. The above with the objective of providing the maximum value to the customers at the lowest costs and to the greatest speed.

Another key aspect in the integration of quality management and supply chain is the human relations since individuals are in constant interaction in the chain (organizations, clients, and suppliers). And it is clear that relationships are not made between companies, are made between people and this connection is decisive for the success of any operation. The author (Gligor & Holcomb, 2013), states that the staff involved in the chain is exposed to several actions, which generate a greater confidence in people, better communication, better personal and business understanding, impacting on an increase in trading volumes.

2. Analysis Methodology

2.1. Integration model: the quality management and supply chain integration model proposal is shown in Figure 3.

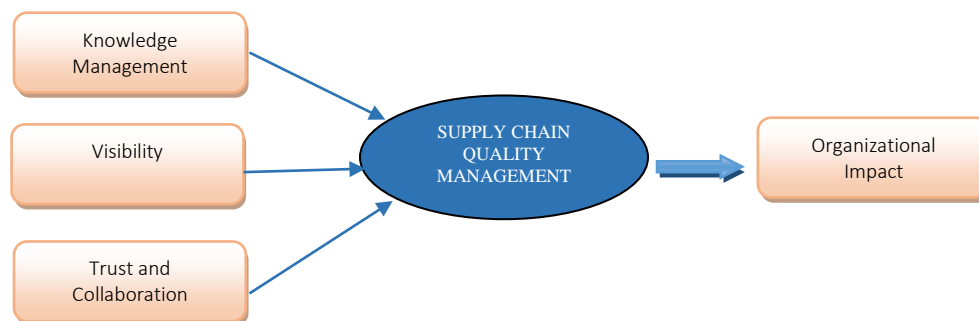


Figure 1. Proposed integration model

2.2. Methodology: this study presents an exploration of qualitative type since this methodology allows the collection, analysis, and interpretation of descriptive data, which are not objectively measurable. It also studies the reality of a situation in its natural context and/or interprets the phenomena according to the meanings for the people involved. This research is developed through case studies that create a bridge between research and practice, with the aim of developing a comprehensive knowledge of the nature of the phenomenon in those responsible. The reference method describes a narrative description, involves a group of observers, a given real-life situation, and the possibility of identifying several solutions options, assisting a divergent thinking. (Gill & Gill, 2014). They are conducted through in-depth interviews, a prepared dialogue in which one person assumes the role of interviewer and the other person is the interviewee. The subject of the interview is defined by the interviewer, while the interviewee expresses throughout the conversation their knowledge, that there is no more information about their experiences and/or personal experiences or own beliefs, desires (motivation to do things) or expectations.

For current type-of-interview research, it is necessary to apply the following questionnaire as a tool:

1. What is your view of quality and supply chain integration? (Considering that the logistics of an organization is integrated into the supply chain).
2. What do you think about quality management in organizations?
3. What do you think about supply chain management in organizations? (Considering that the logistics of an organization is integrated into the supply chain).
4. What is your opinion about the possibility of integrating quality and supply chain in organizations of Colombia? (goods or services).
5. In order to integrate quality and supply chain, it is necessary to have trust and collaboration between the areas of companies and companies that are part of the value chain (customers, suppliers, and allies), what opinion this variable deserves?
 - How do you consider that trust is given in collaboration with customers?
 - How do you consider that trust is given in collaboration with suppliers?
6. In order to integrate quality and supply chain, it is necessary to have the knowledge management between the areas of companies and companies that are part of the value chain (customers, suppliers, and allies), what opinion this variable deserves?
 - How do you consider that knowledge management is given in collaboration with customers?
 - How do you consider that knowledge management is given in collaboration with suppliers?
7. In order to integrate quality and supply chain, it is necessary to have visibility (real-time information) between the areas of companies and companies that are part of the value chain (customers, suppliers, and allies), what opinion this variable deserves?
 - How do you consider that visibility is given in collaboration with customers?
 - How do you consider that visibility is given in collaboration with suppliers?
8. How do you consider trust/collaboration, visibility, and knowledge management are integrated? Is there any order or sequence between these variables?
9. What kind of impact do you consider is generated in the integration of quality and supply chain in the organization?
10. What other variables do you consider are indispensable to integrate quality and supply chain in an organization?

2. Research Development

This research will be carried out in two large selected companies according to the context of the economy in Colombia. The first company is called FMG, which corresponds to the construction sector for architecture and civil works in the housing and infrastructure of the regions. The second company is denominated TMH S.A, which corresponds to the sector of the mass consumption food and raw materials for bakery areas with national coverage.

2.1. Construction sector organization

FMG is a company dedicated to the construction of buildings, industrial and institutional projects. It was constituted in 1998; its partners are a family group with experience in the construction and business administration sectors. The Company has been distinguished by the dedication and responsibility to assumes its commitments in the development of the projects. FMG has carried out important projects for the recognized institutions of southwestern Colombia.

