



CONFIRMATION BIAS IN INNOVATION DECISION-MAKING

VIÉS DE CONFIRMAÇÃO NA TOMADA DE DECISÕES DE INOVAÇÃO

SESGO DE CONFIRMACIÓN EN LA TOMA DE DECISIONES DE INNOVACIÓN

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ABSTRACT

Potential innovators need to overcome many challenges. One such challenge is confirmation bias in decision-making. Human evolution has programmed the brain to act quickly in the face of a threat in the environment. In this way, thinking and (instantaneously) acting rationally is almost impossible for most people. This causes several negative effects on decision-making, notably cognitive biases. For example, an entrepreneur who wants to launch a new product on the market tends to convince herself/himself that her/his product is innovative, ignoring evidence to the contrary, this being a confirmation bias. An innovative analysis of the causes and consequences of the confirmation bias in innovation decision-making is the main goal of this article.

KEYWORDS: Behavioral economics. Neuroeconomics. Innovation. Creativity. Confirmation bias.

RESUMO

Potenciais inovadores precisam superar muitos desafios. Um desses desafios é o viés de confirmação na tomada de decisões. A evolução humana programou o cérebro para agir rapidamente diante de uma ameaça no ambiente. Dessa forma, pensar e (instantaneamente) agir racionalmente é quase impossível para a maioria das pessoas. Isso causa vários efeitos negativos na tomada de decisões, notadamente vieses cognitivos. Por exemplo, um empreendedor que quer lançar um novo produto no mercado tende a se convencer de que seu produto é inovador, ignorando evidências em

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contrário, sendo isso um viés de confirmação. Uma análise inovadora das causas e consequências do viés de confirmação na tomada de decisões de inovação é o principal objetivo deste artigo.

PALAVRAS-CHAVE: Economia comportamental. Neuroeconomia. Inovação. Criatividade. Viés de confirmação.

RESUMEN

Los innovadores potenciales necesitan superar muchos desafíos. Uno de esos desafíos es el sesgo de confirmación en la toma de decisiones. La evolución humana ha programado al cerebro para que actúe rápidamente ante una amenaza en el medio ambiente. De esta manera, pensar y (instantáneamente) actuar racionalmente es casi imposible para la mayoría de las personas. Esto causa varios efectos negativos en la toma de decisiones, en particular los sesgos cognitivos. Por ejemplo, un emprendedor que quiere lanzar un nuevo producto al mercado tiende a convencerse a sí mismo de que su producto es innovador, ignorando la evidencia de lo contrario, siendo esto un sesgo de confirmación. Un análisis innovador de las causas y consecuencias del sesgo de confirmación en la toma de decisiones de innovación es el objetivo principal de este artículo.

PALABRAS CLAVE: Economía del comportamiento. Neuroeconomía. Innovación. Creatividad. Sesgo de confirmación.

1. Introduction

Innovating means generating unprecedented market solutions. For this, it is necessary to make many important decisions that go from the generation of the idea to the commercialization of a product or service. And, unlike common products on the market, the development of an innovation requires the entrepreneur to make these decisions based on a market that does not yet exist. In this way, the entrepreneur needs to find evidence that her/his project will be successful, i.e., to take decisions in a context of (full) uncertainty.

However, this search for evidence that confirms the belief in success can be a trap. This is because individuals tend to prefer information that confirms their beliefs, ignoring contrary information, that points out towards the failure of the initiative.

In fact, human beings are creative confabulators designed to invent stories that impose coherence on the world (TETLOCK; GARDEN, 2016). Therefore, the human tendency to seek confirmatory information serves to give a broader meaning to their life narratives, including in business. This phenomenon happens, to a large extent, unconsciously and has developed from the interaction of humans with the environment throughout their existence.

On the other hand, that phenomenon is made present in a world with unprecedented economic changes, in speed and forms, due to digital transformation. Companies have prioritized the incessant search for innovation aimed at generating value and increasing profit.

