Innovation, Technology and Quality

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ABSTRACT

Purpose: The purpose of this study is to understand the relationship between innovation and technology with quality through the review of previous studies and the real perception of individuals. **Project/Methodology/Approach:** The research method used is qualitative. This study carried out based on a literature review and with the application of an online questionnaire, in order to understand the perception of individuals when these terms are addressed.

Findings: The findings are useful for business managers as these three areas are increasingly interconnected, being the path the organization's success. This study contributed to develop this concepts that be so important on nowadays. The focus on quality as a competitive tool is crucial but insufficient, and innovation and technology emerge as a new way of meeting customer requirements and expectations.

Research limitations/implications: The literature review was limited to a database. Future research despite the little bibliography available on this topic, where the innovation and the technology are related to the quality, it's a very pertinent topic to be deepened and suggested for future investigations.

Conclusions: This research concludes that the higher the level of investment in areas such as innovation, technology and quality, the best competitiveness and production performance will have the organizations. With the application of the questionnaire, it verifies that there isn't consensus among individuals on the definition of innovation and quality and even on technology only half of the participants had the same opinion.

Originality/Value: This study contributed to a better perception and systematization of the relationship between quality and innovation.

Keywords: Innovation; Technology; Quality.

Paper type: Literature review.

1. INTRODUTION

In the economic landscape that exists today mind, from the globalization of rapid technological and cultural change, the environmental pollution and the intense exploitation of scarce resources, organizations are forced to improve the day-to-day d their processes to achieve secure its competitiveness in the market and satisfy the needs of its customers.

In view of this situation, organizations are forced to innovate, offering their customers innovative and high quality products and/or services, in order to anticipate and satisfy market needs. Therefore must make rational use of resources, and the innovation of the current most important concepts in all aspects.

The dynamics of innovation and its technological aspects condition sharply our day-to-day at both professional as personnel. People and organizations will have to adapt to change and participate in it by overcoming the challenges they face.

Innovation, based on creativity, is embodied in inventions that in many cases involve new technologies that become new tools, products, services, processes and methods.

Currently, the quality word appears in all walks of life and point out that organizations not to adopt as a guiding principle, very soon cease to exist, since it is increasingly becoming a "must".

Faced with a market that is constantly evolving, with several changes in consumption and business patterns, research and development (R&D) disseminated and boosted innovation, in order to support organizations to acquire competitive advantages.

Innovation and technology are two of the most striking features of today. During human evolution, the pace of change has never been so fast as currently, observing that it tends to accelerate and not to soften. In this context, people and organizations will have to adapt before the new challenges that they will encounter, through something new and better, urging creativity and quality.

These changes can occur in our daily lives, such as airplanes, televisions, mobile phones, headsets that currently connect without any wire, among many others.

This work will give-emphasis on approaches to innovation, the technology and the quality. A qualitative analysis will be carried out through bibliographic research and through the analysis of a questionnaire in order to understand how individuals approach this increasingly important topic today.

2. PERCEPTION OF APPROACHED CONCEPTS: LITERATURE REVIEW

2.1. Innovation

Innovation makes a difference in all organizations, regardless of type or size. Products and services must be in constant innovation so that organizations don't run the risk of being overtaken by competition (Tidd, Bessant, & Pavitt, 2008).

Innovation can be understood as the development and implementation of new ideas by people over time and is based on four factors: new ideas, people, transactions and institutional context (Van de Ven, 1986).

Innovation is the process of translating ideas into useful and usable products, processes or services (Tidd, Bessant, & Pavitt, 2008). Innovation can take many forms and are known as the "4Ps of innovation" as shown in table 1.

Table 1 - Dimensions of change - the 4Ps of innovation.

Innovation	Definition
Product	Alterations in the products and/or services that an organization offers.
Process	Changes in the ways in which products and/or services are created and presented to the consumer.
Position	Changes in the context in which products and/or services are introduced.
Paradigm	Changes in basic mental models that guide what the organization does.

Source: (Tidd, Bessant, & Pavitt, 2008), adapted.

The success of innovation depends on resources such as people, equipment, knowledge and management capacity of the organization, the last being the most difficult to control, but it is what makes or breaks the process (Tidd, Bessant, & Pavitt, 2008).

The organizations that want to innovate must invest in communication values and on objectives related with innovation, in discussions that involve different areas and members of the business, working with agents outside the organization, and also in setting limits that specify an action camp for employees (Cruz, 2014).

As organizations intend to innovate in products or in production processes, the tasks become more uncertain, referring that "(...) the main way to reduce uncertainties is to do things repeatedly, avoiding

innovation. Therefore, innovation becomes the main contingent factor underlying the contingency of the task with uncertainties" (Donaldson, 2008).

The administration of organizations begins to realize that innovation creates lasting advantages and produces changes in the competitive position (Dobni, 2008), being essential for organizational survival in an increasingly competitive market (Serrão, 2009).

The innovation doesn't exist without the invention. The invention is a new idea, a model, a prototype that arises for a new product or process and while innovation consists in putting this idea into practice , being an economic and social application of the invention (Fagerbeg, 2009). The innovation and the invention are clearly related, once innovation comes from the combination of several inventions or adaptation of something that has been invented in other circumstances. Resuming, the innovation assumes to be a multidimensional and systemic process, being an invention with economic significance.

