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**GESTÃO DE QUALIDADE TOTAL À LUZ DA
ECONOMIA COMPORTAMENTAL – UMA
ABORDAGEM TÉORICA**

**TOTAL QUALITY MANAGEMENT IN LIGHT OF
BEHAVIORAL ECONOMICS - A THEORETICAL
APPROACH**

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Universidade Lusófona de Humanidades e Tecnologias

Escola de Ciências Económicas e das Organizações

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Resumo

Propomos discutir a importância da abordagem econômica comportamental para a tomada de decisões no mundo da gestão. Apresentamos uma avaliação crítica da intervenção da Gestão da Qualidade Total (TQM) a partir desta perspectiva. A TQM é uma abordagem fundamental e exigente para o negócio e fornece padronização de técnicas, procedimentos e princípios. Contudo, é de maior importância que esta abordagem integre as interações do comportamento humano, a influência cultural e as reações individuais que em conjunto descrevem o comportamento humano. Embora a TQM seja responsável por sucessos de alta qualidade, é amplamente reconhecido que ainda há margem para melhorias. Vários autores enfatizam o efeito dos fatores individuais dos trabalhadores e seu impacto no sistema do grupo no desempenho do trabalho e, conseqüentemente nos resultados do TQM. Este estudo tem como objetivo reflectir em que medida o comportamento dos trabalhadores (dimensões comportamentais da decisão humana - heurísticas da ancoragem; disponibilidade; representatividade e efeito framing) pode prejudicar o TQM (em concreto as variáveis de implementação pela gerência; auditorias internas e treino). Utilizamos saberes da teoria da economia comportamental para abrir o debate sobre uma intervenção TQM mais comportamental e desenvolver um ensaio que discuta a teoria do prospecto em relação a processos e vieses de pensamento. Finalmente, propomos a integração das dimensões comportamentais do pensamento humano e seus conseqüentes vieses na TQM.

Palavras-chave: economia comportamental; heurísticas; efeito *framing*; comportamento humano; gestão total da qualidade.

Abstract

We propose to discuss the importance of the behavioral economic approach to decision making in the managerial world. We present a critical assessment of Total Quality Management (TQM) intervention from this perspective. TQM is a fundamental and demanding approach to the business and provides standardization of techniques, procedures, and principles. However, it is of greater importance that this approach integrates the interactions of human behavior, cultural influence, and individual reactions that team up to describe human behavior. Although TQM is responsible for high quality achievements, it is widely recognized that there is still scope for improvement. Several authors emphasize the effect of individual workers factors', and their impact on the group system in job performance, and therefore the outcomes of TQM. (behavioral dimensions of human decision - anchorage heuristics, availability, representativeness, and framing effect) may undermine TQM (specifically, management implementation variables, internal audits and training) . We make use of behavioral economics insights to call for the debate a more behavioral oriented TQM intervention, and develop an essay which discusses the prospect theory regarding thinking processes and biases. Finally, we propose integration of behavioral dimensions of human thinking and its biases into the TQM.

Keywords: behavioral economics; heuristics; framing effect; human behavior; total quality management.

Siglas e Abreviaturas A

BE – Behavioral Economics

TQC – Total Quality Control

TQE – Total Quality Efficiency

TQM – Total Quality Management

S1 – System 1

S2 – System 2

Index

Acknowledgments.....	III
Abstract.....	IV
Resumo.....	V
Acronyms and Abbreviations.....	VI
Index.....	VII
Figures Index.....	IX
Tables Index.....	IX
Introduction.....	10
Methodology.....	12
1. Behavior Economics.....	13
1.1. Making day-to-day decisions: System 1 and System 2.....	15
1.2. Mind Pitfalls: Heuristics and biases.....	23
1.2.1. Anchorage and adjustment.....	24
1.2.2. Availability.....	25
1.2.3. Representativeness.....	26
1.2.4. Framing effect.....	27
1.2.5. Conclusion.....	28
2. TQM: The philosophy of continuous improvement.....	29
2.1. TQM's definition and support theory.....	32
2.2. The influential Authors in TQM.....	36

2.3. TQM critical factors.....	41
3. Behavioral economics applied to TQM.....	43
3.1. Early steps.....	43
3.2. A critical reflection.....	56
Conclusion and future research.....	69
References.....	72

Figures Index

Figure 1 – Variant of a classic experiment that produces a conflict between the two systems.

Figure 2 - Facial expression for interpretation according to S1.

Figure 3 – Facebook office at Mumbai.

Figure 4 - Google office at Dublin.

Figure 5 – A call centre in Bangalore.

Tables Index

Table 1 – Significant events that influenced the development of TQM from 1924 to 1987.

Table 2 - Main Quality authors and their concept of quality.

Table 3 - Differences between the west and Japan, identified by Ishikawa (1985).

Table 4 – Functioning of System 1 and System 2.

Table 5 – Significant studies on behavioral economics field.

Table 6 – Situations that might create biases in the organizational performance.

Table 7 – Salary preferences.

Table 8 – Bonuses system.

Table 9 –Work architecture and rich environmental work.

Introduction

Even though the foundation of Behavior Economics (BE) can be traced back to the 30s, it was during the last decades that it gain relevance in the economic theory as an effective instrument for applied economics and management. This new area of the economics science and, more generally, of the science of economic and social behavior, has gain relevance throughout the world, and serially in the USA and in Europe, as academic departments and research institutes have been created with behavioral teams carrying out ongoing researches on the relationship between economy and behavioral psychology (Angner & Lowenstein, 2012).

In brief, BE studies the social, cognitive, and emotional effects on individuals' and organizations' economic behavior (Angner & Lowenstein, 2012). Although it has been difficult to conceive behavioral economics as a unified discipline, due to its multiple backgrounds, researchers in this area share the common goal of improving the descriptive capacity of the neoclassical economical models, making them more adaptable to human behavior. This objective has been treated considering, either, the possibility of developing new approaches which radically differ from the basic concepts of neoclassical economy, or the hypothesis of changing the fundamental assumption of economically rational decision making (Angner & Lowenstein, 2012). In both cases authors aim to make economic theory converge to new findings related to human behavior, updating the economical neoclassical rationality model.

In 1955, Hebert Simon refutes the neoclassical hypothesis of the economical omniscience agent (*Homo economicus*), introducing the concept of bounded rationality (Simon, 1955). Simon proposes that a decision maker doesn't have full knowledge of the relevant information and is unable to properly evaluate the probabilities of future events. It will be more expectable that he will simplify his strategies based in beliefs which influence the decision-making process (Simon, 1955, 1959).

More recently Kahneman and Tversky (1979), proposes a new approach to the neoclassic economic theory, built upon the mainstream utility theory and discussing the premises and not the whole. This theory - *Prospect theory* - is an economical behavioral theory where decision making is based on psychological principles. It supports that the human being is less willing to take risks when it comes to winning than with loosing, and that the decision-making process considers human behavior characteristics or human behavior strategies, which deviate from the expected economic rationality (Kahneman & Tversky, 1979).

In this dissertation, we want to discuss the importance of this new approach for decision making within the managerial world. For that we choose to make a critical assessment of the Total Quality Management (TQM) program under the perspective of the behavior theory (more precisely the prospect theory).

TQM approach is a crucial and challenging tool for businesses, and it provides prestige near the final consumer and the market. The competitive pressures and the constant necessity to adapt to an ever faster social, industrial and technological evolution, requires the standardization of techniques, practices, principles and common languages within a social cultural multi-diversity. To respond to the appeal for quality of products and services to meet consumer demands, organizations must materialize two key concepts in quality management: "efficiency and effectiveness".

However, the organizations struggle in implementing this approach. Many studies, which tried to explain the reason of this situation, showed a deficit in what concerns the fitting of the practices to the reality.

If the aim is to control the maximum variables in the day-to-day life of companies, it is mandatory to reassess the approach that, not only underestimates the human richness, cultural influence and individual reactions that come together to explain human behavior. More importantly it underestimates the interaction and the dynamics between these variables.

It is of utmost interest to take a closer look at this philosophy, which will be presented in an attempt to contribute to future studies on the relation between the human factors and their adaptation to TQM procedures.

We will be looking to the TQM reality through the eyes of the prospect theory aiming to induce a more behavior based perspective to its implementation.

Our approach will be theoretical, based in a literature review of the fundamentals of the prospect theory and its application to the management decision making (Chapter 1). We then follow with a brief description of TQM and some of criticism that are presented to this model (Chapter 2). We develop our critical revision of the TQM model in Chapter 3, presenting a contribution for its development. We conclude by presenting some proposals for further investigations. In the next two points we present our objectives and the methodology that we will be following.

Methodology

As previously mentioned, this paper aims to reflect on the importance of the decision-making approach within companies and their management. We chose TQM as the application for this study, since it addresses all sectors of a company from top to bottom. Furthermore, TQM involves all workers, divides responsibilities and emphasizes teamwork and communication between workers, team leaders and management. Therefore, it seems safe to say that the TQM procedure focuses on the entire organization, its members, structure and functioning. This was the main reason for our choice, since prospect theory and the approach of decision-making through the human thinking systems influence any decision taken in the entire company, considering that decisions are made by us, humans. We may add that the TQM and the behavioral economy intersect each other, since the first one analyzes all the organizational processes and the second influences the efficiency and effectiveness of these same processes. Our aim is to contribute with an approach that looks at these two grand disciplines as a whole, in which both “hold hands” on a commitment to jointly analyze the data, in order to a continuous improvement in the company.

For this and for future reading, we need to explain certain concepts of behavioral economics. This discipline as coming from the fields of psychology and sociology is based on mostly behavioral studies. The studies presented in Chapter 1 below, are studies that are being replicated with the purpose of concluding different results according to their fields of application. When we address *replication of behavioral studies*, no details of the baseline study can be changed, other than the population to which it is being applied.

This study is theoretical and a reflection of the prospect theory of Kaheman and Tversky (1979) and the systems of thinking that are the base of the decision making (and of this theory), and of how the human decision making can be biased and have a result not as effective and efficient as expected, influencing the business results that TQM analyzes. In this dissertation we used the American Psychological Association (APA) standards, 2001, method (Author, date, page).

1. Behavioral Economics

Behavioral economics (BE) is defined as a study of cognitive social and emotional influences observed on the economical behavior of the individuals (Samson, 2015).

The most important area of development in the field of BE study is human decision making. For the authors of this area of study, the human being hasn't got the capacity to always make the best decision. We tend to calculate the cost-benefit of their actions, studying which is the best stable decision. These behavioral theories support that any individual is intrinsically influenced by memories, emotions and automatic stimulus from the environment surrounding them which will influence the decision making and distort the situation analysis. On the other hand, humans are social beings, driven by characteristics and social emotions like thrust, altruism, reciprocity, awareness of group belonging, among others. The feeling of social belonging is common to every individual and compels us to value social norms. Therefore Social factors are of utmost importance in decision making, thus all the variables influence it.

BE inductions have been meticulously studied and applied in both private and public sectors in fields such as finances, industry, health, energy, development, education and marketing (Samson, 2015). The path of combining economics and behavioral sciences has motivated researches to investigate the human being behavior, creating a "test and learn" culture between companies and even governments (Samson, 2015).

BE started with Herbert Simon (1978) and with his Nobel Prize about the limited rationality of the individual, later Daniel Kahneman won the second Nobel Prize in this area in 2002, and there was a third Nobel awarded in 2012 to Fama, Hansen and Shiller. In 2001, Mathew Rabin, a behavioral economist was commended with the medal John Bates Clark (prize granted by the American Economics Association to American economists younger than 40 years old). Since then and till this day, behavioral economists try to join psychology knowledge to understand how the behavior can influence all and whatsoever traditional economic thought, as for example the utility concept.

The work of Kahneman and Tversky (1979) was the one which elevated this area to a field of actual study. The *Prospect Theory* (Kahneman and Tversky, 1979) was developed as the theory of behavioral economy upon decision making.