Consequently, the challenge for a company in the contemporary economy is to be more assertive in the development of innovative solutions. For this, managers must better understand the phenomena of decision-making.



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However, many variables impact the outcome of developing an innovative product. Understanding the shortcuts that the brain learned to take to be fast enough to survive the dangerous environment of thousands of years ago is possibly one of the most important variables in the process of generating innovations. That is so because the human being is the source of creative ideas - potentially innovative. In short, the potential innovator needs to manage, ideally in a rational way, expectations about production and commercialization.

There are many phenomena related to biases in decision-making. In this study, we chose to investigate the confirmation bias. However, in future research, other types of biases important to the product development and launch process will be addressed individually.

The objective of this research is, therefore, to study the influence of confirmation bias in the decision-making process of economic agents in the face of the possibility of developing innovative products and services.

This research is necessary given that few studies of business innovation include elements of behavioral economics in detecting, explaining and solving problems.

The general hypothesis of this study is that economic agents are negatively influenced by confirmation bias in their innovation decisions. The operational hypothesis is that people overestimate their ability to generate potentially innovative ideas and one of the reasons is confirmation bias; in other words, they convince themselves that it is easy -- or easier than it is true -- to come up with creative ideas in innovation projects.

The inclusion of confirmation bias can be a real difficulty for innovators. A problem that is easy to detect, but that needs a specific approach – based on behavioral economics, which this study adopts.

That being said, the rest of the article is structured as follows: Section 2 consists on some conceptual considerations about behavioral economics; Section 3 presents the materials and method herein used; Section 4 offers the results and its discussion; Section 5 acknowledges the limitations of the study, which may lead to further research; Section 6 concludes.

2. Some conceptual considerations about behavioral economics

2.1. Decision making systems, confirmation bias and innovation

Confirmation bias is a trap capable of catching even the most prepared - and intentional - managers. This is because it is a condition imposed by biological and social variables, occurring unconsciously. Therefore, no brain -- however trained -- is free to fall into this trap.

Originally, a large body of research in behavioral economics and psychology has highlighted systematic mistakes we can make when looking at data. We tend to seek evidence that confirms our preconceived notions and ignore data that might go against our hypotheses. We neglect important aspects of the way that data was generated. More broadly, it is easy to focus on the data in front of you, even when the most important data is missing (LUCA, 2021).



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Thus, in describing how people think and decide, modern psychologists often use a dual-system model that divides the mental universe into two domains: a. System 2 is the familiar realm of conscious thought. It consists of whatever the individual chooses to focus on; b. On the other hand, System 1 is largely a stranger to the individual. It is the realm of automatic perception and cognitive operations like the one you put to work right now to turn the printout of this page into a meaningful sentence or to hold the book while reaching for a glass of water and drinking it. a sip. We are not aware of these quick trigger processes, but we could not function without them. We would be turned off. The numbering of the two systems is not arbitrary. System 1 comes first. It is fast and is constantly operating in the background. If a question is asked and you know the answer instantly, it is triggered by System 1. System 2 is in charge of interrogating that question (TETLOCK; GARDEN, 2016).

However, it is necessary to point out that not all researchers of decision biases subscribe to the theory of dual systems, as such. Dual process theory is a broader term that encompasses the work of dual systems theorists (EVANS; STANOVICH, 2013). There is no universal acceptance of literally just two systems that support automatic decision processes and effort is important, and for this reason Evans and Stanovich reverted to the nomenclature of type 1 and type 2 processes, each of which can and does seem to be based on multiple systems (LIEBERMAN, 2007).

It can be dangerous to rely too heavily on what experts call System 1 thinking -automatic judgments that result from associations stored in our memory, rather than working logically with the information that is available. Undoubtedly, System 1 is crucial for survival. It is, for example, the one who makes you swerve your car to avoid an accident. But as psychologist Daniel Kahneman (1934-) has shown, it is also a common source of biases that can result in poor decision-making, because our intuitions often lead us astray. Other sources of bias involve System 2 thinking failures - basically, deliberate reasoning gone wrong. Cognitive limitations or laziness, for example, can lead people to focus intensely on the wrong things and not seek out relevant information. We are all susceptible to such biases, particularly when we are tired, stressed, or multitasking (SOLL; MILKMAN; PAYNE, 2015).