On the table 2 are describes some of the definitions of innovation from the standpoint of some authors.

Table 2 - Some definitions of innovation.

Author	Definition
Schumpeter	The innovation underlies a rupture or discontinuity in relation to the past, associating itself with the expression "creative destruction", which underlies a radical cut with the past.
Drucker	The innovation is an instrument of entrepreneurs, through which they explore change as a new opportunity for a new product and/or service.
Lundvall	The innovation is a cumulative process, with the impossibility of separating invention, innovation and diffusion.
Utterback	Innovation is the conversion of an idea to a first use or sale.
Freeman and Soete	The innovation is the first commercial application or production of a new product or process, taking up the crucial contribution of the entrepreneur in connection process of new ideas with the market.
Deakins and Freel	Innovation is essentially related with the knowledge: creation new knowledge or recombination existing knowledge.

Source: (Carvalho, 2008), adapted.

After analyzing table 2, it can be seen that the authors reveal different perceptions about the concept of innovation.

The innovation is considered as a critical success factor, been necessary that it be established as one competitive advantage, allowing to the companies consubstantiate, in fact, its own differentiation ability in value.

The figure 1 illustrates briefly the concept of innovation.

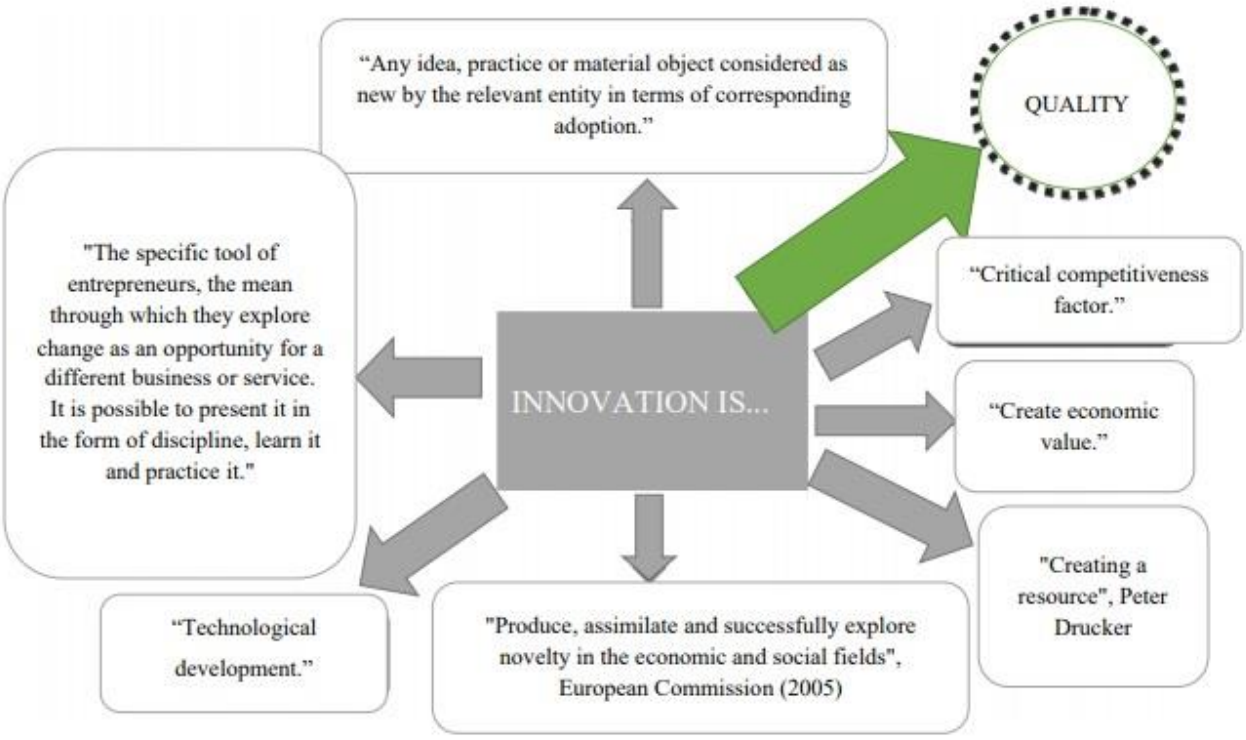


Figure 1 – Some definitions of innovation.

The innovation brings new challenges and advantages to the organization, such as: giving access to new markets, increasing profits, creating jobs, strengthening brands and quality. These advantages are crucial in a globalized world, in which organizations are obliged to compete as in the external market as in internal market, with competitors installed anywhere in the world.

2.2. Technology

The technology can be defined as a group of practical knowledge applications used for a purpose, including the skills and the competencies to apply that knowledge. One of the aspects to highlight about technology is its ability to produce and increase the usefulness of products and/or services (Negas, Carvalho, & Sousa, 2020).

The technology refers to form how an organization works, in other words, how this turns the raw material in products, including in this procedure the machines, the tools, the materials, the people and the knowledge (Chenhall, 2003).

The technology has occupied and occupies an important role throughout the evolution of humanity and can be seen as a lever of human intelligence while species.

Like almost everything, the technology has positive (advantages) and negative (disadvantages) consequences on humanity and it is sometimes difficult to differentiate one from the others. The table 3 shows some advantages and disadvantages related with the technology.

Table 3 - Advantages and disadvantages of the technology.