This theory explains that one of the main shortcomings of the approach of the Utility Theory is that it doesn't allow earnings to be computed differently than losses - this theory eventually assumed, unintentionally, that the distinction between gains and losses did not matter. Therefore, Prospect theory seeks to understand the real behavior of the decision maker, and it supports that deviations in individuals' real behavior from normative models are too generalized to be ignored, as well as too systematic to be dismissed as random errors.

The prospect theory differs from the utility theory in several points:

- 1) It highlights the differences between the terms utility and value: utility is defined in terms of net wealth, and value is given in terms of gains and losses, which in turn are defined as deviations (positive or negative) from to a certain reference point;

2) In this theory the value-for-loss function is different from the value function for gains, since in the field of losses the function becomes convex and steeper. On the other hand, in the field of gains the function is concave and not so steep.

This led to the studies of Behavioral Economics, with the intent to study the human behavior before the decision making, therefore the fields of psychology and sociology sciences have crucial contributes to benefit BE.

1.1. Making day-to-day decisions: SYSTEM 1 AND SYSTEM 2

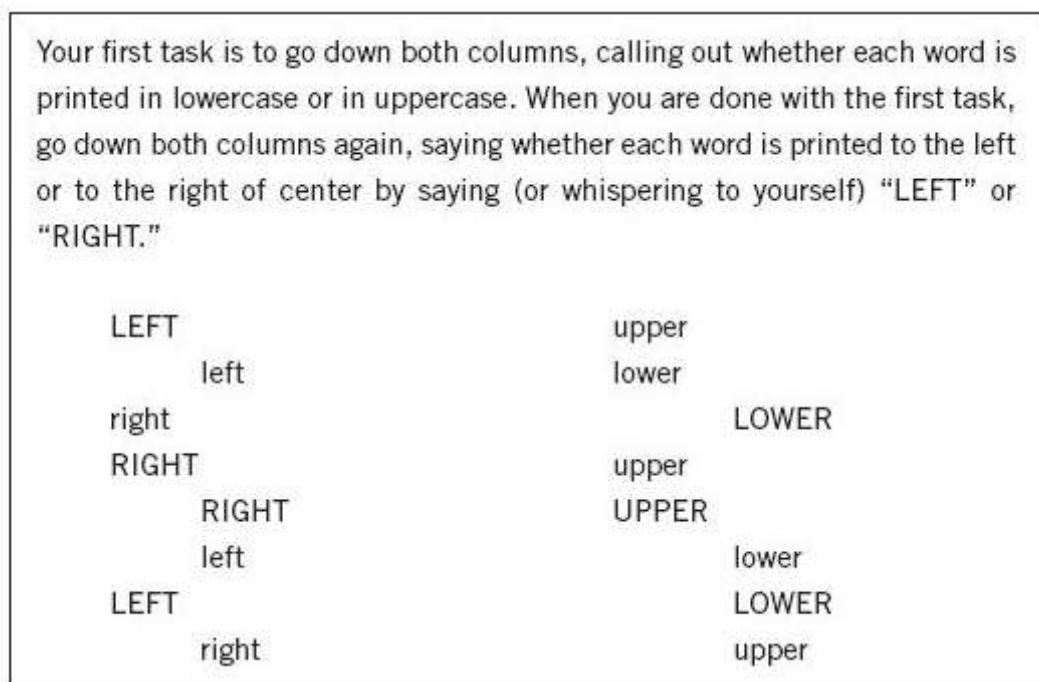
In order to present an analysis in behavioral science perspective, we must start by exploring the world of reasoning and how it influences our decision making. The seminal work of Tversky and Kahneman on heuristics and bias (Tversky and Kahneman, 1974) highlight some important factors which influence this process. The two ways of thinking studied by Kahneman in 2002 (article which granted him a Nobel Price) must be taken under consideration to understand the reasoning mechanisms and their post influences. Kahneman (2002) describes both systems, pointing out their unique complexities, explaining when one acts and when the other is called to action. System 1 is mainly evocative: intuitive, automatic, inconsistent (without any sensation of voluntary control); effortless; naive and subjected to heuristics. Under this first system people answers to questions in a quick way, using associations and similarities. On the other hand, system 2 searches in the various mental activities interlinked to the solution of the situation in analysis, distributes the attention throughout them and works complex calculations to obtain an answer, taking into account that their operations are often linked to the subjective experience, choice and focus; it is: conscientious, slow and controlled, deliberate, hardworking, statistically based, suspicious and lazy (taking large quantities of attention/focus). In short we can conclude that the system 1 is based on intuition whereas system 2 in the concept of thinking.

Evans and Stanovich (2013) have made further assumptions in which they suggest the existence of two evolutionary apart cerebral systems, responsible for these two types of

handling. Various authors suggest the idea that there are two forms of cognitive thinking, one that is instinctive and animal as well as one other exclusively (or distinctively) human, able to reflect and proceed with cognitive actions (Kahneman,2003); Evans & Stanovich, 2013).

Below you may find a game that was proposed by Kahneman (2011) in his book *Thinking Fast and Slow*, which will demonstrate a better understanding on how the two types of thinking function. Please try this exercise before continue reading.

Figure 1 – Variant of a classic experiment that produces a conflict between the two systems.



Source: Kahneman (2011)

Probably you succeeded in saying the correct words in both assignments, and surely you found out that some parts of each task were way easier than others. When identifying upper-and lowercase, the column on your left was easy but the right-hand column made you slow down and maybe stammer or stumble when you state the position of the words; moreover the left-hand column was difficult whereas the right-hand was much easier. These tasks arise system 2, because saying "upper/lower" or "right/left" is not what you usually do

when looking down a column of words. What you did when you here setting up the task was to prepare your memory, and the relevant words (upper and Lower for the first task) were right in "the tip of your tongue". The priority established by these words was effective and just a mild temptation to read others was quite easy to resist in the first column. On the other hand the second column was harder because it had words your mind was set for and could not be ignored. You were able to respond in a correct way most of the time, but overcoming the competing answer was not easy, and slowed you down. A conflict between a task you wanted to fulfill and an automatic response which interfered with it, was an experience of the conflict of the answer of system 1 (automatic) and system 2 (rational).

We all had the experience of trying not to lose control of a car sliding on the ice in places with harsh winters with icy roads. We have stored in our memory the instructions on how to react, and we fight to follow those well-researched instructions which are the opposite of what we usually do: "steer into the skid, and never use your brakes!" - this is another example of the automatic answer of system 1 and the rational and conscientious answer of system 2 (Kahneman, 2012).

For a better understanding of this theme it will be important to make a descriptive approach of the main attributes of each system and the relation between them.

System 1 (S1)

S1 is described in the literature as a way of reasoning shared with other animals species. It is characterized as unconscious, implicitly, automatic, requiring little effort, of quick execution and of high capacity. However, this system can lead to emotions and conscientious intuitions. (Kahneman, 2012).

In terms of information processing and respective answer, there are quick, automatic, unconscious, parallel processes involved in which only the final product is conscious. It is triggered unwillingly and it is intimately connected to the instinct/innate, which results in a functioning by default. In short: it is a functioning that answers to autonomous systems, which

do not require controlled attention, thus they do not use the work memory and allow the quick processing of a huge amount of information (Kahneman, 2012).

The S1 is independent from the intellectual capacity so it works at the concrete level of thinking (contextual and specific), resulting in being fallible and presenting constant biases and systematic error (heuristics). Example given of a typical S1 respond situation: the interpretation of a face expression occurs in an automatic way, effortlessly, and quick through S1(Kahneman, 2012). Below we can analyze the figure with the facial expression chosen by Kahneman (2011).

Figure 2 - Facial expression for interpretation according to S1.



Source: Kahneman, 2012.

Naturally the reader interpreted this facial expression as angry - this is a typical response of system S1. It is often defined as based on experience, reflecting not only the explicit learning but also beliefs and previous knowledge (Evens, 2013). The S1 is responsible for the associative activation of the process (Evans, 2007). The impulse responsible for the actions is due to S1. So, S1 provides matters that can be transformed into beliefs, and it is the source of impulses that frequently become our choices and actions, it is a credulous system and biased by beliefs (Kahneman, 2012).

System 2 (S2)

The S2 is innate to the human species, able to reflect in a conscious way and proceed to cognitive actions (Evans, 2007; Kahneman, 2012).

It is able to monitor our behavior. It is conscious and controlled, of general dominium and requires access to work memory. It uses the conscience and the work memory capacity which explains its slow nature, sequential and limited S2. Besides it needs to mobilize quite a lot of attention and separate itself from other tasks to achieve a deliberative reasoning. It also presents characteristics: it is explicit, it demands high logical effort, of limited analytical capacity. It is a way of thinking under voluntary control, which can be based in unconscious procedures of S1 (Kahneman, 2012). The S2 is in charge of abstract thinking (Evans, 2007) we can give as an example the calculation of a complicated arithmetic, which involves slow thinking and following of several steps. Here Kahneman (2011) supports that it is necessary to mobilize the knowledge acquired throughout life about multiplication, in order to achieve its solution. It requires a deliberate and industrious mental work, that only the S2 is able to perform (Kahneman, 2012). Due to the need of concentration, being this limited, it is only possible to dedicate oneself to two distinct tasks without compromising the performance, and this only if they are not very demanding (Kahneman, 2012).

Relationship between S1 and S2

S2 requires the functioning of System 1, however S1 never demands the activity of S2 (Kahneman, 2012). This author (2011) admits that S1 provides an answer by default, through the intuition and impulse which reflects the lack of effort or motivation more than a cognitive capacity limitation. Kahneman (2002) suggests that system 2 only takes action whenever the circumstances call for it, that is when system 1 is unable to provide a solution to the situation or when there is a mistake of the system in providing the answer. So, the conclusion reached is that many of our real choices in life, even the ones of major importance

come from system 1, and are therefore submitted to recurring and bias significant errors in what regards the economic pattern model (Kahneman, 2002).

Let's analyze the following example a group of people is asked to individually estimate the total number of murders in Detroit in one year; to another group is asked to individually estimate the total numbers of murders in Michigan in one year. The analysis of the answers reaches the conclusion that in average the first group presented a higher number of murders than the second. Kahneman (2002) that the system 1 analysis was predominant. Detroit represents a violent city, connected with many murders; whereas Michigan is known by farm lands. The lacking of system 2 analysis, being the fact that Detroit is located in Michigan, does not come to mind of the second group of interviewers, leading them to a logic basic "infraction".

Intuitive answers are allowed by S2 since they do not interfere with hypothetical thought. The thinking intervention of S2 occurs more often when the individuals have extra time to think, they come more motivated by the context or by their own personality. S1 creates intuitions and impressions which supported by S2 turn into beliefs; and S2 origins voluntary actions derived by the emotions created by S1 (Kahneman, 2002).

In the literature it is admitted that there is a work division between S1 and S2 which leads to an increase in performance, allowing a lessen effort. The S2 provides the basis for the hypothetical thought which leads the individuals to have a greater rationality in decision making, thus the controlled cognitive processes are correlated with individual differences in terms of general intelligence and memory work capacity (Kahneman, 2002).

However, it is necessary to stress that the unconscious procedures of System 1, such as heuristics which can be defined as brain shortcuts, that will be discussed in the next chapter.

It is important to in mind that S1 controls the behavior by nature, and the reverse only happens if a conscientious control effort is made by S2. Sometimes, there occur conflict situations between the two reasoning methods. This happens when the individual is led to have an automatic response provided by S1, yet tries to control it by S2. In the latter, the S2

goal is to beat the S1 impulses, making an auto-control; when S2 is busy the auto-control is weakened, making the S2 more efficient (Kahneman, 2012). The table below synthesizes and compares the two types of system functioning.

Table 4 – Functioning of System 1 and System 2.