The Company FMG has a defined and organized structure to ensure compliance with the quality, hygiene, safety and environment of the projects; as well as professionals, administrative and operative personnel competent in the budgets preparation, execution, and control of the projects. The above with the purpose of fulfilling the main objective: "to satisfy and to take care of our clients, workers, and environment". It also seeks to obtain a profitability that allows them to grow in the market with greater dynamism than the general industry, always governed by principles of professional ethics.

To conduct this exploratory study, it was required to interview eight professionals related to quality management and operations, three suppliers of raw materials, and two industrial clients. The results were as follows

2.1.1. Question No.1: 77% of the interviewees have a positive perception of SCQM integration

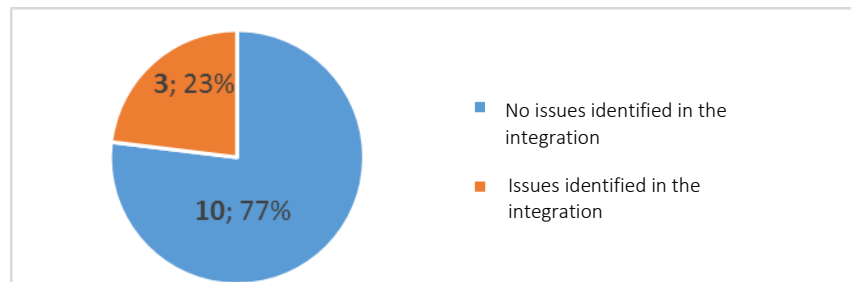


Figure 2. Perception of the interviewees regarding SCQM integration

2.1.2. Question No.2: Interviewees identified some benefits from Quality Management in organizations, as are shown in Figure 3.

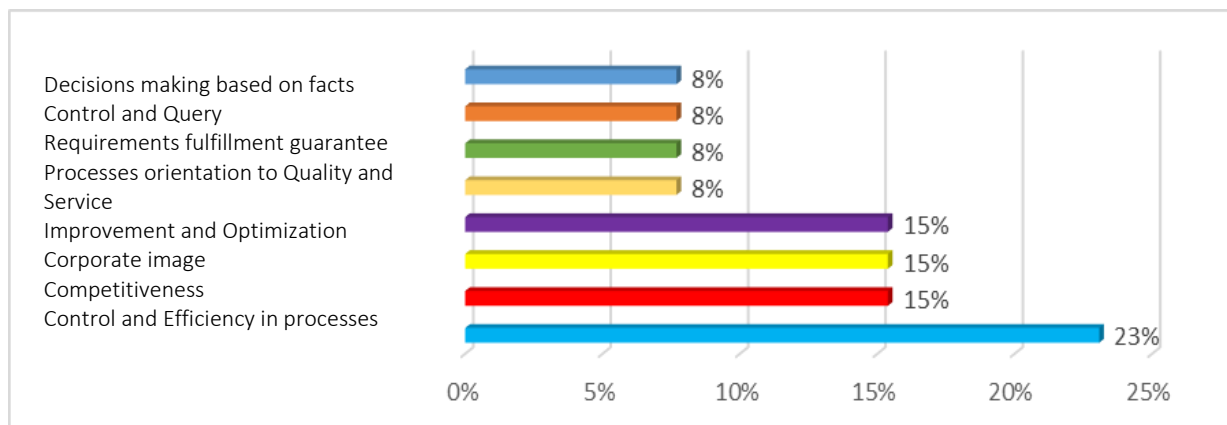


Figure 3. Quality Management Systems benefits in organizations

2.1.3. Question No.3: Perception contrast of supply chain management importance.

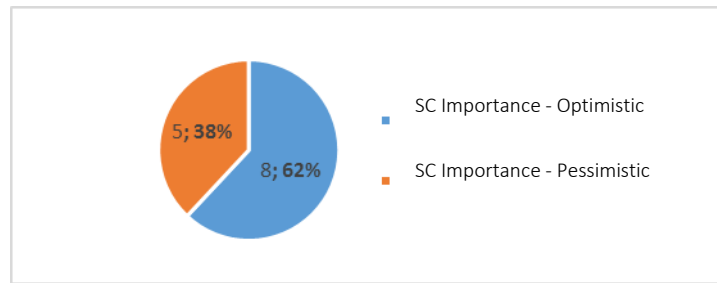


Figure 4. Opinion about Supply Chain Management in organizations

2.1.4. Question No.4: Interviewees perception about the possibility of Quality and Supply Chain integration in Colombian organizations.