Advantages	Disadvantages
Increase of food production.	Pollution.
Increase of production the goods and services.	Depletion of natural resources.
Improvements in comfort.	Disturbances in the use of time.
Better use of natural resources.	
Ease of traveling.	Risk of extinction of the human species.
Improvement in communications.	
Improvement in health care.	Great dependence of technology.

Currently, the evolution of technology is so fast that there are authors who classify it as a revolution, once we live in a time of relevant changes due to technology that doesn't tend to slow down (Negas, Carvalho, & Sousa, 2020).

In the current technological revolution, this is replacing or at least changing the jobs that demand and rely on intelligence and not on physical work as it did at the beginning of the 19th century in the industrial revolution.

The technological revolution that we are experiencing today has led to the extinction of many administrative functions performed by humans who performed more elaborate activities. This revolution did, does and will make many people lose their jobs and have to adapt to the new reality, including a reduction of the vast majority of salaries of those who can work. Only individuals who control in the professional skills currently required, a minority, will wage gains.

A little detail about this new reality is that the machines are being used to carry out increasingly elaborate functions, functions such that when performed by humans require many practice and intelligence. As a common example, medical diagnoses arise where increasingly the machines replace human intervention. This type of situation will tend to occur in many other areas and domains of intelligent human work, since the new machines will be able to perform the tasks better and/or at least in a cheaper way (Negas, Carvalho, & Sousa, 2020).

2.3. Quality

There is no concrete definition of quality, since it's a subjective concept that is directly related to the perceptions of each individual. There are several factors that directly influence the definition of quality, such as the culture, the type of product or service, the needs and the expectations. As the term has several uses, its meaning isn't always clear and objective.

The quality is a term difficult to define but easy to recognize, being associated with something good or exceptional. In this way, the quality of a product and/or service is related to its attributes and characteristics that may or may not satisfy the needs of an individual (Gaster & Squires, 2003).

The table 4 presents some definitions of the main quality gurus.

Table 4 - Some definitions of quality.

Author	Definition
Walter A. Shewhart	There are two common aspects in quality. One is the person who clings to the real and objective quality of something, regardless of the existence of men. The other is linked to what we think, feel or experience as a result of this objective reality.
W. Edwards Deming	The ability to satisfy desires.
Joseph M. Juran	Suitability for the use.
Kaoru Ishikawa	The ability to develop, design and produce (...) in the most economical, useful and pleasant way for the customer.
Armand V. Feigenbaum	The best for some customer requirements, being these requirements: utility and selling price of the product.
Geinichi Taguchi	The damage caused to society by the product, from the moment it is sold to the customer.
Philip B. Crosby	Compliance with requirements. Zero defects.
Paulo Sampaio	Give to the customers what they want and try to overcome their expectations.
Portuguese Quality Association (APQ)	The quality is the totality of the characteristics of a product or service that determine its ability to satisfy a given need.

Source: (Oakland, 1994), adapted.

According to the definitions presented, the quality has as main objective the satisfaction and well-being of customers. However, the definition of the concept of quality involves other perspectives, as can be seen in some of them outlined in figure 2.