System 1	System 2
Unconscious process (despite emotions and conscientious intuitions are triggered)	Conscientious process (with the support of unconscious mechanism)
Implicit	Explicit
Automatic (always active)	Controlled (depending on the general intelligence and of the memory capacity of individual work)/sequential/abstract. Controls the answers of system 1. The two systems may confront themselves, like the system 1 giving answers by impulse and system 2 by deliberation. The late only succeeds if auto control does not allow the answer from system 1
Little effort demand	High effort demand
Quick execution	Slow execution
High capacity	Limited capacity
Involuntary/instinctive/innate	Voluntary/analytical
First to be triggered in analyses of the situation. Very subjected to heuristics and biases of the thinking. It creates intuitions and impressions which supported by system 2 become beliefs. Independent from the	Only triggered if system 1 is unable to provide answer and consequently less exposed to thinking heuristics and biases. It is also invited to answer when individuals have more time to think or are more motivated by the context or by the

intellectual capacity.	characteristics of the personality itself.
Autonomous system, without attention, work memory controlled	Access attention /concentration/work memory, inner capacity.
Allows large process mentor information quantity	Limited information procedure
Supports the answer in previous experiences, beliefs (association memory)	Based on deliberations, rules, logical and to intuitions and sensations associative of system 1
Product resultant of conscious process	Resulting product of the conscious process
E.g. Interpretation of an emotional face expression	E.g. Arithmetic
Methods of inducing the two types of reasoning	
Time limit - the shorter the time the less system 2 comes into action; Simultaneous tasks - system 2 is dependent on the concentration given , the more exigent the task , the worse is the activation of system 1; Humour - unhappy, uncomfortable or suspicious individuals, analyse the information in a more deliberate way. When preventing system 1 to work, they become less intuitive. Happy disposition weakens the control of system 2 , enabling error occurrence; Task relevance -focus on relevance of the decision may be a form of increasing the using of system 2.	

Source: Based on Kahneman, 2012

1.2. Mind Pitfalls: Heuristics and biases

Heuristic is a method or process created with the aim of finding solutions for a problem. It is a simplifier procedure (not simplistic) which facing difficult questions substitute these for other easier to solve in order to find viable answers, even if not perfect. Such a procedure can either be a deliberate technique of problem solving, or an automatic behavioral procedure, intuitive and unconscious. Generally speaking, heuristics are useful, but sometimes they can lead to severe systematic mistakes. (Tversky &Kahaneman, 1974).

The field of investigation called *Heuristics and Biases* is studied since the beginning of the 50s and 60s and derives from a vast ensemble of researches in psychology which foreseen that human judgments are less coherent than mathematical models such as the one proposed by Bayes Theorem (Tonetto, Kalil Melo, Schneider & Stein 2006). In the 1955/56 Simon presented the theorem of Limited Rationality which has for basis that people seek solutions which meet their aspirations, simplifying the search for a solution of a decisive problem, where limitations of time and mental work are extremely important in decision making (Tonetto *et al.*, 2006). Since 1974, these researches revealed that the human being is unable to master rationally, conception originated in classic researches about decision making, originated in Economic Sciences (Tonnetto et al.2006).

Based on the research in heuristics and biases, Tversky and Kahneman (1974) stand that to deal with a complex and rapidly shifting world we developed simple ways of reasoning, where heuristics play the part of simplifying the cognitive process which has to judge alternatives under uncertainties.

Analysing the focus of this study which goal is to discuss the effects of individual actions inside the group of an organization, we can understand how these heuristics are able to induce individual and group behaviors, which may consequently result in biases to the organization and thus compromise its sustainability.

As previously demonstrated many of our daily decisions making are made under uncertainty when we do not know the odds of the possible outcome. There are important and

risky decisions where the decision maker has access to information of the risk probability, however many of finance investment decisions, environmental disasters, insurance and medical diagnosis are more and more taken without the sufficient knowledge of relevant probabilities (Mellers, Swartz & Cooke, 1998 quoted by Tonetto *et al.*, 2006). So we study the three more often used heuristics in judgments of uncertainty, revealed in the seminal study of Tversky & Kahneman (1974): a) anchorage and adjustment, usually used in numeric predictions when there is an initial value available; b) availability (of instance or scenarios) it evaluates the frequency of a class or the plausibility of a particular development; c) representativeness, judgment by the probability of an event or object A belonging to class or process B.

1.2.1. Anchorage and adjustment

This heuristic is a particular cognitive process that emerges while evaluating the possibility of some event occurring through an anchor (base), from where its final dynamic forecast is adjusted. Even though this heuristic is extremely useful in judgments and decisions, by the gain of time, not by the cognitive effort, usually the final answer tends to be biased in relation towards the anchor, in spite the irrelevance of the anchor (e.g. An arbitrary number provided by the researcher (Tversky & Kahneman, 1974).

In one of their studies Tversky & Kahneman (1974), asked people to estimate the percentage of African countries in the United Nations. The group who received 10 as the initial anchor, estimated in average 25%, while the group who received 65 as initial value estimated in average 45%. In this example it is clear the continuous adjustments towards the initial anchor.

When putting this heuristic in an organizational context, we can reflect the personal or investments evaluations. Let's imagine that the organization has a basis value as the reference point for the evaluations of the employees, and on the other hand, the employees estimate a reference point lower than the organizations' estimate. It can be observed with a great constancy is that regardless of the initial value established by the organization, the adjustments made tend to be insufficient because the employee tends to make an unconscious

effort to reach the value he as estimated from the start. Thus, we can achieve different solutions to the same problem, depending on initial values.

1.2.2. Availability

Availability regards exclusively to the easiness that a certain fact is remembered or imagined by the individual (through evoking memory examples), what can create the bias and a hyper or underestimate of the frequency probability of this event occur (Tversky & Kahneman, 1974).

Our memory tends to vividly evaluate the situation through previous experiences, what constitutes a cognitive short cut which Tverky and Kahneman (1974) named availability.

As an example of these authors' study (1974) it was asked to a group of people to estimate the degree of violence of their city (with the probability that some of the people had already been victims of some sort of violence themselves or having already watched a TV documentary about the matter) people who had already been exposed to some sort of urban violence either real or explanatory estimated the risk of aggression as being more intense than those who had had none negative experience whatsoever in this field.

According to the organizational context, it can be said that the managers estimate the frequency, probability or plausible causes of an event having into account the degree in which circumstances or happenings are available in the memory (Tversky, Slovic, Kahneman, 1990). We can state for sure that an event which arose emotions is easier imagined and remembered than one other that had been neutral and therefore difficult to remember. This can cause a constant sanction towards the worker by a memorable happening (which can be linked to the information connected with other factors not related to the objective frequency of the situation).

1.3.3. Representativeness

Representativeness is based on the stereotype judgement, where the foundations of the judgement are mental models of reference. There are some kind of typical examples which favour the use of representativeness, such as many of the probabilistic questions (e.g. “which are the probabilities of object **A** belong to class **B**? Which is the perspective of the event **A** being originated in process **B**?” (Tversky & Kahaneman, 1974, p. 1124)). Let us try then to answer such questions. The most reasonable would be to evaluate the probabilities from level **A** in which **A** is similar to **B**, using that way the representativeness as basis of its probable reasoning. An example given by Tversky and Kahneman (1974) help in understanding this heuristic:

Whereas an individual is very shy and withdrawn, he is always ready to help, but has little interest in people and the world around them; It is peaceful and organized; has need for order and structure and a passion for detail. Moreover, we can assume that this individual is engaged in a particular profession.

Thus, based on individual characteristics of people tend to imagine the possible his profession using the stereotype of various professions (e.g.: physical, mathematical, librarian, salesperson, doctor or farmer). However, using this approach the probability of judgments can lead to serious errors, since the similarity (or representation) is not influenced by several factors should affect probability of judgments.

This heuristic disrespects several criteria, which were numbered by the authors (Tversky & Kaheman, 1974):

1) Size of the sample - the probabilities are evaluated concerning the correspondent parameter in the population (sample). When applying this heuristic, we fail by not taking in consideration the size of the sample, even when this is stressed in the problem formulation.

2) The (small numbers law) (Tversky & Kahneman, 1971) - idea that a sequence of events created by a random process represents its determinant characteristics, even when it is

a small sequence, making the belief that random population samples are more alike to this than to other predictions from sample statistics theory.

3) Sensitivity to prediction - it is usual the choosing by the representative while dealing with numeric predictions, such as the future economic scenario or the result of a specific investment.

4) Fallacy of conjunction (Eysenk, 2001 quoted by Tornett et al.2006) - erroneous belief that the combination of two events are more likely to occur than only one of them.

We can conclude that in general there is a substitution of probable laws by heuristics, perceived by all of us as safe and reliable, because they translate reasonable estimates in various situations despite their margin to run out of course.

Organizationally, it is simple to understand that managers estimate the probability of the happening of an event throughout their similarity with its stereotypes. When this situation is misinterpreted, it can have consequences translated in irrational behaviors or morally condemned ones – such as discrimination.

It is a given fact that heuristics are cognitive tools which we use to simplify decision making; however these can be subject to several biases of our thoughts which again can result in mischief. It is mentally impossible without them to work our innumerable, quick and demanding daily decisions. Individually, each one of us ought to be extremely careful with the possible heuristics biases. Organizationally it is of vital importance to deepen the studies of several areas which concern these individual variables which affect all the outcome of an organization and may put at risk its sustainability.

1.2.4. Framing effect

Even though framing effect does not represent a heuristic we would like to develop it a little further, since we consider it responsible for the potential of the stimulation for the search of continuous improvement. This effect is built on contexts/form in which choices/problems are presented (Kahneman, 2002).

Reger , Gustafson , Demarie , Mullane (1994) supports that framing, that is, the form in which the TQM approach is presented to the collaborators of an organization is indispensable from the start. As previously described, *Prospect Theory* (Kahneman & Tversky, 1979) supports that each decision taken tends to be evaluated in an independent form, where profit and losses are evaluated from a neutral reference point, resulting in answers associated to this point. Framing effect came to support the idea that the way perspective is presented the neutral point can origin different decision making, thus Kahneman & Tversky (1979) argued that the loss can be more enriched than the profit-events of less probability of achievement tend to be overrated whereas events with medium and big probability of occurring tend to be underrated (Kahneman & Tversky, 1979). Let us take the example given in the work of Kahneman (2002): facing a scenario of an Asian disease - imagine that the USA is preparing for an outbreak of a rare Asian disease, which is likely to kill 600 people. There are two alternative plans to fight the disease which are based on the consequences calculated in exact and scientific estimates if program A is adopted 200 people are saved, whereas if program B is adopted , there is the possibility of a third of the 600 people are saved and two thirds perish. In this situation the major part of the participants choose program **A**. The fact that this program only mentioned the people, who were saved, causes its bigger acceptance vs. program **B** which also mentioned the deaths.

1.2.5. Conclusion

Heuristics are cognitive mechanisms that create adaptive approaches that reduce time and effort in judgments, but which can lead to errors and biases. The suppression of logic

favors establish of a vicious circle, since most of the times, the results of the judgments made by heuristic are satisfactory for us, which makes their use frequent and unconscious. However, did you have already tried to imagine your daily decision without their instant “help”? Possibly your life would be summed up to evaluate alternatives. There are pros and cons in their use, but we cannot question the necessity of its existence, considering our demanding life in the contemporary world. When we are confronted with a decision of high relevance or complexity, we must take under consideration that there may arise possible errors and biases that heuristics can lead to. Organizationally this has a huge impact since it is an environment in which behaviors favor to the sustainability of the company are wished for, so it will be a wise choice to use framings that will enhance such behaviors. There are several authors that state that there are adaptive ways of minimizing these errors and biases. This work focuses on a contribution to a TQM philosophy that takes into account the theory of human behavior. To do so, in the next chapter we will present the TQM approach, exploring from its historical evolution to its definition, principles and critical factors.