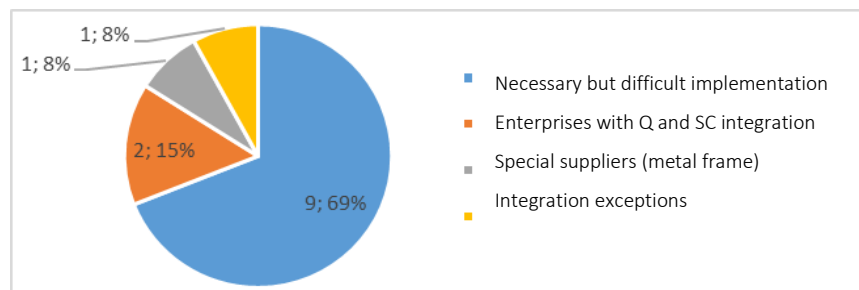


Figure 5. Opinion about Quality Management and Supply Chain Management in organizations
Of Colombia

69% of the interviewees believe that Quality and Supply Chain integration in Colombian organizations is necessary when the company desires to optimize and improve processes. However, they identify some issues that can make this integration difficult:

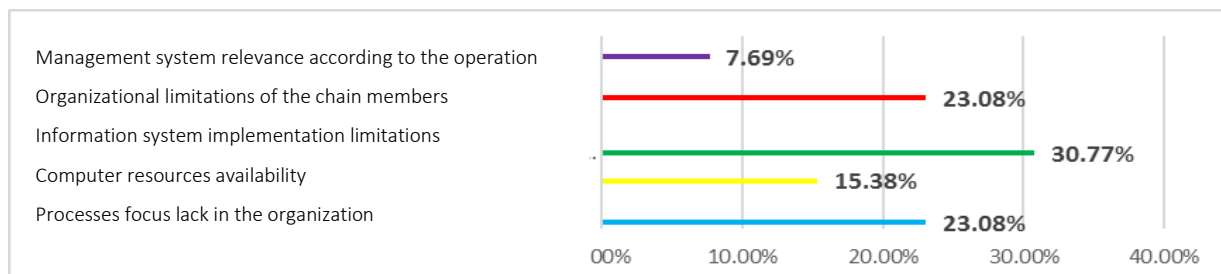


Figure 6: Issues identified for Colombian organizations integration

Three issues constitute approximately 80% of the situation described above, namely:

- The absence or limitations of organizations regarding costs, implementation times, and people competencies related to Information Systems.

- The absence of definitions regarding supplies or inputs, outputs or finished products, as well as the interactions of the organization processes.
- The size of the organization, economic activity, and organizational culture of suppliers and contractors close this characterization.

2.1.5. Question No.5: 92% of the interviewees consider that the variables “trust and collaboration” are important, necessary, fundamental, and vital in the integration of the areas of quality and supply chain. The reasons they expressed are the following:

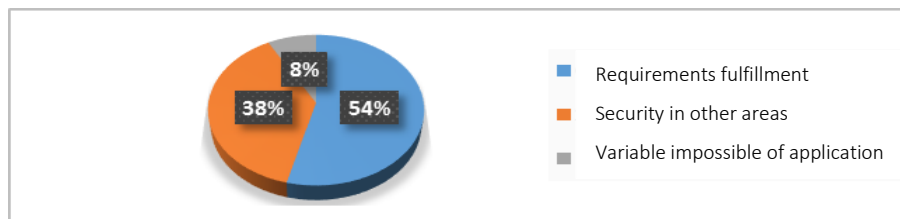


Figure 7. Opinions on the variable trust in the integration of the areas of quality and supply chain.

2.1.6. Question No.6: Knowledge management is considered by the interviewees as a fundamental and necessary variable for the areas of quality and supply chain integration, between the areas of the Company and the companies that are part of the value chain. They consider that the constant demand of the market and the dynamism of its environment requires all the companies have competitive advantages that allow them to be attractive and sustainable.

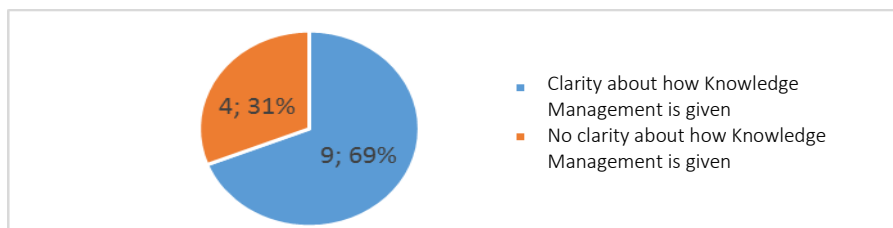


Figure 8. Opinion about Knowledge Management with Customers and Suppliers

2.1.7. Question No.7: 85% of the interviewees consider that the information is a strategic asset of organizations, not people or areas of the organization. This information should be available in real time, and it should be visible to the different actors of the chain and related interest groups; allowing the optimization of operational processes, the timely reaction to any deviation and the taking of appropriate actions.