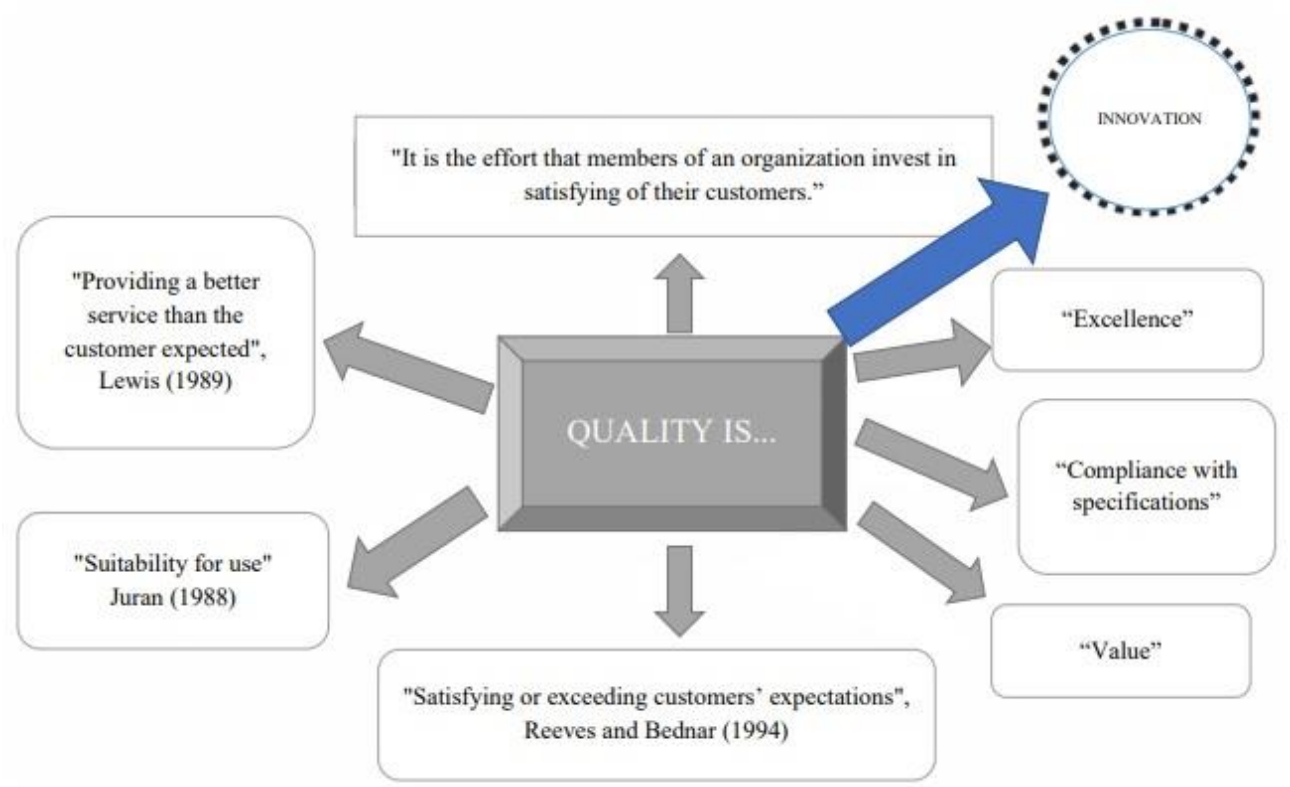


Figure 2 - Quality definitions.

According to the definition in the standard NP EN ISO 9000: 2015 (9000, 2015), the quality is understood as the "degree of satisfaction of requirements given by a set of intrinsic characteristics of an object" and the success of any organization depends directly on the its ability to mobilize and organize the means and the resources necessary to carry out products and/or services that satisfy the requirements, needs and expectations of their customers. Therefore, the quality is the "engine" of the success of any the organization and its recognition, the distinction factor and choice of products and/or services. The development of a culture based on quality principles and their consequent values, will pave the way for the effectiveness and continuous improvement of methods and processes (Pinto & Soares, 2018).

The great competition between the organizations (between the various products and/or services), enhanced by the challenge of increasing globalization of the economy, relaunches and stresses the need to satisfy customers' requirements. Quality is thus a growing imposition whatever the market in which the organization is inserted, in many cases being an important criterion for selection or exclusion. However, the quality of products and/or services is not the result of inspiration or chance: the organization must demonstrably proven that it have the means and resources necessary for the development of quality products and/or services and their continuous improvement, for in order to accompany the growing and natural increase in the demand of its customers.

The organizations began to realize that quality is a non-negotiable factor, that is, the consequences of placing a “non-compliant” product or service on the market are catastrophic and can compromise the organization's future viability.

The highly competitive scenario makes that organizations remain in constant improvement of their products, processes and employees. Many Japanese organizations have adopted “Kaizen” which is a philosophy of personal, organizational and social improvement, and it has contributed considerably to the progress of quality concepts, promoting the concepts reported by Deming, such as, for example, the well-known PDCA Cycle. The Kaizen protected the various Japanese administrative production techniques, such as Total Quality Control, Zero Defect and Just in Time (Robles, 2003).

3. METHODOLOGY

This study is based on a bibliographic search, initially made through the reading of books related to the subject and then through a search and selection of articles in the Google Academic database, focused on the relationship between quality and innovation. The keywords used during the search of the articles were: innovation, quality, technology, relationship between quality and innovation, impact of quality and innovation, link between quality and innovation. The criterion used in the selection of articles was the choice of those articles that directly addressed the relationship between quality and innovation and where this was the central theme of the article.

An online questionnaire will be apply, in order to understand the perception of individuals when these terms are addressed and the research method used will be qualitative.

4. RELATIONSHIP BETWEEN INNOVATION AND TECHNOLOGY WITH QUALITY

After conducting the research, no study has been found that relates the innovation and the technology to quality. This relationship will be addressed between each one separately:

- Innovation and Technology;
- Innovation and Quality;
- Technology and Quality.

The relationship between the innovation and the technology with the quality will be addressed according to the proposals presented in the questionnaire, covered in point 4.

4.1. The relationship between innovation and technology

When society refers to innovation, it is natural to associate the term with an instrument, equipment, software, developed based on the most recent technological advances. Any innovation produces what the author described as "creative destruction" in which the "new stands next to the old" and later takes its place, leaving behind "dead and wounded" but driving progress. In this sense, the innovation may result from new combinations of productive means, designated per technological innovation, which brings with it innovation of the product (goods or services) and innovation of the process (Paiva, Cunha, Junior, & Constantino, 2017).

However, the concept of innovation can't and shouldn't exhaust in hillside of the technological development. Currently, the term is also linked to non-technological innovation. Non-technological innovation may include: the organizational or administrative innovation (namely new forms of work organization or changes in organizational structures); the access to new markets; the adoption of advanced management techniques (such as Total Quality Management or Just in Time on production, or the use of new raw materials less polluting and more environmentally protective). With this, the innovation has ceased to be exclusively focused on the technological aspect, to cover all internal areas within an organization.

The advances in information technology have spurred innovation and change in the collection, measurement, analysis and communication of the information within and between organizations (Burns & Vaivio, 2001).

Analyzing the work of Hyvönen, information technology refers to the highlight of the company in advanced applications of information systems and measurement only of variables that represent the use of information technology innovation in general. These variables include the e-commerce, the *enterprise resource planning* (ERP), the *customer relationship management* (CRM), the supply chain management (SCM) and the data storage (Hyvönen, 2007).