Figure 1 Two cognitive systems

System 1 (or automatic)	System 2 (or reflective)
Out of control	Painful
Easy to do/low effort	Complicated
Associative	Deductive reasoning
Rapid	Slow
Unconscious Reasoning	Self-Conscious Reasoning
Practical	Rule-Based

Source: Thaler and Sunstein (2009).

Concerning confirmation bias, we place extra value on evidence consistent with a favored belief and not enough on evidence that contradicts it. We fail to search impartially for evidence



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(BESHEARS; GINO, 2015). People tend to look for confirmatory information for what they believe to be true and neglect to look for negative evidence (BAZERMAN, 1998 cited by GARY, 2006).

We all employ filters that direct the flow of information in our minds. For a variety of reasons, the mind does not give you license to interpret certain information. You do not deal with issues you do not want to believe are real, and that leaves you with a distorted view (GARY, 2006).

When we make decisions, we make mistakes. We all know this from personal experience, of course. But just in case we still did not confirm this fact, a seemingly unending stream of experimental evidence in recent years has documented the human penchant for error. This line of research-dubbed heuristics and biases, although you may be more familiar with its offshoot, behavioral economics, has become the dominant academic approach to understanding decisions. Its practitioners have had a major influence on business, government, and financial markets. Their books-Predictably Irrational; Thinking, Fast and Slow; and Nudge, to name three of the most important - have suffused popular culture (FOX, 2015).

Another interesting point about confirmation bias is that the individual does not have to decide for it to happen. With the simple fact of thinking about a specific issue, the decision maker can already be a victim of this bias.

However, innovation is a complex process that entails a myriad of decisions and a wide range of cognitive biases are likely to undermine the innovation process in varying ways dependent on which particular decisions are in play at a given moment, and a host of additional factors, not least individual differences pertaining to cognitive and decision styles, which in turn influence the balance of, and interaction among, automatic and effortful information processing in judgment and decision making (EPSTEIN et al., 1996).

Of course, whether innovations are perceived as threats or opportunities depends on the extent to which they are incremental or radical in nature. Radical, competency-destroying innovations are highly threatening to people and organizations that may have their jobs and competitive advantages displaced, while incremental innovation can improve competency. In the former case, decision biases of many types, including confirmation bias, are likely to be more prominent than in the case of less threatening incremental innovations (HODGKINSON; HEALEY, 2014).

Confirmation bias is very pervasive in everyone's decision-making process. It includes day-to-day and short-term economic decisions, such as going to a bakery to buy a loaf of bread. But it also includes important, long-term decisions like buying a house or a car. Certainly, this effect affects potential innovators when thinking about the company's strategy or developing a new product, just to exemplify.

2.2. Innovation

The art and science of innovation is the ability to transform insights into unprecedented market solutions. Therefore, innovating is a brain, behavioral and environmental process. The result of the



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innovation can generate the ultimate transformation or affect to some degree the way in which goods and services are produced. Innovative companies tend to make monopoly profits in the very short term.

Innovation is the introduction of new products or services, or new techniques for their production or operation. It may consist in the practical application of an invention, duly developed (such as the transistor). New forms of marketing, sales, advertising, distribution, etc., which result in lower costs and/or higher revenues, are also innovations. In addition to the great impact they can have on social life itself, innovations play an important role in stimulating economic activity, as they imply new investments (SANDRONI, 2005, p. 428).

Therefore, it seems to be more appropriate to present innovation through the words of the father of the study of innovation in economy. For Schumpeter (1883 – 1950), producing means combining materials and forces that are within our capacity to influence. In this sense, innovation is a force to produce other things, or the same things with a different method. This demands the (different) combination of different materials and forces. For that, there are five cases of possible new combinations (SCHUMPETER, 1983, cited by CHAVAGLIA; FILIPE; CALEIRO, 2019): a. The introduction of a new good; b. The introduction of a new production method; c. Opening a new market; d. The achievement of a new source of supply of raw materials or semi-manufactured goods; e. The establishment of a new way of organizing an industry.