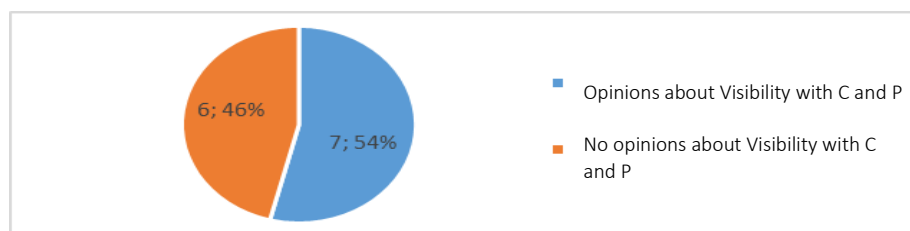


Figure 9. Opinion about Visibility variable with Customers and Suppliers

2.1.8. Question No.8: Trust is considered by the interviewees the main basis for any personal or labor relations. They say that "trust is measured by the degree of security that a person or an organization projects through its actions and the actions they take; behaviors with which organizations manage to generate and strengthen credibility as well as to maintain a climate and appropriate work environment".



Figure 10. Variables order proposed by the Quality Director of the FMG Company.

2.1.9. Question No.9: 100% of the interviewees consider that the impacts generated by the integration of quality and supply chain in organizations are **positive**. They are given for both the internal and the external customer.

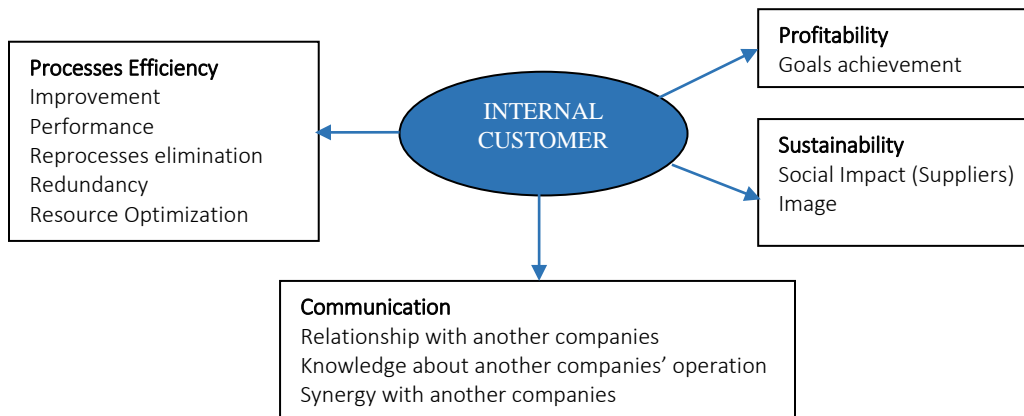


Figure 11. Impacts of the integration for the internal customer

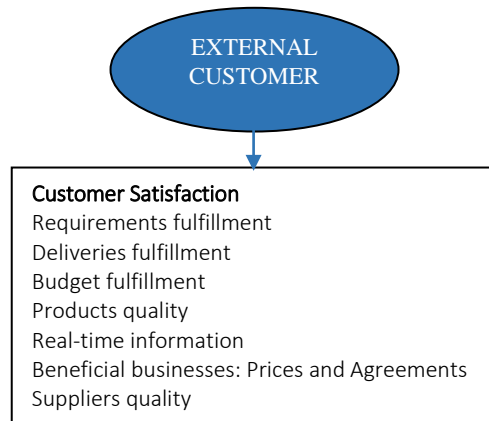


Figure 12. Impacts of the integration for the external customer

2.1.10. Question No.10: The future of organizations is based on managing the integration of the key concepts of Quality Management such as process efficiency, continuous improvement, human factorization, innovation, technology and customer service approach, achieving a structure that covers the important areas of the organization, which are guided to organizational excellence. The last one described above is a managerial technique or a tool that helps organizations to improve administrative management and achieve business success.

2.2. Food manufacturing sector organization

The Colombian Company TMH S.A. has spent 67 years making food products, as one of the most innovative companies in this sector. It has grown steadily through effective strategies that have allowed it to expand the portfolio, which includes 40 brands of quality products belong to eight categories of the market, reaching thousands of consumers in Colombia. TMH S.A Organization sells and distributes products directly in 600 municipalities of the country in both the massive consumption line as the industrial line. It also exports its products to countries such as the United States, Spain, Ecuador, among others. Although the current dynamics of the market forces companies to have an international presence such as this Company, Colombian market still requires being explored and consolidated, due to It currently sells its products in the traditional channel to more than 9 thousand stores and bakeries.

In order to conduct this exploration, it was selected eight professionals from TMH S.A. in positions related to Quality Management and Suppliers Management, one customer, and one supplier.

2.2.1. Question No. 1: The total of the people interviewed agree that satisfaction is achieved considering the integration of the two areas. 82% of them say that it also achieves competitiveness and profitability by visualizing a positive outlook that companies should take into account as a strategy to be successful.