4.2. The relationship between innovation and quality

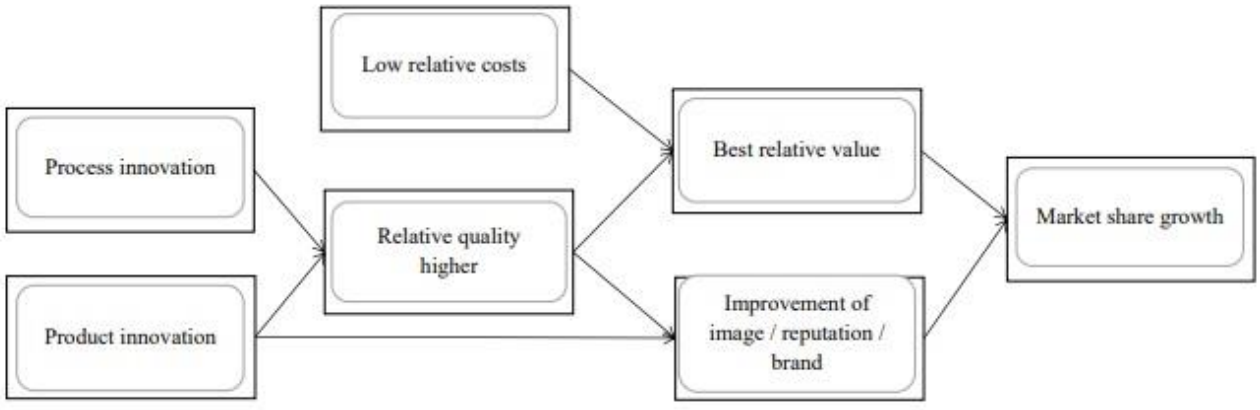
In the business community, the relationship between the quality and the innovation has sparked some controversy, given that there are studies that prove a positive relationship between the quality and the innovation, but there are others that argue the opposite. However, some studies about innovation consider total quality as a form of innovation (Cooper & Schindler, 2003). In this way, the discussion of the relationship between total quality and innovation is fundamental for the success of organizations.

The innovation has several advantages such as granting access to new markets, increase the profit, create new jobs, strengthen the brands and the quality. These advantages have become crucial in a globalized world, where companies are forced to compete as in the external market as in internal market, with competition in any part of the world.

On the other hand, the innovation can be seen at the level of strategy, resource management, design or monitoring of processes, forms of organization and structures, financial aspects, production, distribution, marketing and commercialization, brands, remuneration and reward policies, quality or environmental management, in short, in all activities related to the way of being an organization, which is also a characteristic shared with Total Quality Management.

A strong degree of innovation can be reflected in competition with other organization through the creation of new products, which is generally seen as the influence of the environment. Thus, the organizational structure is caused directly by the internal innovation factor and indirectly by the external environment factor. Thus, as the task of uncertainty increases, through innovation, structural simplicity is reduced and the costs are high, but is rewarded by the benefits of innovation (Donaldson, 2008).

The innovation of the process improves the relative quality, reduces the costs, and consequently, improves the relative value of the product. The innovation of the product also affects the quality, but the biggest effect is to rename and value, which together lead to the increase of the market space (Tidd, Bessant, & Pavitt, 2008), as illustrated in figure 4.



Source: (Tidd, Bessant, & Pavitt, 2008), adapted.

Figure 4 – The relationship between innovation and market performance.

The figure 4 shows a direct relationship between the innovation and the quality.

Next, two quality tools that are associated with innovation will be addressed: the Kaizen and the PDCA cycle.

4.2.1. KAIZEN

The Kaizen is a small innovation in continuous improvement and sits on a philosophy which holds that everything can be improved, involving all employees of an organization (Negas, Carvalho, & Sousa, 2020). The main objective of Kaizen is to eliminate waste, being used mainly in the quality area.

The Japanese companies were the pioneers in the use of this method after the Second World War and after the divulgation and achieving of great success, this method was released worldwide and adopted in many places.

The Kaizen involves all employees of an organization and it consists in the implementation of small improvements suggested by them (the s considered useful ideas are implemented on the same day in which are proposed). This method goes beyond the continuous improvement in productivity once it also contributes to humanize the workplace, such as example, reducing and if it's possible to eliminate hard work.

The good implementation of Kaizen requires the cooperation of the employees of the organizations, once without this cooperation, it isn't possible to obtain the benefits of using this method. The implementation of this method requires changes to made and they should be evaluated, and taking into account the evaluation, should be the adjustments made necessary.

For a good implementation of Kaizen individual suggestions from employees are used that focus on the work they perform and then can be implemented in the workstation of the person who suggested them. This is done with the involvement of a small number of people and if the proposed improvement is a success, it can (and in many cases should) be implemented in other sectors of the organization where appropriate (Negas, Carvalho, & Sousa, 2020).

4.2.2. PDCA CYCLE

PDCA is a circular change process that facilitates the introduction of innovations in organizations that adopt it (Rother, 2010). PDCA is an approach to solve problems, allowing to experiment possible solutions to a given problem in order to identify the improvement before executing it. The process, being circular, is endless and must be repeated indefinitely, having this repetition the purpose of improvement continuously the processes and the products.