The production units are permanently seeking to obtain advantages over competitors in the market through numerous strategies. In this context, it is observed that the efforts for this lead to a single direction, that of the systematic expansion of the capacity to generate value in the market. It is known that the generation of value depends on a company's capacity to innovate. Therefore, the innovation in the productive process of these organizations will determine whether they will be winners or if they will be just companies that grow inertial, or eventually die, in the market.

According to Kim and Mauborgne (1997), innovation can occur on three platforms. According to this approach, the most successful companies in terms of innovation are those that take advantage of the three platforms on which value innovations occur: a. Product. The product platform refers specifically to the physical product; b. Service. Service platform deals with the support offered, such as maintenance, customer service, warranties and training for distributors and retailers; c. Delivery. The delivery platform encompasses logistics and distribution channels.

So, what are the risks of an innovation? An innovation has three types of risk (ANDREW; SIRKIN, 2006): a. Technician. If the new product or service has any technical flaws; b. Operational. If the organization is unable to market it or make it happen; c. From the market. If the market does not accept the product as planned, the company runs the risk of not getting the necessary or desired return.



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The innovator is the person who creates, organizes and commercializes an original idea in the market. Any human being equipped with her/his mental conditions can be an innovator. And the development of innovation encompasses all spheres of human activity.

Finally, innovation is a double-edged sword. This is not a 'smooth' process. This is because it means the transformation of all location conditions, costs and production functions.

3. Materials and Method

As for the purposes, this research is explanatory, as its main objective is to make something intelligible, at the same time justifying its reasons. The study aims to clarify which factors contribute in some way to the occurrence of a certain phenomenon. As for the means, the research is bibliographic, considering that several books, scientific journals, electronic articles and newspapers are used for the study (VERGARA, 2004).

The working tools relate to the following: bibliographic research; documentary research; and, field research.

The questionnaire used in this research was inspired by a survey conducted by James Andrew and Harold Sirkin. In this survey, completed in April 2006, 1,070 executives from 63 countries, and representing the main business lines, answered 19 questions. For this study, some Brazilian executives answered the questionnaire during the period from March 30, 2022 to June 6, 2022.

4. Results and Discussion

An innovative idea is hard to come by because people overestimate their ability to generate innovative ideas. This is because they are looking for evidence in favor and not looking for evidence against – confirmation bias.

A field research was carried with the participation of 75 people, being: 31 female and 44 male; with a mean age of 44 years.

Table 1 The biggest difficulty to innovate in the company

Options	Answers
I don't have the right people to help innovate	10
Difficulty executing the idea	11
Lack of resource	9
Bureaucracy	14
I don't have support from the boss	7
Uncertainty about the success of the product, service or idea	8
Lack of personal motivation	2
Lack of innovative ideas	6
I don't think innovating is necessary	0
Others	8

Source: Field research



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In the “others” field, it was possible to find the following answers: a. Culture that it was always like this, and it worked; b. Team focused on innovation; c. Fear of making mistakes; d. Conflict of interest and insecurity.

Table 2 Economic sector

Options	Answers
Primary Sector: extraction of raw materials	4
Secondary Sector: industry	23
Tertiary Sector: sale of services and intangible goods	48

Source: Field research

Table 3 Level of education

Options	Answers
Elementary School	0
High school	1
University education	8
Postgraduate (specialization/MBA)	48
Master's degree	12
Doctorate degree	6

Source: Field research

The data presented in tables 2 and 3 are for the reader's reference only. Therefore, they will not serve as a basis for this analysis but are important as providing some contextualization. Looking at table 2, it can be seen in the result obtained in the item “lack of innovative ideas”, in which only one person said it was the greatest difficulty when it came to innovating. This is proof that human beings tend to overestimate their ability to come up with innovative ideas.