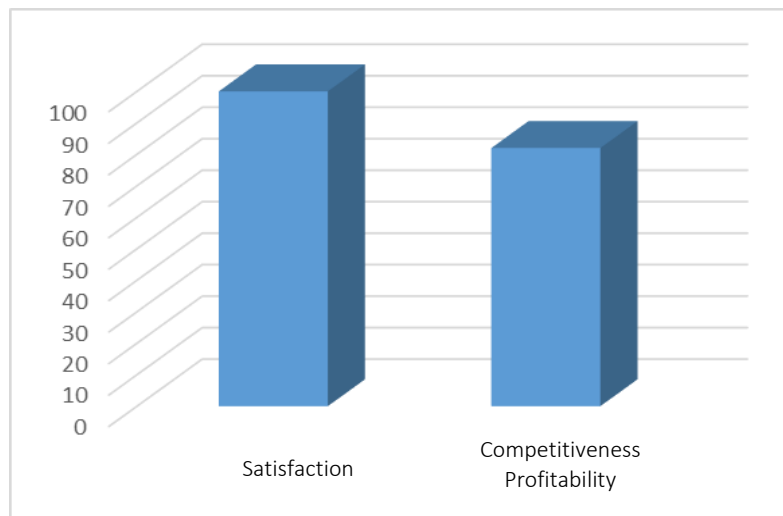


Figure 13. Opinion on Quality Management and Supply Chain Management integration

2.2.2. Question No. 2: Regarding the opinion on Quality Management, 45% of people relate it to continuous improvement, and 36% relate it to customer satisfaction. Although this area is an indispensable management in the companies, it is not guaranteed of profitability and sustainability.

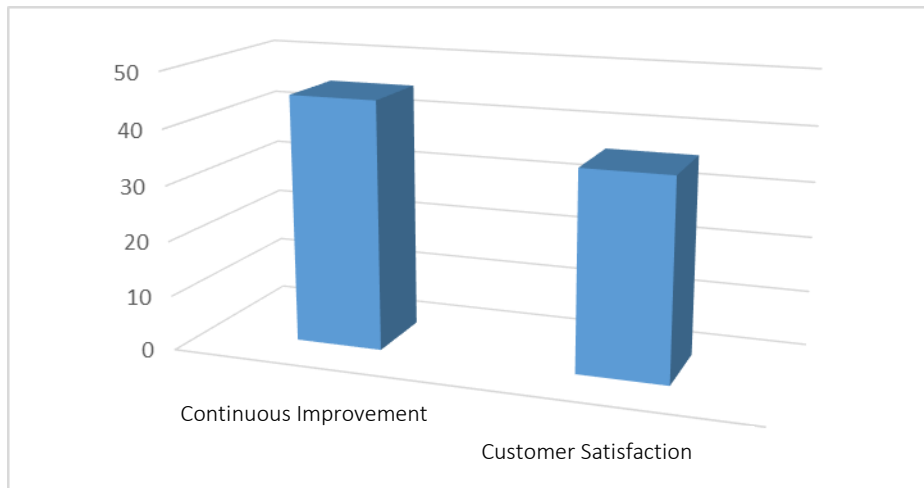


Figure 14. Opinion about Quality Management in Organizations

2.2.3. Question No. 3: 64% of interviewees perceive supply chain as the key of efficiency achievement in companies, having an adequate use of the resources in order to reach the objectives. 45% of them believe that the SC encourages the harmonization of the processes involved in this management, due to it provides an appropriate correspondence between each of the chain processes to achieve a common goal.

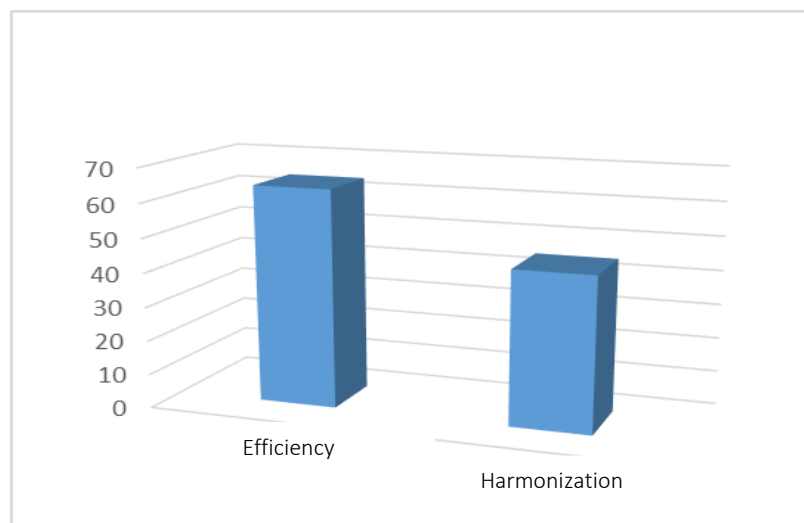


Figure 15. Opinion about Supply Chain in Organizations

2.2.4. Question No. 4: 91% of the people think that quality management and supply chain integration, organizations would be more competitive when referring to international markets. 36% of them agreed that globalization is another advantage offered by supply chain quality management. Finally, the opinion of 27% of the interviewees become a challenge for the country.