2. TQM: The philosophy of continuous improvement

Quality management emerges with the need of supporting industrial expansion. Social, political and economical conjuncture both in our country and all over the world are going through constant adaptation to ensure a sustainable economic growth. The commercial expansion lead to a new understanding of markets in a global way. With the internalization of markets and the export of goods, new challenges have arisen, which are inherent in a broader and fiercer competitiveness.

In this global environment, firms are incentivized to continuously innovate and differentiate their goods and services. Quality of products and management become of central importance in a market where fierce competition is the rule and the certification and supervision of procedures are the new standard to which firms must comply.

Martinez-Lorente, Dewhurst, and Dale (1998) developed a historical perspective of the TQM's evolution, where they described the most significant events that influenced the

development of this concept from 1924 to 1987, underlining the many changes it has undergone, in the past eight decades. The following table (Table 1) presents details of the historical perspective.

Table 2.1. – Significant events that influenced the development of TQM from 1924 to 1987.

Year	TQM Development
1924 -1932	Harwthorne studies demonstrate the importance of the social and psychological climate in work.
1924	Shewhart developed statistical process control.
1926	The Bell Telephone began to apply statistical control methods.
Mid-1940s	During World War II, there was the need of the American army sampling methods, which pushed it.
1950s	A large number of attempts at work improvement were undertaken (e.g. job enrichment, work redesign, participative management, quality of work life and worker involvement).
1950	First visit of Deming to Japan.
1951	Foundation of <i>Deming Application Prize</i> in Japan. First Edition of Juran's <i>Quality Control Handbook</i> .
1954	First visit of Juran to Japan. Maslow theories about the human needs: Maslow's pyramid
1960	Liberalization of economy in Japan with pressure to improve quality to compete with foreign companies. McGregor's X and Y theories. Ishikawa's (founder of the Japanese quality control – QCC circles) created the philosophy that is base for quality circles.
1961	First edition of Feigenbaum's <i>Total Quality Control</i> .
1962	The Japanese first issue of the journal <i>Quality Control for the Foreman</i> wrote about the idea of quality circles .
Late 1960s and	The American companies began to be felt the pressure of Japanese

early 1970s	companies.
1972s	Mitsubishi's Kobe shipyard site advanced with QDF.
1973	After the 1973 oil crisis the JIT system was adopted by a vast number of Japanese companies. A small number of American and European companies began to apply this system in the 1980s.
Mid-1970s	Quality circles began to be exploited: in the USA the first quality circle programme was launched in Lockheed in 1974; in the UK it was Rolls-Royce which introduced the concept in 1979.
1979	First edition of <i>Croby's Quality is Free</i> . Xerox Corp. started to apply the benchmarking concept series. Publication of the BS5750 quality management series.
1980	NBC television documentary proposed Deming as key element to this miracle – title: <i>Japanese miracle</i> .
1982	First edition of Deming's <i>Quality, Productivity and Competitive Position</i> .
1983	Garvin published in Harvard Business Review the article <i>Quality on the line</i> . The article examined the differences between Japanese and American companies, and exposed the causes for enhanced performance of the first. Harvard Business Review also published a paper about Taguchi's design of experiments.
1985	Creation of the concept of <i>Total Quality Management</i> by the Naval Air Systems Command, who named the Japanese-style management approach by it.
1986	First edition of Deming's <i>Out of Crisis</i> , which has become a bestseller.
1987	First edition of ISO9000 quality management series. Publication of the <i>Malcolm Baldrige National Quality Award</i> .

Source: Based on Martinez-Lorente *et al.* (1998); Lopes e Capricho (2007)

In Portugal, the quality management principles and its consequent reformulations were introduced in a more serious way during the 90s along with the Portuguese certification system, which was a consequence of the normalization process. With the adoption of quality

norms various companies saw the opportunity to implement management systems with a global perspective involving the whole of the organization. According to Lopes e Capricho

“The Portuguese Quality System, how it works, and the instruments deployed in the field, can decisively contribute to improving the productivity and competitiveness of Portuguese companies by disseminating practices that can improve the performance of organizations, creating incentives to reward the Companies that present best practices or carry out audits to punish companies that violate the law and damage the quality of life of citizens.” (Lopes & Capricho, 2007, p. 88)

2.1. TQM’s definition and support theory

Although there is not an unique universal definition of TQM, we can consider that it is based on five main aspects: continuous improvement towards the customer, planning, continuous training, continuous measurement and control considering a work-team. As the authors Lopes and Capricho (2007, p. 32) have described

“(…)in the definition of the concept of Total Quality, in consonance with some of the most famous investigators, there is a conformity in considering it as a managerial philosophy, being implicit that in the various perspectives quality, in its essence, must be focused in the client and in his needs (...).

It is important to note that total quality is not the same as traditional quality. According to Bank (1998, quoted by Lopes & Capricho, 2007), the main differences are that the first one has the objective of obtaining zero defects and aims to reduce costs; uses prevention as a standard; involves all elements of the company and places them as participants in problem solving teams. The second approach - traditional quality - establishes acceptable levels of quality; instead of using prevention it reacts to problems; becomes expensive; only involves some of the workers who face the problems in the face. In this study

we will be focused in total quality (TQM). In this approach all workforce is fundamental in planning and management of companies' resources. Briefly, we can advance that Total Quality Management involves all aspects of business activity through a comprehensive analysis and implementation of quality management principle (Dahlgaard, Kristensen & Kanji 2007). TQM implements in particular, the tools and specific training necessary to improve the skills of individual workers, viewing the self-managing and planning of their own work (Calarge & Lima 2001). Calarge and Lima (2001) support that the customer's concept should be viewed internally and/or externally, considering that in an organization there are infinite chains of suppliers and customers, who indeed build up the core of the total quality.

The implementation of the TQM implies an internal change of management practices, starting by a top management change of mentality and demands an evaluation performance system to be permanently side by side with the actions to be developed.

So TQM not only absorbs the continuous quality improvement (at the practical level) but also total quality. According to Calarge and Lima (2001) the following steps are to be taken into consideration:

- 1) Choice of an area for improvement: to reduce default percentage, production timing, time of machine pause, personnel absenteeism;
- 2) Appointment of workforce team in charge of improvement : stressing team work so obstacles in implement quality can be overthrown / emphasize continuous training;
- 3) Benchmarks identification: it should be identified, known, copied and overcame. The benchmark can be internal (of another department) or external (either from a competing company or an excellent one);
- 4) Benchmarking: the improvement team analyses the current work method in order to compare and check how it can be improved with the aim to overcome the focused benchmark;

5) A pilot study of improvements: viewing the solution of a problem and improve the quality testing its relation cost/benefit.

6) Implementation of improvements: the team proposes the improvement and the head of department assures its implementation. The improvement strengthens the competition of the organization and increases the motivation of the people involved in the process.

Pekar (1995) defends that there is not a unique method to achieve total quality within an organization, however all TQM manuals should include key-success variables:

1) Commitment / leadership: The effective leader must foster empowerment through a work of coordination, commitment and negotiation that must be based on respect, trust, example and accountability. It is crucial to create an environment of cooperation that results in motivated, self-managed teams that aim at quality and permanent learning (Lopes & Capricho, 2007);

2) Focus on the customer: it is important to take into account that there are two kinds of customers - the externals and the internals. The internal customersⁱ are the collaborators who work with the company, therefore it is essentially to also have into account their needs and expectations;

3) Empowerment and Participation: all elements of the team must be involved and should be empowered by providing tools so that they can achieve their goals. A supervisor (team leader) must never feel threatened for sharing information; instead he should promote it;

4) Statistics measurement: the measurement of the process' indicators is of extreme relevance for the analysis of the objectives delineated by the organization;

ⁱ Internal customer can be a coworker within the company, such as a worker in a different department. An internal customer can be part of an external organization that is intimately linked in with the company by providing services such as delivery of the goods to the external customer.

5) Recognition and rewards: systems of evaluation of achievements of the company employees that are directly translate into a recognition or reward of the achieved product (psychic, social or monetary);

6) Communication: the organization must communicate with all the task force (collaborators suppliers and customers). It is important the streaming of information in both directions -to the top and to the basis.

Chiavenato (2003) also stresses out that to have an efficient TQM it is important a change of attitude and way of thinking in particular of the people in charge of high positions in the hierarchy. The people in this type of positions must be absolutely convinced of the needs of the implementation and at the same time be able to hold more responsibilities, thus understanding that the outcome of the final work of the organization will only be satisfactory if there is quality in individual and team work. Furthermore, people who support TQM add that this is a control concept which provides people, not only managers, the responsibility for achieving the quality patterns by empowering the company's elements.

Sanders and Reid (2012) argue that TQM is based on already known techniques such as downsizing (quality departments should be decentralized to an operational level in all departments); outsourcing (resumes to a simplification of the structure, bigger focalization in the core business as well as in the fundamental aspects of the business); and reduction of the production time period.

Team work and ongoing training to achieve a continuous improvement is essential to TQM. Training of employees in new procedures is crucial, to hold them responsible for their outcome, controlling the quality of the product, and letting them make their own decisions (identification of defects; rework and correction of its causes; using the techniques of statistic control for monitoring; stop the line of production to avoid defective products; implementation of programs of improve the product quality) (Sanders & Reid, 2012).

TQM is closely linked to the process of quality management, and as such to the international quality patterns of ISO9000. Although these patterns are made of specifications,

it is up to each organization to implement the good practices, procedures and specifications as to achieve such demands (Sanders & Reid, 2012).

2.2. The influential Authors in TQM

TQM implementation is made through the adoption of a set of principles. Amongst various authors, Juran (1951), Feigenbaum (1961), Crosby (1979), Deming (1982) and Ishikawa (1985) are some of the most influential theoretical authors in this area, who supported the principles in the process of quality improvement.

Table 2 – Main Quality authors and their concept of quality.

Authors	Quality concept
Juran (1951)	Quality in the occidental world needed to learn and adopt the principles of Japanese Quality, as the kaizen concept.
Feigenbaum (1961)	Quality is one way to manage your company's business. Quality enhancement can only be achieved in a company with the participation of all task force.
Crosby (1979)	Quality is compliance with specifications and customer requirements. The author supported the pattern of zero default performance.
Deming (1982)	Quality is to feel pride in the job well done. Quality improvement raises productivity and maximum utility for the consumer. The author developed the human approach of quality.
Ishikawa (1985)	Rapid perception and satisfaction of the market needs. Concept of a clear customer orientation/satisfaction - internal and external, training and education.

Source: Lopes and Capricho (2007); Al-Nofal, Zairi and Al-Omair. (2004)

Juran and Godfrey defined quality by TQM (Total Quality Management) (Juran & Godfrey, 1951). Their book *Quality Control Handbook*, published in 1951, is a reference all

over the world, especially throughout the USA and Japan. Juran believes that the concept of quality has changed, and that the occidental world needs to learn and adopt the principles of Japanese Quality, as the kaizen concept. To enable this, it is necessary:

1) A well-structured annual program viewing the betterment of quality products. Develop the principle of responsibility to an active participation of specific skills.

2) A consistent formation of quality training.

3) High motivation level, measurement, result evaluation and commitment to quality at all times in the company. The responsibility for the implementation of these items above is hold by the high hierarchy of the company.

Juran believes in the three crucial points (Juran's *Quality trilogy*): planning; execution, control (Juran & Godfrey, 1951).

On the other hand, Demings' method provides systematic and functional logic throughout training and quality improvement. He stresses that administration precedes technology and considers as decisive the leadership and motivation. Deming emphasizes the role of quantitative and statistic methods, furthermore he conceives a constant evaluation of the relation between quality and the reality of the organization (collaborators, management) (Neave, 1987). Deming (1986 quoted by Lopes and Capricho, 2007) disclosed that it is crucial to valorize more the system failures than the human failures; therefore he noted that only through a leadership on the statistical methodology would the companies soften the unjustified accusations and problematic legal issues.