This process has similarities to the scientific method which can be summarized as a process where hypotheses are placed, and then realized experiments in order to prove or disprove and

finally, should proceed to the evaluation of the results of these experiments confirming or not the hypotheses initially proposals (Negas, Carvalho, & Sousa, 2020).

The implementation of the PDCA system can provide great benefits to organizations, such as: continuous improvements through a standardized method; reduction and barrier to resources spending in the implementation of inferior or ineffective solutions; promotion of group work and cost reduction.

As for continuous improvements through a standardized method, the PDCA cycle is a standardized method, which provides several advantages, such as the fact that it can be repeated numerous times on new or recurrent issues and it permit go that decisions are made based on objective data and information.

Regarding the reduction and barrier expenditure of resources in the implementation of solutions lower or ineffective, the PDCA cycle is an experimentalist method, that is, it tests possible solutions on a small scale in order to avoid big spending on ineffective solutions.

With regard to the promotion of group work, the PDCA method promotes group work by resorting to the solution of solving problems by calling on everyone involved.

Finally, regarding the reduction costs, the costs of implementation of this method, when compared with the advantages which provide organizations to remove obstacles and inefficiencies, result in an investment completely useful (Negas, Carvalho, & Sousa, 2020).

4.3. The relationship between technology and quality

According to (Baines & Langfield-Smith, 2003), the implementation of advanced industrial technology is a way that organizations present to respond to the high customers orders, ensuring quality, flexibility and confidence in the supply of products. The authors considered for the research some variables, such as: computer aided design (CAD), *Just in Time* (JIT), total quality management (TQM), resource planning, integrated production by computer (CIM) and flexible production systems (Baines & Langfield-Smith, 2003).

5. ANALYSIS AND DISCUSSION OF RESULTS

For this study, the method research realized was qualitative. This was done through bibliographic research and through a shared questionnaire, in order to understand the concepts and the importance of the terms under study for individuals. It was based on multiple choice and direct answers.

The size of the sample in study is irrelevant, once just want to know what it is that the people understand by innovation, technology and quality through a group of options by multiple choice.

Regarding the perception of the relationship of the three variables (innovation, technology and quality), it is intended to understand the opinion of individuals in relation to the topic under study.

5.1. Perception of the concepts under study

According to the study, most individuals define "innovation" as the process of translating ideas into useful and usable products, processes or services and as a multidimensional and systemic process, being an invention with economic significance, as shown in the figure 5.

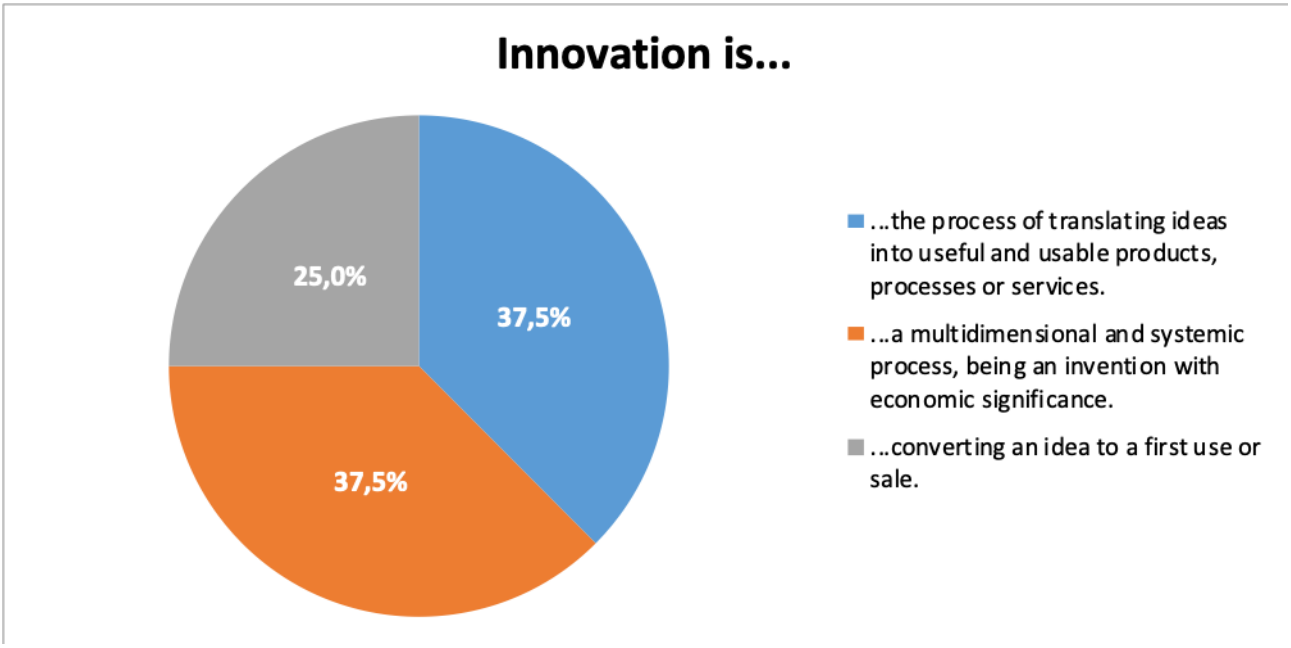


Figure 5 - Perception of the innovation by individuals.