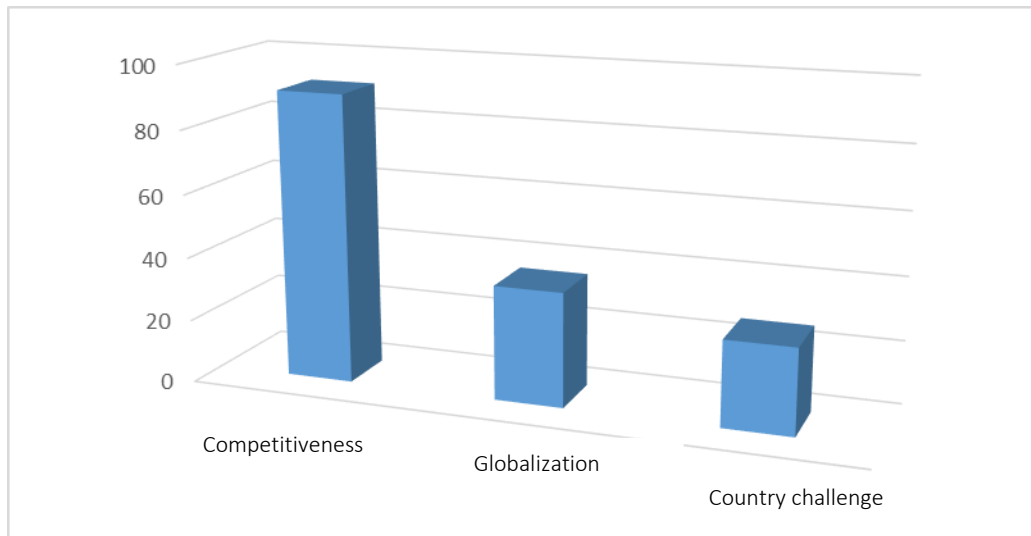


Figure 16. Opinion about Quality Management and Supply Chain integration in Colombia

2.2.5. Question No.5: most of the interviewees (82%) believe that the trust with the customer is given with the level of service and quality since these variables determine their satisfaction. However, today customers expect more than what is offered, thus there is another variable that yielded a considerable percentage. Finally, 64% of them think that trust is given when the product exceeds the expectations of customers.

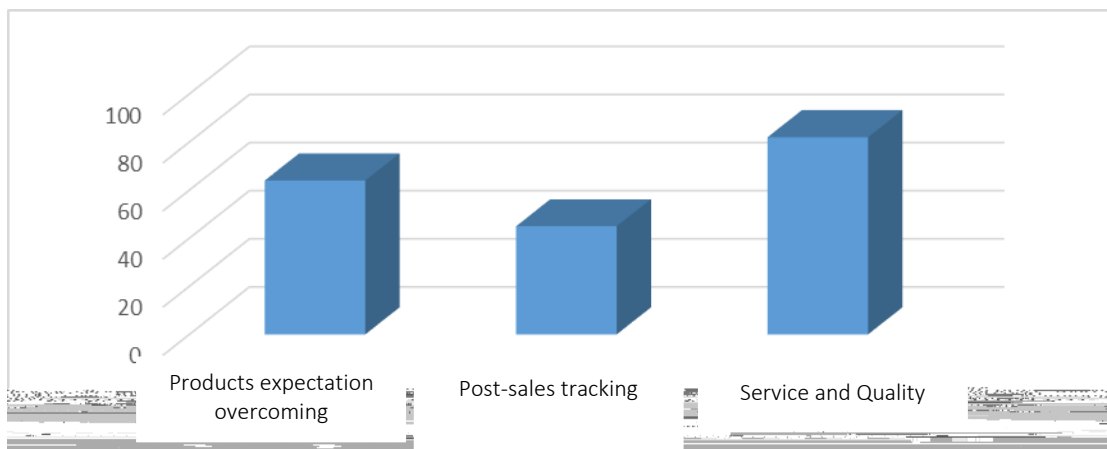


Figure 17. Opinion about how the trust and collaboration with customers are given by integrating Quality and Supply chain

2.2.6. Question No. 6: Opinion about knowledge management with customers. 27% of the interviewees think it is given through updated information. 18% of them consider it comes from feedback given to the customers regarding their needs. Hence, they might generate greater innovation in their processes.

Updated information Customer needs feedback

Figure 18. Opinion about how knowledge management is delivered to customers when integrating Quality and Supply chain

2.2.7. Question No. 7: According to the opinion of 54% of interviewees, visibility with customers in quality and supply chain integration can be given through modern communication channels (internet, Facebook, cell phone, email, WhatsApp, etc.). On the other hand, according to 18% of the interviewees, technological developments also facilitate information transfer in a timely way.