Feigenbaum was the creator of the concept Total Quality Control – CQT – in 1949, and then he published his book *Quality Control* (1961) (Lopes & Capricho, 2007). The author stated that the control should be transversal from the project of the product to the delivery of the same having achieved customer satisfaction (Al Nofal et al., 2004a). Accordingly, Armand Feigenbaumⁱⁱ defined the TQC as “an effective system for integrating the quality-development, quality maintenance, and quality-improvement efforts of the various

ⁱⁱ Feigenbaum, A. V. (1956), Total quality control. *Harvard Business Review*. Vol. 34, No. 6, p. 93-101. in Martinez-Lorente, A.R., Dewhurst, F. & Dale, B.G. (1998), Total quality management: origins and evolution of the term. *The TQM Magazine*, Vol. 10, No. 5, P.7.

groups in an organization so as to enable production and service at the most economical levels which allow for full customer satisfaction” (Martinez-Lorente et al., 1998). The author observed that this approach did not include many of the elements that were fundamental for the achievement of quality (e.g. supplier developmental relationships, people empowerment and teamwork), so he acknowledged that all departments in a company have responsibility (this was of the first considerations of TQM) (Martinez-Lorente et al., 1998). Feigenbaum proposes an approach concerning elements like management of quality, the system for total quality, management strategies and quality, engineering technology and quality, statistical technology and the application of total quality in the enterprise (Martinez-Lorente et al., 1998). The author’s contributions can be briefed in two main points (Al Nofal et al., 2004a):

1) Quality is the responsibility of everybody in the company ranging from top management to unskilled workers.

2) Costs of non-quality have to be categorized if they are to be managed. Costs of control and costs of failure of control have to be minimized by a quality improvement programmed.

The author's goal is to present an approach that enables the managerial and every employee to design a quality system shared by the all organization (Al Nofal et al., 2004a). One of the weaknesses of this approach is that Feigenbaum doesn’t take into account the problem of motivation and commitment of the individual employee to quality (Al Nofal et al., 2004a).

Crosby's theory argues essentially the pattern of zero default performance, a concept created by him in 1979. In his opinion the characteristics for the success in quality programs are: dedication and commitment of the high level administration; reliability in the company and in the concepts of quality management; everybody must be involved; change of culture; prevention as opposite to evaluation; a philosophy towards people; common goals; transparent politics without incoherencies; integration with suppliers; work recognition; participation and pattern of zero default performance (towards the customer satisfaction) (Al-Nofal et al., 2004). The author points some of the quality management functions: quality is conformity to requirements, not perfection; prevention VS inspection; the zero-defect approach must be a

performance standard; the measurement of quality is by non-conformity and not by index. In general, this author creates a philosophy of prevention as a guarantor of quality.

Ishikawa's approach (1985) is the one closest to today view on TQM. His line of work has been noted in particular, by four aspects: quality circles, the question of continuous training, the quality tool *Ishikawa diagram*, and the quality chain (Al Nofal et al., 2004a). It is an approach that represents a new way of thinking about management. All employees of the organization have to make a commitment and participate in and promote quality control – from top to bottom (Ishikawa, 1985 quoted by Al Nofal et al., 2004a). Ishikawa stress the relevance of the example given from the top management, to demonstrate the commitment with the implementation of this approach. Therefore, it is important to lead a team of employees that can contribute with their ideas (freely and frankly) on how to improve the quality processes. For this author the top priorities are highlighted in 3 stages - control and quality assurance value the inspection to the needs of the consumer; Quality control enhances the manufacturing process of the product and the guarantee appreciates the control; The control and the guarantee comprise the development of new products, all elements of the company and its consumers (Lopes & Capricho, 2007). The starting point of this approach was to feature also the concept of a clear customer orientation/satisfaction - internal and external. The author emphasizes the crucial importance of paying attention to "internal" customers and internal relationships (Al-Nofal, et al., 2004). Ishikawa implemented the quality circles, which he considered as an effective way of involving of all of the labor force in the company's problem-solving process (Lopes & Capricho, 2007). This requires a continuous education and training that from Ishikawa's point of view "QC training and education must also be carried out without interruption, through good times and bad" (Ishikawa, 1985 quoted by Al Nofal et al., 2004a, p. 4). Ishikawa (1985 quoted by Al Nofal et al., 2004a) believed that this approach in a certain country should be implemented according to the culture of this country. Furthermore, he identified differences between Japan and the West (USA and Western Europe):

Table 3 - Differences between the west and Japan, identified by Ishikawa (1985).

West	Japan
Great highlighting is placed on professionalism and specialization (QC ⁱⁱⁱ only for QC specialist)	In Japan it is an important tool, however it isn't highlighting
Great stress placed on Taylor system	In contrast to Taylor system that is rigid and hierarchical, in Japan it's used a more flexible, agile, organic, and holistic.
Pay system based on merit (to motivate people by money alone)	Japan uses system of seniority and ranking;
High turnover rates and layoffs are found in the West	Japan has a lifetime employment system;
Relationships with subcontractors – 50% of product manufacturing costs contributed by outside suppliers in USA Subcontractors treated as friends not enemies as is the case in the West;	Relationships with subcontractors – 70% of product manufacturing costs contributed by outside suppliers in Japan
Old-style capitalism versus short-term profits	Democratization of capital: long-term profits.
Labor unions are trade unions in western countries	Labor unions enterprise-wide unions in Japan.
Elitism among university graduates.	Class-consciousness among university graduates
The roles of governments: Control, Stimulation, Freedom, Competition.	Organization: Japan has a hierarchical and vertical society, sectionalism —the tendency is strong in Japan.

ⁱⁱⁱ QC is quality control.

Education: QC education in Japan.	Education: General education. Literacy: People using Chinese characters are generally more interested in education.
Multiethnic nation.	Ethnically homogeneous nation

Source: Al Nofal et al., 2004a

2.3. TQM critical factors

There are several studies that found critical factors in TQM, that difficult the implementation of this strategy as a main factor and tool for an organization. As noted by Lopes and Capricho (2007), investigators as the ones mentioned in the previous chapter helped to develop the Total Quality systems. The measurement of process indicators is of extreme relevance for the analysis of the objectives outlined by the organization. These authors further add that

"(...) in order to cope with Japan's growing competitiveness, business and the United States, have adopted a new approach to total quality, but its implementation has proved difficult, because the current status quo, favorable to the class Leader, did not understand that part of the success of this philosophy was due to the values of Eastern culture, which bet more on teaching and learning, participation and involvement of people and teamwork." (Lopes & Capricho, 2007, p. 71)

Below we present a list of the disadvantages pointed out by Al-Nofal et al.(2004b) that is based on and summed up the critics of several authors.

- The number of overlapping programs; lack of clear accountability; inadequate reporting;
- Difficulty in keeping up with changing customer priorities;

- Diversification of business;
- Different methods of data collection and classification;
- Focus on internal processes rather than on external result;
- Focus on minimum standard; lack of strategic focus;
- Develops its own ponderous bureaucracy;
- Expects perfect people vs. real people;
- Does not require radical organizational reform;
- Does not demand changes in management compensation;
- Does not demand entirely new relationship with outside partners;
- Applies to faddism, egotism, and quick-fixism;
- Drains entrepreneurship and innovation from the organization cultures;
- Has no place for emotion and soul, but mechanical approach;
- Tries a one-size-fits all solution;
- Failing to recognize the difference of organization characteristics and environment;
- Applying tools of TQM before needs are determined and direction is established;
- Conducting mass training of hourly employees without involvement of all levels of management;
- Overemphasizing technical tools.

(Al-Nofal et al., 2004b).

Mechanisms have been described in order to minimize these problems such as: to avoid overloading the employees through new divisions of TQM activities; general quality politics which minimize and fit the sectors goals to those of the organization; sharing of results at short, medium and long term (reducing errors and wastes, bring down costs, rationalization of activities, changing of work routines viewing comfort, security and well-being of the workers) (Al-Nofal et al., 2004b).

Although TQM is responsible for high quality achievements, it is widely recognized that the organizations keep on reporting problems with the implementation of this model. Several authors emphasize the effect of individual workers' factors and their impact on the group system on work performance. Quality standards are critical factors for the success of

any organization, which should be addressed in an integrated and continuous manner. Previous studies about the efficiency of TQM suggest a number of factors which were left out and we will discuss them in chapter 3. In the next chapter we will travel around studies that have integrated behavioral theory (behavioral economics) with TQM philosophy.

3. Behavioral economics applied to TQM

3.1. The early steps

Some authors have studied the factors that made it difficult to implement TQM. Table 5 depicts the year, author and main conclusion of each the study, allowing for a better understanding of the support theories that we have focused on.

Table 5– Significant studies on behavioral economics field.

Year	Author	Main conclusions of the studies
1994	Reger <i>et al.</i>	States that success for a TQM approach is proportionally related to the success of its implementation.
1994 2003	Waldman Montes, Jover, & Fernandez	Build up models that had focused on individual variables as well as those of organizational system, which are inwardly interconnected to the behavioral economy theory.
2003	Hoque	Revealed the importance of crossing the TQM approach with BSC (balance scorecard ^{iv}) where the main contribution is the analysis of the learning and

^{iv} Balanced Scorecard (BSC) is a measurement and performance management methodology developed by Harvard Business School (HBS) professors Robert Kaplan and David Norton in 1992. These methods are usually based on established methodologies that can be used by IT Information) and ERP (Enterprise Resource Planning) software as support solutions. The steps of these methodologies include: business strategy definition, business management, service management and quality management; These steps are implemented through performance indicators. The BSC tends to lead to a creation of performance indicators, reaching all organizational levels, becoming a communication and general promotion tool, with the strategy of the corporation.

		continuous growth of the labour force and its satisfaction.
2007	Camerer and Malmendier	Studied the human being as an entity built up by beliefs values and goals which to be achieved need inner motivation. Human beings are also social beings, therefore submitted to social pressure comparisons/identification with their peers and within groups. The authors consider of central significance to take under consideration this variables when we study the outcomes of an organization.
2013	Nordfeld	Established the human bias in decision making, and recognizes that there are processes to mitigate them.
2016	European report (behavioral insights applied to policy	Demonstrated that individuals are subject to several cognitive biases which influences the policies that are intended to them.

Source: Self elaboration

In 1994, Reger and his colleagues stressed that there is a direct proportionality between the TQM and its implementation. The success of TQM implementation dictates its future success, especially if it takes into account the beliefs of the workers on the organization identity and future radical changes.

Waldman (1994) followed by Montes, *et al.* (2003) conclude in their studies that for TQM to have a successful approach, it would be necessary that a number of conditions coming out from models focused on organizational system were put together. These models were built upon individual human variables as well as those of organizational system, which are inwardly interconnected to the behavioral economy theory. The main premises of these models are:

1) The TQM is subjected to the inner individual motivations, instrumental beliefs and, level of commitment, goals and values. To lessen the consequences of these aspects supporters of the TQM approach suggest **(a)** bonus system **(b)** leadership that will constantly improve the workers performance **(c)** work architecture (that is presenting architecture that

facilitates the adequate organizational environment and traduces the organizational culture);

2) Transformational leadership will stimulate individual efficiencies and valued works headed to a work group and continuous improvement of those processes;

3) Internal motivation to work derived from a rich work environment (team quality, good companionship, processes, procedures, organizational culture, etc.) which will result in a high performance effort;

4) The individual motivation will interact with the work demands as well as the organizational context and determination of its organizational performance.

5) The organizational performance will be maximized when the norms and values of the individuals are coherent with the organizational culture (its norms and values).