According to the study, most individuals define "technology" as the reality where machines will be used to perform increasingly elaborate functions, functions that when performed by humans require a lot of practice and intelligence. In this concept, there is a consensus among the majority of individuals who participated in the study, as shown in figure 6.

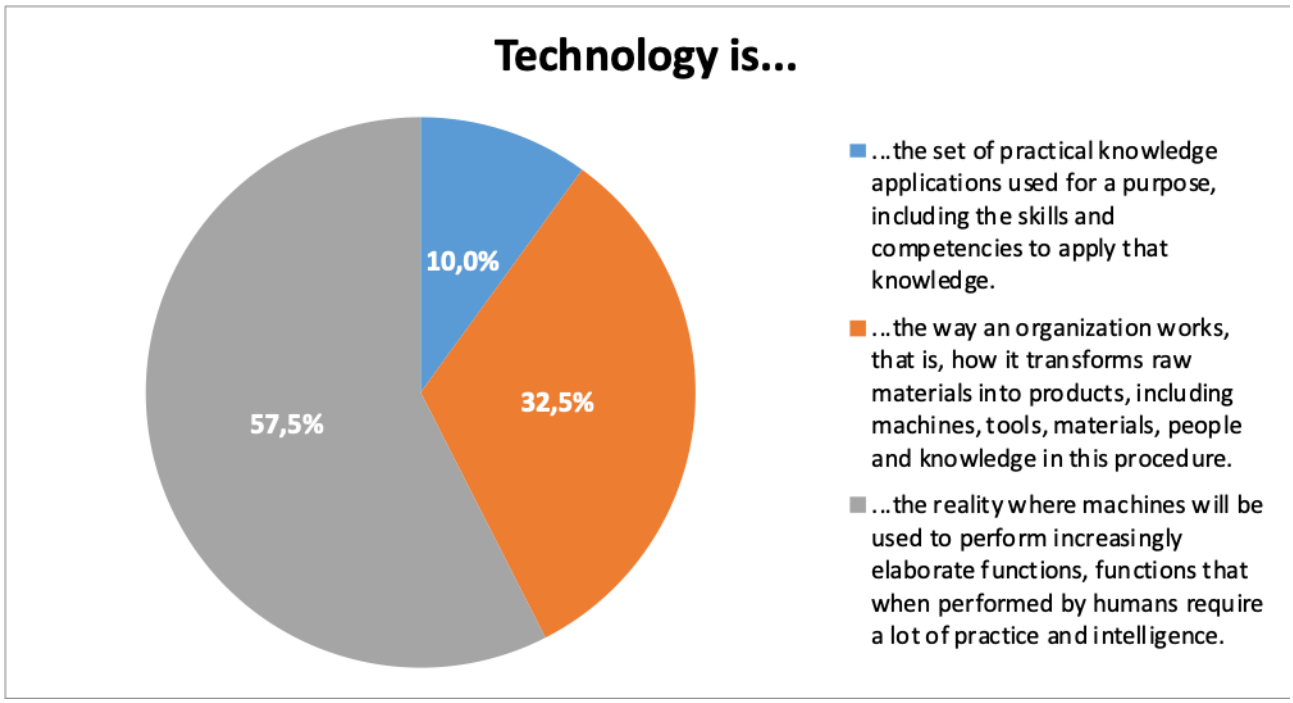


Figure 6 - Perception of the technology by individuals.

According to the study, most individuals define "quality" as being a standardization to give the customers what they want and trying to exceed their expectations, as shown in figure 7. This study itself proves what is mentioned in the literature review, that is, quality is difficult to define and there is no one concrete definition for it.