Modern communication channels Technological developments

Figure 19. Opinion about how visibility is delivered to customers when integrating Quality and Supply chain

2.2.8. Question No. 8: 36% of the interviewees believe that trust/collaboration integration, visibility and knowledge management is given through the implementation of improvements opportunities defined by stakeholders (suppliers-company-customers) in order to improve their processes. While 27% of them think that this integration is given through stakeholders' alliances, which seeks profit with satisfactory results for all.

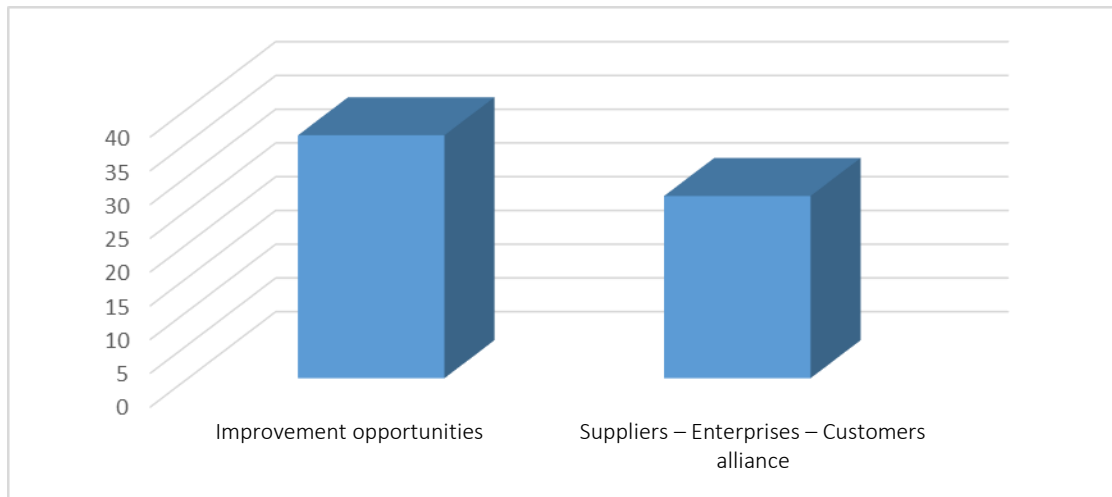


Figure 20. Opinion about how trust/collaboration, visibility and knowledge management are integrated.

2.2.9. Question No.9: interviewees agreed that it is generated a positive impact when integrating quality and supply chain. 45% of them say that it would obtain a better profitability and sustainability. Finally, 36% of them think it would be more efficient and effective.

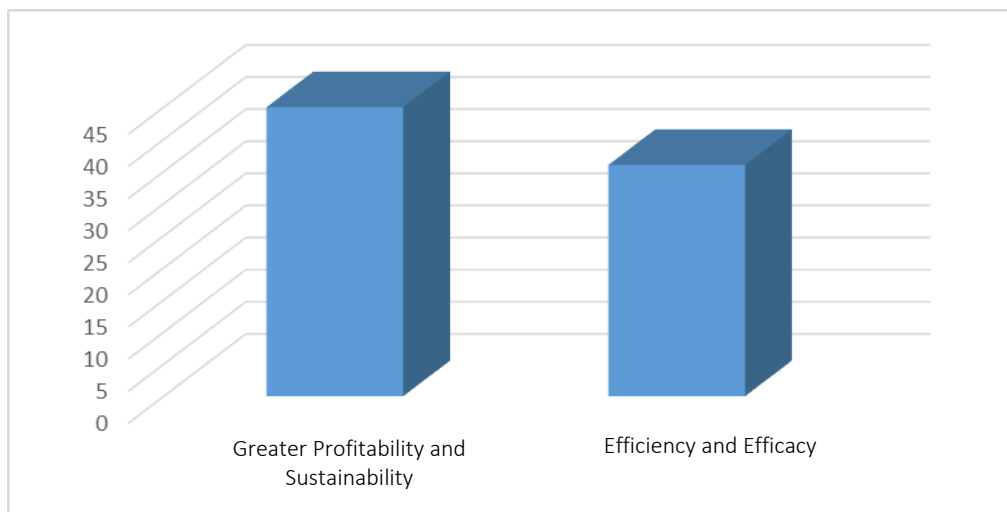


Figure 21. Opinion about the impact of Quality and Supply chain integration in organizations

2.2.10. Question No.10: aforementioned variables are enough to have knowledge of the customer, know their needs, priorities, scopes, and satisfaction levels. Nevertheless, the economic resource required to guarantee quality is fundamental to carry out the integration, the collaborators learning is necessary to harmonize within all the processes as well as to generate satisfactory results. In addition, the teamwork between Suppliers-Organization helps to continuous improvement.