Waldman (1994) followed by Montes, *et al.* (2003)

The concept of organizational structure concerns the means that are utilized to divide the work into tasks, taking into account the coordination and control that is spend by all the elements of the organization to respond to the internal and external demands (Ferreira el al, 1996 quoted by Lopes & Capricho, 2007). The concept of work architecture and rich work environment of Waldman (1994) and Montes *et al.* (2003) corresponds to the concept of organizational structure previous explained. This directly depends on the organizational culture that evolves according to the ages, dimension, technology, interests, organizational characteristics of the people that work in the company (Lopes & Capricho, 2007).

In 2003 works like the one from Hoque revealed the importance of the crossing of TQM approach with BSC (balance scorecard) where the major contribution is the analysis of the learning and continuous growth of the labour force and its satisfaction. Here it is noticeable the emphasis given to psychological variables when handling TQM implementation.

Camerer and Malmendier (2007) work demonstrates the impact of the psychological variables derived from economic behavior and in greater detail, analysed which

organizational situations might create biases in individual performance and therefore in the organizational outcomes.

The authors established two different scenarios:

- 1) Individual behavior - model of the single agent in an organizational context;
- 2) Individual belonging to an organization - model of multiple organizational agents.

To each scenario, they have concluded which of the situations may create biases in the collaborators' organizational performance (table 6).

Table 6 – Situations that might create biases in the organizational performance.

Agency model - Single agent	Agency model - Multiagent firms
Wage preferences	Social comparison
Individual concerns about the salary increase or bonus	Group identification
Need for higher external appreciation - may just be psychological and non-material vs. monetary	Culture
Material or monetary benefits	Peer pressure
Performance evaluation (bias judgment)	Coordination and Leadership

Source: Based on Camerer e Malmendier (2007)

As we pointed out before, Waldman (1994) and Montes and collaborators (2003) concluded that the TQM approach is subject to individual psychological variables - individual

internal motivations; instrumental beliefs; level of commitment; goals, and values - and so they move forward with ways to mitigate their impacts in this intervention. Hoque (2003) reflects about the relationship between job satisfaction and TQM implementation. The work of Camerer and Malmendier (2007) shows that individual psychological variables have an impact on the group, and that in turn, the individual is also subject to group variables in an economic and organizational context. Therefore, it seems that these two types of psychological variables (individual and group) have an impact on the results of implementing the TQM approach, such as the heuristics discussed in the previous chapter. It is important to understand that the latter are shortcuts in the decision process (and come from a mostly cognitive process) and that the psychological variables are emotions / motivations internal or triggered by the group. Next, we will briefly explain the psychological variables that have been discussed.

Job Satisfaction

Job satisfaction has been defined over the years, since the 1930s when it was thought to standardize and measure this concept. Kaliski (2007 quoted by Aziri, 2011) argues that job satisfaction is related to the achievement and success felt by the worker in his workplace; this author adds that satisfaction is directly linked to productivity and personal well-being, which is the key factor that leads to recognition, salary, promotion, and achievement of other goals (Kaliski, 2007 cited by Aziri, 2011). George et al. (2008 quoted by Aziri, 2011) argues that job satisfaction is a set of feelings and beliefs of the individual about their work, and can range from extreme satisfaction to extreme dissatisfaction. Hoque's (2003) study discuss a perspective that although TQM is effective in some organizational contexts, it may not be a good philosophy for employees and workers at workplace taking in consideration their satisfaction towards it.

Motivation

In general, motivation is all that drives the person to act certain form and that gives rise to a specific behavior, causing an external stimulus (coming from the environment) or also be generated internally in the individual's mental processes (Chiavenato, 1999).

There are several motivational theories:

Maslow (1943) – Theory of needs - states that the satisfaction of human needs is important to the individual's physical and mental health, for they are arranged in a hierarchy that includes physical, social, and psychological needs.

Frederick Herzberg (1960) - Theory of Hygienic Factors and Motivational Factors (1968) - distinguished these two factors, the first refers to business management policy, such as supervision, salary, working conditions; and the second is related to the professional achievement, recognition, nature of the work, interpersonal relations, hypothesis of progression.

Douglas Macgregor (1960) - Theory X and Y - presented two distinct views of human needs, based on how managers treated their employees. The X theory assumes that the human being, in general, has an essential aversion to work and avoids it whenever possible, therefore, so it must be controlled, coerced and punished when the results are poor. Y theory assumes that employees like to work, are creative, seek responsibility, and can exercise self-direction and self-control.

(Chiavenato, 1999)

Organizational Commitment

Bastos (1994, quoted by Medeiros & Enders, 1998) described commitment as a disposition, characterized by positive feelings or affective reactions such as loyalty towards something.

The model of Meyer and Allen (1991) allowed to understand how the commitment within the individuals is processed, being each person is characterized by positive and negative relations in each dimension of the commitment, varying of intensity with each of these dimensions (Medeiros & Enders , 1998).

Mowday, Steers and Porter (1979) defined commitment as a strong relationship between an individual and an organization, comprehending three factors: being willing to apply considerable effort for the benefit of the organization; the belief and acceptance of the values and objectives of the organization; and a strong desire to remain a member of the organization. Becker (1960, quoted by Medeiros & Enders, 1998) described commitment as an individual's tendency to engage in "consistent lines of activity" - called the "side bet" (Becker, 1960) - and believes that the individual remains in the company due to associated costs and benefits your exit. Later, Wiener (1982) adds to Becker theory the acceptance of organizational values and goals, which represent a form of control over people's actions (Weiner, 1982, quoted by Medeiros & Enders, 1998).

As mentioned previously, Waldman (1994) and Montes and colleagues (2003) propose ways to lessen the impact of motivation and level of commitment in the TQM approach, establishing the significance of these variables when implementing this dimension in a company.

Social comparison

Leon Festinger (1954) was the first to discuss the theory of social comparison. This focuses on the belief that there is a inner motivation within individuals for accurate self-assessments. The theory explains how individuals evaluate their own opinions and abilities by comparing themselves with others, in order to reduce uncertainty in certain domains and learn to define the self.

In the initial theory, Festinger (1954) provided nine main hypotheses.

1 - Humans have a basic motivation to evaluate their opinions and abilities. People evaluate themselves through objective and non-social means.

2 - If non-social goals were not available, people will evaluate their opinions and abilities compared to other people.

3- The tendency to compare the other person diminishes as the difference between their opinions and abilities becomes more divergent (that is, if someone is very different from you, you are less likely to compare yourself to that person).

4 - There is a one-way push for continuous improvement.

5 - There are non-social constraints that make it difficult or even impossible to change someone's ability to be motivated by the change. The author advances with an example that no matter how much a person wants to run faster or be smarter, even if he or she is motivated to achieve improvement, there are great difficulties in achieving this change.

6 - The cessation of comparison with others is accompanied by hostility or derogation, insofar as the continued comparison with these persons entails unpleasant consequences.

7 - The greater the attraction to the group, the more pressure will be on the uniformity of ability and / or opinions.

8 - If people who are very divergent from their own opinion or ability are perceived as different from themselves and there is a tendency to narrow the range of comparability.

9 - When there is a set of opinions or skills in a group, the relative strength of the manifestations of pressure toward uniformity will be different for those who are close to the group's fashion than for those who are distant.

Festinger (1954)

Festinger (1954) theorized the concept of social comparison, and subsequent studies have come to prove it empirically. Since then, this theory has undergone new advances in understanding the motivations underlying social comparisons and the particular types of social comparisons made. Reasons that are relevant to social comparison include self-improvement (e.g. Gruder 1971; Schachter 1959); maintaining a positive self-assessment (Tesser, 1982); components of attribution and validation (Goethals & Darley, 1977); and prevent closure (Suls, Martin & Wheeler, 2002; Kruglanski & Mayseless, 1990).

In 2018, Gerber, Wheeler and Suls reviewed six decades of research on social comparison and systematized the information, concluding that:

- People generally tend to choose a comparison goal up (not down) and, surprisingly, that threat leads to an upward comparison;
- The threat leads to a downward comparison;
- For comparison reactions, the authors found a general contrast effect (people feel worse after an upward comparison, better after a downward comparison) and these effects were stronger for the more direct measures (ie feelings of people on comparative ability).

Camerer and Malmendier (2007) consider that

“in the expected utility of the worker, only the effort and wage of the worker enters into its utility. But in real organizations, people make friends and enemies, and naturally compare themselves to others. These facts suggest that workers often sacrifice their own earnings to help their friends and harm their enemies, or to create better social comparisons.”
(Camerer and Malmendier, 2007, p. 248)

Group identification

The concept group identification comes from Tripartite Model of Group Identification of Henry, Arrow and Carini (1999) that integrates social identity and self-categorization as one of the (cognitive) sources involved in its construction. The authors define group identification as the identification of members with a small group in which they interact.

This model takes into account 3 key points:

- Cognitive origin (how social identity and self-categorization influence group identification);
- Affective origin (what is the contribution of interpersonal attraction in identifying group);
- Behavioral origin (which focuses on the cooperative interdependence of behaviors and results).

Henry, Arrow and Carini (1999)

As Camerer and Malmendier (2007) make clear that in terms of organizations

“(...) workers will help members of their own group— as they perceive their group and its membership. In this view, a group is a club of people who all agree to help each other. This introduces an interesting role for management of group boundaries.” (Camerer and Malmendier, 2007, p. 251)

Culture

Robbins and Coulter described the concept of organizational culture as "values, beliefs or perceptions shared by employees within an organization (Schein 1983, Robbins and Coulter cited by Yafan Tsai, 2011). Scott-Findlay and Estabrooks (2006, cited by Yafan Tsai, 2011)

argue that organizational culture reflects values, beliefs and behavioral norms used by the organization's employees as a guiding vector to the situations encountered in everyday life and influence team attitudes and behaviors. Camerer and Malmendier (2007) argue, as the authors above, that shared understanding reduces conflict and also encourages efficient matching between workers' attitudes and the attitudes required by the company (when culture is visible to outsiders). There are studies that relate the role of organizational culture to performance improvement; job satisfaction; organizational commitment; as well as with leadership (Yafan Tsai, 2011). It seems crucial to recognize that the culture of an organization has direct effects in behaviors of the individuals, and therefore their outcomes as well as the company's.

Peer pressure

Camerer and Malmendier (2007) considered peer pressure as a psychological concept that takes place in the economy. They argue that immediate peer pressure impacts individual performance.

Leadership

Leadership has been studied for decades. Nowadays, literature is so rich that it is already studied which leadership styles to adapt towards to certain situations. Kurt Lewin (1939) and his researchers were the pioneers in this subject and defined three leadership styles: authoritarian, liberal and democratic. Bernard M. Bass (1990) in 1985 explained the psychological mechanisms underlying transformational and transactional leadership - transformational leadership can be seen as leaders and followers push each other forward to a higher level of morality and motivation; transactional leadership focuses on the role of group supervision, organization, and performance throughout rewards and punishments in order to ensure the fulfilment of their leaders. For Bergamini (1994) the leader is an agent of cultural change; their ability to understand the organizational culture allows them to manage the sense that is given to the actions of the organization for the ones who are led, therefore this requires

an ability to establish the alignment of the expectations of the individual and group with the organizational demands. The latter author (1994) argues that leadership's difficulty in acting would be linked to the organization's resistance to changing its status quo.

The authors mentioned in the beginning of this chapter acknowledge that it is crucial to recognize these individual and group factors that constitute the human foundations and originates beliefs, values and goals that impact the group and organizational performance. Therefore, they conclude that the study of the professional relationships and performances of an organization's workforce should draw attention to all the individual and organizational variables of human behavior.