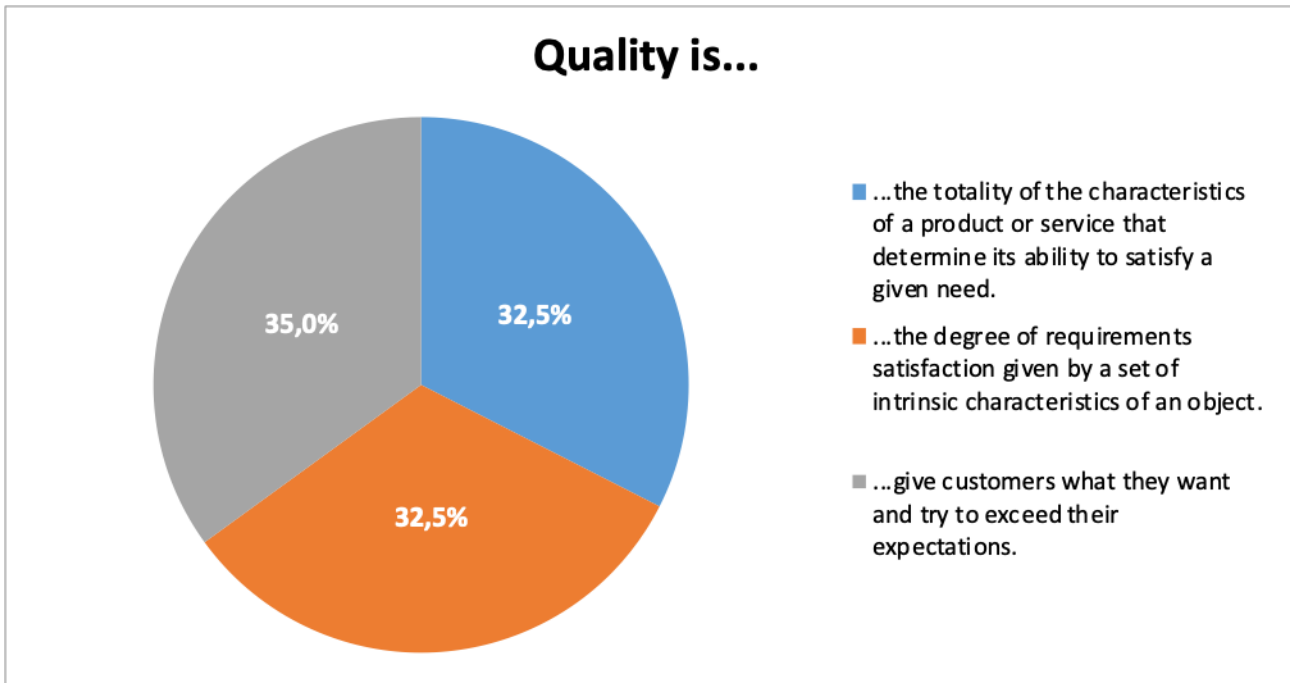


Figure 7 - Perception of the quality by individuals.

5.2. The relationship between innovation and technology

The relationship between innovation and technology is undoubtedly the most noticeable by the individuals who participated in the questionnaire, highlighting this relationship as:

- Essential, since part of the innovation exists due to technological development and vice versa;
- Modernization;
- Doing more and better, reducing waste and increasing the value of products and / or services.
- Direction of the organizations for Industry 4.0;
- The mutual accompaniment of both;
- Satisfaction of the needs to develop a product and / or service and transform it with the help of technology;
- Disruptive (technology helps to refine innovation as something new/different in society).

5.3. The relationship between innovation and quality

Although there is some grounded theory about this relationship, the relationship between innovation and quality is not very noticeable to individuals. This relationship was addressed as:

- Improvement;
- Increased productivity with fewer defects;
- Today's most important differentiating relationship;
- One variable raises the other;
- The quality brings benefits to innovation, when it helps to implement procedural controls, improving it;
- Improvement of internal processes.

5.4. The relationship between technology and quality

As for the relationship between technology and quality, there is almost no information, but it is the most noticeable for individuals, perhaps because it follows the evolution of technology. This relationship was addressed as:

- Industry 4.0;
- Decrease in human resources, therefore decrease in errors;

- Use a particular machine (technology) and achieve maximum quality from it;
- The technology helps to increase the quality, either through an improvement in management system or as an improvement procedural.

5.5. Relationship between innovation and technology with quality

The relationship between innovation and technology with quality is the focus of this study, but in order to understand this relationship, it was necessary to understand the isolated relationships of these variables.

With the questionnaire applied and after all the bibliographic review covered in this study, it can say that the relationship between innovation and technology with quality is seen as:

- Organizational effectiveness and efficiency;
- Facilitated production of a product with fewer defects (producing more and better);
- Evolution;
- The quality is an area that can be interconnected with all other areas. Innovation, sustained with an adequate technological base, goes beyond the requirements of customers through the implementation of quality management systems.

After analyzing the results obtained through the questionnaire applied, it should be noted that in open and direct answers, there is no consensus on the relationship that each variable has with the other, obtaining different opinions. This shows that this is an area that is rarely addressed when related to the three variables, with uncertainties still remaining.

Despite the little bibliography available on this topic, where innovation and technology are related to quality, it is a very pertinent topic to be deepened.

6. CONCLUSION

The quality is the engine of any organization's success. The development of a quality-based culture paves the way for organizational effectiveness and efficiency, enabling the achievement of more for less.

The Kaizen method is based on the idea of continuous improvement through the gradual adoption of small innovations. The PDCA cycle is a process of circular change that involves four phases and aims to identify the best solution to a problem before executing it, also based on the idea of continuous improvement.

Innovating without quality can lead the organization to an ephemeral result. However, the market may not recognize this innovation without quality. In this sense, it is possible to detect signs of convergence between the concepts of quality and innovation, which may result in reciprocal benefits within organizations.

The quality with a view to satisfying the end customer is the other side of innovation, whose purpose will be to create value. In short, the result of the implementation of quality and innovation strategies will lead to the creation of value and, consequently, to the increase in the competitiveness of organizations.

(Alves & Saraiva, 2011) report that the implementation of innovation and quality strategies tend to increase the competitiveness and create value, once your goal is focused on the satisfaction of the end customer.

The presence of the innovation in the quality universe becomes increasingly more visible, especially in the design and the planning of quality in respect to the development of new products and/or services, where innovation is focused on satisfying the needs of customers.

Due to the permanent and fast changing markets, organizations have to be creative and maintain the quality of their products and/or services in order to survive. Thus, innovation and quality are presented as aspects crucial in the functioning of organizations, able to tackle competitiveness, the instability and the requirement.

After conducting this research, it is concluded that the higher the level of investment in areas such as innovation, technology and quality, the best competitiveness and production performance will have the organizations.

As verified in the application of the questionnaire, there isn't consensus among individuals on the definition of innovation and quality and even on technology only half of the participants had the same opinion.

Despite the little bibliography available on this topic, where the innovation and the technology are related to the quality, it's a very pertinent topic to be deepened and suggested for future investigations.

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