It is important having into account human talent. The success of the implementation depends on how much each of the members of the company has been internalized, the importance of quality, and the philosophy adoption in all areas of organizational life.

3. Conclusions

3.1. Construction sector organization

FMG is certified under ISO 9001:2008, a tool that has given confidence to its customers (internal/external) about the accomplishment of product or service requirements. The evolution stage of the quality concept is "Assurance (QA)". At the same time, it performs Quality Control (QC) in several phases of the process to guarantee the conformity of the product or service, perform inspections (I) to the final product in order to validate compliance with specifications. However, there is a weakness in the quality control performed in the operation and development of daily activities (construction projects), since there are no professional staff neither expert in that area.

FMG has a low level in terms of supply chain. This concept is unknown inside the Company. Instead the above, it has logistics processes responsible for specifying, purchasing, receiving, storing and delivering products at the place and time agreed with the customer, reaching the agreed quantity and quality. However, it does not have a system that integrates distribution channels, suppliers, customers, and final consumers. Neither it has a tool that facilitates the relationship between customers and suppliers through proper stock management, timely delivery, and quality of their supplies. Nor an appropriate software that allows keeping the information centralized, synchronized, and accessible in real time to the actors of the chain.

The supply chain quality management integration level at FMG is considered low, which is based on the inequality of its areas. Because the supply chain term is unknown inside the Company, there are only independent logistics processes not related to each other, nor common objectives aimed at the organizational strategy. Although quality management is at an intermediate level of the evolution stages (quality assurance), there are improvement opportunities, which must be analyzed quickly by those responsible.

In supply chain, quality management integration at FMG, trust and collaboration variables are low too. From the management approach used by FMG: the activities and functions are distributed by areas or departments. They have individual objectives and not sided with the strategy of the organization. The management style is a little participatory, which implies that the processes of the organization are not related to each other, affecting collaboration and final results. On the other hand, collaboration is conceived by the collaborators as additional efforts to the work they perform or simply actions or optional decisions.

3.2. Food manufacturing sector organization

Quality management at TMH S.A is structured and certified in the quality management system ISO 9001: 2008. However, not all stakeholders are aware of the scope of this system. They consider it as the fulfillment of product and documentary requirements. There are found inefficiencies in the achievement of effectiveness about the quality management system. There is also found an improvement opportunity in strengthening leadership in all areas and having the total commitment of top management. Likewise, there is a lack of solid negotiations in relations with suppliers. They should have clear policies, quality agreements, and services related to supply to guarantee an appropriate delivery, as well as satisfaction according to needs and timely fashion.

Supply chain management at TMH S.A presents the required structure. However, from the management point of view, the supply chain is at an average level. Those people involved are not specifically aware of the benefits provided by the supply chain.

In order to achieve the quality and supply chain management integration at TMH S.A, there is necessary more knowledge and involvement of stakeholders, both quality management and supply chain. Therefore, the Company must implement actions to develop more culture. At the same time, it is important to determine the participation degree of CVC variables, trust, visibility, and knowledge management in the company.

The trust and collaboration in the Company TMH S.A are obtained at a low level according to the degree of client-supplier relationship, which must be based on negotiations and quality agreements. If TMH S.A decides to carry out the integration of quality management with supply chain, it should build up alliances between suppliers and customers as one of the main implementations. Regarding real-time information, this Company presents a medium level, due to the lack of exploration and better use of the SAP integrated information system. In addition, there is necessary to improve decision making in a timely way, according to the needs and deviations raised between order and delivery processes. These involve adjustments to the requirements from both suppliers and customers

In supply chain quality management is essential that the company moves from the low level in which it is currently at a high level, given the great impact that knowledge management has on companies like TMH SA, which invests in technology and information systems. They also seek permanent customer satisfaction, be competitive and sustainable.

Despite having considered two companies from productive sectors located in different areas, goods and services, construction and food, structural and organizational capital, defined quality management areas and supply chain through declared processes, such as having specific logistics functions; they present deficiencies in relation to quality and supply chain management, as well as deficiencies to consider the integration of SCQM, reflecting a long way to go.

4. Future research

The selection of two large companies belonging to two economic sectors encourages a continuous research of selected companies in order to setup a representative sample. Paradoxically, SCQM could facilitate actions, processes, and scope within the organization with the aim of having better management indicators. It would also strengthen relations with customers and suppliers, but there are great doubts about the possibility of integration, thus it would be interesting to evaluate this condition. In this exploration, three variables have been selected in order to promote the SCQM integration: collaboration management, visibility management, and human resource management. In addition, it is necessary to explore new perspectives on these selected variables as well as new variables.

5. Acknowledgments

The current exploration was carried out with the support of the I3 group of the Faculty of Engineering of Icesi University, Department of Industrial Engineering. This research was supported by Industrial Engineering Master, as well as Valencia University in the Department of Management, Juan José Renau Piqueras, through the tutors of the Management Organizations Doctorate.

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