Nowadays, even the policies models are combining factors of human behavior. For example, the European report of Behavioral Insights Applied to Policy recognizes that "there is growing recognition that behavioral insights (BIs) – by shedding light on how people actually make choices – help deliver more effective policies and complement traditional forms of intervention" (European Commision [EC], 2016, p. 6). This report (2016) covers 32 European Countries (EU - European union + European Free Trade Association - EFTA) and presents enriched policies interventions either implicitly or explicitly informed by behavioral insights. This report demonstrates that the individuals:

- Are subject to several cognitive biases (e.g. overconfidence);
- Have conflicting long-term and short-term preferences (e.g. want a high income upon retirement and a high current disposable income);
- Care about themselves and also about others (i.e. they express *reciprocity* and *altruistic preferences*);
- Seek to avoid losses to a far greater extent than they prefer equivalent gains (i.e. they feature *loss aversion*);
- Overestimate the probability of high-impact and vivid but unlikely events, and get over insured accordingly (i.e. they display an *availability bias*);

- Seem to struggle in contexts where they are provided with too much information or where they face too much choice (referred to, respectively, as *information and choice overload*).

Nordfjeld (2013) studied *The aspect of the human bias in decision making within quality management systems and lean theory*^{vi} and established the human bias in decision making. This investigation concluded that "errors caused by bias in planning and production generate rework and delays, idle time, reduce the efficiency, and hence increase operational costs" (Nordfjeld, 2013, p. 2540). The author (2013) points out that there are processes to mitigate the biases like the trust effect; WYSATI^{vii} bias (what you see is what you get) (Kahneman, 2002); and optimism. We describe below the processes found in this investigation:

- Consider the best sceneries and discuss them with all team and within the organization. The author points out that despite of being possible to suffer the trust effect from the leader of the team, this group discussions are important to see the employees' point of view, which nowadays are often suppressed by fear of disloyalty;

- The elements of the team should be encouraged to discuss threatening sceneries, that haven't been considered before.

Nordfjeld (2013) also defends the implementation of methods that detect the bias on a direct, specific and systematic way and that are intrinsically connected to the eight fundamental principles of quality (ISO/TC 176). At the present time there are models, methods and mathematical and heuristically strategies to solution the risk, uncertainty and

^v As Taiichi Ohno (1998) refers "the LEAN concept focuses on improving the information flow along the production process from the suppliers to the customers. The five principles of LEAN: Value, Value Stream, Flow, Pull and Perfection are valuable in improving the flow of information. Basically, LEAN is a quality management philosophy built on common sense and simple thoughts, with the goal of cost reduction by identifying customers and specifying value, creating flows and eliminating waste." (Nordfjeld, 2013, p. 2539).

^{vi} Ohno, T., Bodek, N. (1998). Toyota Production System: Beyond Large-Scale Production. Productivity Press. in Nordfjeld, A. (2013). The Aspect of the Human Bias in Decision Making within Quality Management Systems & LEAN Theory . *World Academy of Science, Engineering and Technology International Journal of Mechanical, Aerospace, Industrial, Mechatronic and Manufacturing Engineering*. Vol.7, No.12, p. 2539.

^{vii} It's a bias that occurs throughout our tendency to decide based only on what we know. This is a limitation that greatly influences our behavior and our decision making (Kahneman, 2002).

human bias, therefore the author ponders that they have to be taken in to account in the quality process (Nordjfield, 2013).

3.2. A critical reflection

We propose an integration of all the theories in analysis, showing how personal human variables can influence individual organizational behavioral, as well as those of groups and, therefore, promoting a more successful approach to TQM. To do so, we will discuss the effects of the heuristics in the framework of a TQM implementation, and we will try to demonstrate the relevance of the behavior perspective to its success.

TQM's approach has proven to be a very useful tool for those who wish to improve their companies and turn them into more effective and efficient towards a competitive market. However we find it exposed to the debilities innate to human behavior.

With the support of Waldman (1994) and Montes *et. al*, (2003) works, we intent to improve this intervention and, thus, contribute to more successful results. We consider that the premises found on the studies of Waldman (1994) and Montes *et. al*, (2003), are a starting point that acknowledge the interlink between the human behavior, the implementation of TQM and the organization outcome. Accordingly, we will explain how the individual and group variables impact from the individual to organizational performance in compliance to Camerer and Malmendier (2007) research. Then we will clarify how the errors originated by biases and heuristics may occur and also effect the individual, group and organizational performance. For this, we introduce the following tables - 7; 8; 9; and 10 - that will discuss the every point of the premises of Waldman (1994) and Montes *et. al*, (2003), in light of the work of Camerer and Marmendier (2007) and of Kahneman & Tversky (1979); Kahneman (2011).

For a better understanding of the tables, please note that:

- Premise 1 is examined in Tables 7 and 8;
- Premises 1; 3; 4 and 5 are explored in table 9.

Table 7 – Salary preferences

Author	Remarks
Camerer and Marmendier (2007)	Quoting Camerer and Marmendier (2007) the salary preferences are one of the situations that can result in changes in the organizational performance of the individual.
Comment referring to behavior theory of Kahneman & Tversky (1979); Kahneman (2011).	Naturally in the social economic context of any country, there are average calculated professional salaries monthly established, according to its grade. However these averages are probabilistic, when based on beliefs, and can suffer biases through the anchorage, availability and representativeness.
Example	Let us consider the following situation: an individual that works for an organization for 10 years, receives a payment within the average of its professional category in the country, however his belief is of 50 or 100 higher. This salary belief constitutes the anchorage heuristic, with which the individual will make several adjustments, however these can still prevent him to be happy with his current payment. It is understandable, that an individual in such position and consequently unsatisfied will have his motivation and level of commitment compromised towards the company.

Source: Self elaboration

As previously described, the TQM approach should be followed by active and responsible collaborators seeking a higher continuous improvement. Unsatisfied individuals, with few inner motivation and low organizational commitment level will invalidate the whole process. It is of greater importance to acknowledge the dissatisfaction of the company's employees and where it's coming from, because it may be originated through biases such as those presented above, and once demystified may bring greater productivity to the company. As a result the individual motivation, instrumental beliefs, level of commitment, goals and values directly affects the individual and group performance (by social comparison and group identification), and as a consequence TQM outcomes.

Table 8 –Bonuses system.

Author	Remarks
Camerer and Marmendier (2007)	Camerer and Malmendier (2007) support that the situation of workers validation per se can originate biases of bad judgment from the evaluator. We will explain the origin of this bad judgment made at an unconscious level with no discriminatory or conscious factors considered. According to the authors we can emphasize three situations which affect the worker performance: individual concern with the raise of salary or bonus; need of external superior appreciation; social comparison. In this table we will discuss the effect of the raise of salary or bonus.
Comment referring to behavior theory of Kahneman & Tversky (1979); Kahneman (2011)	One should keep in mind that the representativeness heuristic is described as a decision simplifier aspect, which leads the individuals to make judgements in accordance to the degree to which a specific event corresponds to a wider category within their minds, even if it is the combination of the two events being evaluated. We also recall that the availability heuristic allows us to recur to the short cut of event probability. As you may agree we may judge an event throughout a past memory, which will affect the future action).
Example	Let us illustrate the new situation: a collaborator submitted to a reward system. The evaluator of a specific collaborator performance can create a bias and perceive in an incorrect way his effort and dedication. This situation may be due to the disregarding of variables of error or success, made larger by the heuristic of representativeness. This incoherence between the effort made by the worker and longitudinally will again demotivate the worker and create less engagement towards the organization, and consequently the inefficiency of his professional behavior. The evaluator can recur to the availability heuristic yet, and if before a similar situation has been wrongly evaluated, with the representativeness heuristics (taking into account the biases above described) in the future he will evaluate similar situations in the exact same way.

	Camerer and Malmendier (2007) also explain the over confidence factor. This can originate in the person evaluated the feeling that he/she had a brilliant performance, when in fact that was not the case. The overconfidence leads to an underestimation of the high performance effort and again overestimates the marginal effort performed, which results in a high output. Under confidence and reward makes the person evaluated to have an insight of trust that the company has in him and in what results he could achieve. This might lead to a future bigger effort. However, an organization cannot have a record of motivating its collaborators by bonuses to exploit their thrust, because it endangers its sustainability (bonus vs. low success rates).
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Source: Self elaboration

It is relevant to take under consideration the superior external psychological validation excluding rewards and bonuses; however this is rarely considered, even though it is profoundly important to the motivation, compromising as well as group and organizational identification.

As formerly mentioned, a motivated task force is one of the most imperative factors for a successful TQM intervention. Though, if the workers aren't satisfied with their bonuses system, they aren't motivated and this might prejudice theirs and the group's work performance and, therefore, the outcome of the TQM intervention. So, it is critical to study an unbiased form of bonus assignment, such as the bonus being provided by an external evaluator that will be exempted from any biases originated from heuristics.

Table 9 - Work architecture and rich work environment

Author	Remarks
Camerer and Marmendier	These premises are always based in the internal individual motivation of each collaborator. The inner motivation is affected by many unconscious

(2007)	psychological processes a, like those we have present above. However and as already mentioned, we are social beings, and therefore the motivation may be improved if a rich work environment is provided along with a motivational leader.
Comment referring to behavior theory of Kahneman & Tversky (1979); Kahneman (2011)	Going back to what was exposed about the framing effect, we'd remind that this effect is built on contexts/form in which choices/problems are presented (Kahneman, 2002). It seems to us that these are key elements to the implementation of TQM like: - work architecture - is a framing form of modelling the environment where the work will be performed, where one can feel comfortable and find, stimulating factors such as motivation; satisfaction; and others. The organizational culture is always a framing effect, concerning the identification with the company, it is the reason why workers choose that company. This is why the company norms and values have to be carefully coherent and consistent with work environment, so that it may promote the identification of the peers and groups towards the mission and vision of the company. - rich work environment - team quality, good companionship, harmonious processes, procedures and work demands are a direct consequence of a positive shaping form of the problems. This positive shape of problems is another form of framing. The work demands even resolutions may be carry out by an authoritarian, culpable form or by a motivating and shared form.
Example	We all comprehend the meaning of a positive organizational environment and we all feel different emotions towards a luminous, harmonic and comfortable organizational environment. If not, please try the following exercise: Below we present three figures of three different work environments of three different companies. Based on the figures below, chose one of them as if this choice were to determine your place of work. Figure 3 – Facebook office at Mumbai.



Source: Google

Figure 4 – Google office at Dublin.



Source: Google

Figure 5 – A call centre in Bangalore



Source: Google

If your choice was either Figure 3 or 4 you are also a proof that we react better to positive work architecture, for this reason, all companies may put their efforts in framing positively their work places in order to produce healthy emotions in its work force and in the future benefit from the outcomes of the TQM intervention.

Source: Self elaboration

Despite the benefits, it isn't easy to add the previous findings in the TQM approach, since these biases may happen in any aspect of a performance of a task force. Summing up the previous findings, it is important to retain:

1) The TQM approach should ponder to address the significance of individual motivation, instrumental beliefs, level of commitment, goals and values as well as present preventive measures towards the most relevant procedures that might be more affected by these variables and its biases. In agreement with the authors Lopes and Capricho (2007) the management of the human resources of the company is of the most important. This is

supported by Jeffrey Pfeffer^{viii} who states that

"(...) in order to manage quality through people, a new philosophy of human resources management is necessary, which must break with traditional practices and take into account that the future success of competitiveness of the companies dependent, greatly, on how their managers manage these resources. This management philosophy should be based on new assumptions, e.g. "best practices", in order to enhance self-esteem and confidence."(Lopes & Capricho, 2007, p. 248)

It seems essential to consider unbiased forms of evaluation of the collaborators in the TQM intervention, since its philosophy is all for evaluation of procedures of the task force. We recall that several companies make resort of quality evaluations as base to their collaborators evaluation bonuses system, not to mention the significance of an unbiased evaluation for the stimulation of emotions like motivation, satisfaction and self-esteem. According to research studies of Pfeffer (1998, quoted by Lopes & Capricho, 2007) there is an existence of a strong correlation between the performance of the company and the average level of developed competencies of its human resources. However it is very significant that new approaches consider that the system of rewards / incentives is important and must be combined with theories such as Ouchi's (1981, quoted by Lopes & Capricho, 2007) which include key points such as: trust in employees; involvement among employees and leaders; balance between skills and social relationships; bet on employment for life; slow promotions; encourage of workers (from the top) and holism; among others.

2) It would be very helpful that the TQM approach paid relevance to the framing aspect concerning the work architecture, environmental work, work demands, and organizational culture. It is critical that the organizational structure doesn't condition the culture and the strategy to implement to achieve the company goals. Firstly, when a company

^{viii} Pfeffer, J. (1998). *The Human Equation: Building Profits by Putting People First*. Harvard Business School Press. U.S.A. in Lopes A., Capricho L. (2007). *Manual de Gestão – Qualidade 100%*. Lisboa: Editora RH. P. 248.

wants to grow and implement TQM approach, it is relevant to pay attention to the framing effect and create a positive environment, and secondly create a new organizational culture. For this, it is necessary to focus on the items below described by Robert E. Quinn^{ix}

“1 - has been a made a diagnoses focused in the new values to implement; 2 - leaders committed in giving the example of change; 3- open discussion between all workforce to debate all problems and solve them in a team; 4 – implementation of a evaluation methodology that permits de performance analysis.” (Lopes & Capricho, 2007, p. 171)

Now regarding the thorough analyses of the TQM approach and concerning the four main premises described above, we will make to a direct contribution to three of the most vital point of it. Therefore, we present table 11, where in the first column we review the most influent theories regarding TQM in light of behavioral economics and in the second we make a contribution towards the three most important points of this approach:

- Implementation by management;
- Internal audits;
- Training.

Table 11 – Reviews and contributions.

^{ix} Quinn, R. (1996). *Deep Change*: First Edition: California. in Lopes A., Capricho L. (2007). *Manual de Gestão – Qualidade 100%*. Lisboa: Editora RH. P. 171.

Implementation by management	
Review	Contribution
Authors like Waldman (1994) and Montes <i>et al.</i> (2003) recognize the key elements for the implementation and development of TQM approach, which come from training the leaders at the higher levels in the presentation of the problems and the choices of their collaborators. There are a number of studies which came to analyze the importance of TQM implementation for its success. We concluded that the positive implementation of the TQM start as a positive framing and so it is necessary to alert that the framing effect is an effect born from the behavioral economics and therefore should be addressed as a key problem in this approach, because it can deviate or up rate the success of TQM in an organization. It is vital that the management of the organization be alert and aware of this effect and fully understands its consequences. Therefore, when mentioned that the TQM implementation is from the responsibility of the management, it should add positive forms of implementation and how to avoid consequences of the frame effect.	Examples of framing effect in the organizations: - Workers care about the procedure that generates wages or other outcomes - that is, if a new procedure regarding a TQM is presented, and represents some kind of individual benefit (<i>psychic income</i>: non-remuneratory benefits; e.g. employee of the month) to the employee, they will ponder the new evaluating and its the consequences. The framing of the situation may contribute to its own positive results. - Group Identification - workers help members of their own group if they perceive he/she as an intra-group element (Camerer & Malmendier, 2007). The framing presentation of the new employee in the company and the team; mission and vision of the company; organizational culture which is exposed by the company when of the will produce consequent effects related to the inter-help among group members. - The framing effect may also affect directly the situations of the daily routine only by its presentation/formulation of questions regarding problems to solve. As Kahneman (2002) described, when asked to someone which situation do you prefer to a) surgery in which the survival rate is 90%, or b) surgery in which the mortality rate is 10%, the majority of people chooses the first sentence, although they aren't different.
Internal audits	

Review	Contribution
The TQM approach suggests that these audits should be carried on by the quality manager. An internal auditing carried on by an internal technician (quality manager) or internal quality department its, from the start, biased by the three heuristics mentioned above and affects the organization's proper functioning. Below we give some same examples to illustrate this statement.	The representativeness heuristic will be the most obvious, since the whole TQM system or of quality management is done by samples. This means that in an internal auditing the whole of the company actions are not considered, instead a sample of what to audit is chosen by the auditor (= internal quality manager). This heuristic also explains all type of biases related to the wrongness prediction of conjunction/sequence of events, where event A does not always cause B, however and audit done by an internal technician, this association will be the first to be deducted, what may bias the whole process. The availability heuristic concerns all the events that are judged by the remembering of our memory. This can occur in procedures analyses; processes, or even personal. A procedure/process that we believe to be the origin of a change in the past, is going to be the first culprit of a change in the future. A collaborator who acted wrongly on the past, when making a new error will be judged by the previous one, and the new causes will not be taken into account. By above mentioned reasons we suggest that the TQM approach should set an internal auditing both with an internal and external technicians. This way, the internal technician has all the insight and know-how of the company and the external one will not disregard most of the biases, pondering and comparing all the errors with the other samples, broadening the representativeness and being freed of previous events, which might cover its real reasons.

Training	
Review	Contribution
The base of TQM is its collaborators training. The TQM approach adverts to this crucial and essential point, and even thought it demonstrates powerful forms of training it doesn't provide insight from theories that may help to avoid a significant percentage of errors / biases. The cognitive learning of each individual is quite unique. In psychology the learning is defined as a process that establishes links between certain stimulus and respective answers, causing an increase of human beings adaptation to its surrounding environment (Gleitman, 1981). The theorists of the organizations support that a narrative or story is the most common way to codify the information on how to behave in an organization, they add that it's not relevant whether the conclusion is success or failure, the story is basically an instruction (adaptation) on how we should behave (Camerer & Malmendier, 2007). The stories are easier to memorize, from a human memory point of view), which meets the availability heuristic.	Considering all mentioned, it seems crucial the need to adapt the training to human learning capacity, and so we suggest two tested theories: i) Error training (based on mistakes done) (Dormann & Frese, 1991) - These authors support that when training by error the individuals are invited to make as much errors as possible, so that they can learn to fix and avoid them, it is a learning throughout error exploitation. ii) TLAS - Test approach: Learn-Adapt-share (Test-Learn-Adapt-Share) (European Report - behavioral insights applied to policy 2016) TLAS theory was defined by the European report (behavioral insights applied to policy 2016) and defines the following steps: Test (to test the procedure or process); Learn (to verify what is best suited to the procedure or process); Adapt (to adapt the learning to each situation to which the procedure or process concerns), Share (sharing the leaning and spread throughout other scenarios). These studies demonstrate that training based entirely on a demonstration of the most frequent errors to avoid and the possibility of experiencing and solving it is cognitively more positive. Recalling the heuristics previously presented, let us take as an example the availability that as Tverky and Kahneman (1974) explained our memory tends to vividly evaluate the

	situation through previous experiences, what constitutes this cognitive short cut - availability. It is obvious that we recall much easily an error we had to solve than a situation that never gave us any problem. It should be taken into account, however, that this training here is an individual that will lead to groupal and then organizational learning. However, according to Lopes and Capricho (2007), the training available to employees of companies is not providing adequate answers to their organizational needs, since that in these the most important is growth through experience and self-learning. Lopes and Capricho (2007) warn of “(...) the urgent need to correct <i>"the gaps in the system, reconciling the" world of work "with the" world of training"</i>. The organizational learning and the way that it's originate is still dubious and questionable because there is no consensus model. (...) Organizations - just like people, even with conditions and abilities, wanting to learn and practicing - do not always learn right from time to time." (Lopes & Capricho, 2007, p. 377). The authors also explain that learning does not happen equally in all companies, it evolves through levels of accumulation, transformation and information sharing where the inter-help is of greater significance (Lopes & Capricho, 2007).
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Source: Self elaboration

Accordingly to our theoretical exposition, we conclude that the TQM approach must be improved taking in account the suggestions above. From our point of view it is fundamental to guidance the corporate management with the all the details that might prevent the uncess of the TQM implementation. Nordfjeld (2013) stated, today there are several

heuristic and mathematical models, methods and strategies to solve risk, uncertainty and human biases. These tools should be integrated into to counter biases in a direct way through the different phases during the project life cycle of an organization, to eliminate waste and ensure predictability in the project quality management systems turning them into more efficient and competitive (Nordfjeld, 2013). We would like to leave a reference to a very meaningful manual of the authors Lopes and Capricho (2007) - Manual of Management - 100% Quality , that although it does not contemplate the mechanisms of decision-making and heuristics of the thought, it's a manual that combines the fields of quality with psychology and sociology. This manual is an implementation guide to TQM, leaving to the reader the possibility of using / experiencing the different approaches and theories presented as solution for each point discussed. More important it discloses that there is a European Foundation that is constantly looking for building an adaptative approach with suitable quality tools, that will culminate in a structured management system, in favor of an improvement and ability of TQM implementation.- "The European Foundation for Quality Management (EFQM) is a non-profit association founded in 1988 by fourteen leading companies at European level and are currently more than 750 (EFQM, 2004 quoted by Lopes & Capricho, 2007, p. 207).

Conclusion and future research

TQM approach was without a doubt, a tuneful tool for the businesses: challenging, perfectionist and providing greater prestige and benefit to the companies. The times were of competitiveness and there was a need for the companies to update their situation according to the fastness of the evolution. The demand of the standardization within a global world became gradually imperious, demanding in turn that the companies would stress the practice, principles and common language within social cultural multi diversity. The effort and rationality put in such procedures are undeniably viewing the ambition of structure and organization which would reinforce and materialize two key concepts in Quality "effectiveness and efficiency". Therefore if each of their definitions can be matched and receive contribution of written documented procedures, it is indeed half way to meet the

goals.

Nonetheless, studies on the quality field have demonstrated that organizations still have difficulties in implementing this approach. On the other hand, there are already authors interested in explanations for this difficulty. If the aim of quality management is to control the maximum day-to-day business variables, it is of absolute importance to take into account an approach that recognizes human richness, cultural, individual variable, and their interactions plus their consequences for organizational actions.

It is imperative to take a multidisciplinary look to the philosophy which has been presented, trying to contribute with future studies about the joining of human factors and its adaptation to the TQM procedures.

In this study, we contributed with an analysis of the contents and elements of TQM, throughout an integrated vision where we conjugated individual and group psychological variables in an attempt to call for the need of future studies which can confirm the impact of those variables in the performance of the collaborators in a company. We called our philosophy as integrationist since it is necessary to perceive TQM as a tool included in a reciprocal system between the individual and the organization, where one as direct consequences in the other. It is essential to take a closer look at the market available TQM manuals, since their purpose is to assist the company's management and quality departments, and they are of shortened help regarding all TQM procedures that require human performance.

We also alert for the fact that other TQM intervention is being held as an important instrument and it's starting to proof as useful in other fields. Major studies, like Stewart's (1994) and recently Ates and Durakbasa (2011) consider the importance of understanding the quality, energy and environmental management in joined holistic approach, as these are fundamental success factors in today's market competition. The same study presents the approach of Total Management Energy (TQE), based on TQM philosophy, viewing the energetic efficiency through the change of company workers human behaviors by training of processes and procedures similar to TQM, since they consider of utmost importance the

employee awareness and access to valuable information energy savings. So it is most urgent that these findings evolve and continue to be study in order to empower of this tool as a basis to other areas of knowledge.

From all the above, we have this starting point: human are social beings with unique characteristics, unique ways of thinking, which can be influenced by heuristics which in turn are daily used (most of them) in an unconscious way, create biases in our choices and decisions. Important choices that affect determinants to the implementation of the TQM approach in a company. Likewise, we have verified that the individual factors such as inner motivation, level of commitment, satisfaction have either beneficial or malign effects in the individual interaction with the organizational system: peers; groups; leaders. Furthermore, we've learned that these group variables have also an effect in the individual factors. If effectiveness and efficiency are crucial factors for TQM implementation, we must study our way of thinking and (re)acting so we may understand why TQM is such a reliable theoretical model, and then in its practice it ends up not having the best expected results. For this reason, we suggest that future studies operate each of these variables and test them in the field, in order to understand how much they are related and in what form.

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