However, coming up with innovative ideas is by far the most difficult part of any innovation. Genius ideas are very rare, you are wrong if you think they are not. As well documented by Arthur de Schopenhauer (2013), Joseph Schumpeter (1983), Gregory Berns (2009), among other authors. So, if for these geniuses, having innovative ideas was considered an arduous task, why, for an average human being, would having innovative ideas be something easy? It can only be because one is faced with a cognitive bias – the confirmation bias.

After all, having innovative ideas depends on opening our minds to new information, promoting the start of the creative process. In this way, stimuli that might otherwise be ignored become conscious and resonate with memories, generating new thoughts and original ideas (CARTER, 2009).

In a study conducted by Drexel University, neuroscientists captured images of the “eureka!” moment. Images of brain activity revealed that, a third of a second before the “eureka!” moment, a burst of gamma waves occurs above the right ear, close to the previous temporal gyrus, and also a rapid inflow of blood to that part of the brain. Gamma waves are the highest brain waves, oscillating between 38 and 42 Hz, and are associated with insights, peaks in concentration and expanded awareness. Even more surprising is that Magnetic Resonance Imaging (MRI) images showed a burst



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of alpha waves in the right occipital cortex exactly one second before that. Alpha waves oscillate between 8 and 12 Hz and are associated with relaxation, visualization and creativity. Basically, the brain is suppressing vision just before the “eureka!” moment occurs (KOUNIOS; BEEMAN, 2015).

In addition, confirmation bias can occur in any type of belief, therefore, it could have occurred with other items in the questionnaire survey performed. However, an innovative idea is the basis of innovation, so we chose to observe how people perceived their ability to generate creative ideas.

But what if potential innovators did not need to create? As is the case with lead users. Lead users is a method of developing innovative products that systematizes the generation of innovative strategies, products and services. This system is based on two major discoveries by scientists: a. Many commercially important products are initially conceived and even prototyped by users rather than manufacturers; b. they found that these products tend to be developed by lead users – companies, organizations or individuals that are well ahead of market trends and have needs that go far beyond those of average users (HIPPEL et al., 2005). This does not change that innovation does not only happen in the product, it can also happen in the service and delivery platform (KIM; MAUBORGNE, 1997). In addition, the frequency with which innovative ideas from third parties appear is very low. It may even be a source of support, but it does not solve the whole problem of the search for innovation.

The researcher may hesitate at the possibility of making some statements about such a new subject. However, the scientific methodology and studies already carried out on confirmation bias applied to the decision-making process guarantee the necessary support for research on this bias, or any other pertaining to the field of behavioral economics, to be carried out without major problems.

Finally, although it is very clear that confirmation bias is present, at least with regard to people's real ability to generate innovative ideas, it is not possible to specify the information used by people to reach the conclusion that generating innovative ideas is not the company's main challenge.

5. Limitations and Future Research

Collecting a higher quality sample is necessary for future investigators. Even opting for an online data collection modality, the financial costs are considerable and the return of completed questionnaires does not happen in a desirable way – quickly. This was a major limitation of this research; however, the study served more as an example to facilitate reasoning about the impact of confirmation bias on innovation.

In particular, it is recommended that those who have abundant resources for studies in behavioral economics also invest in physiological techniques for mapping the human brain and body, in addition to behavioral outcomes. For example, through facial micro expression mapping software, it is possible to detect the dominant emotion feeling at the time of decision-making.



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Nevertheless, the researcher who wants to venture into future investigations of biases in decision-making needs to ascertain the impact of other biases, for example, the “availability bias” and the “not-made-here bias”.

Finally, in an attempt to apply the scientific knowledge of experimental research, exploit to the maximum the biases in the decision-making of entrepreneurs and other leaders of real innovation projects through applied research, documentation of case studies.

6. Conclusion

Confirmation bias is a threat to the process of developing innovative products and services. This is because it blinds entrepreneurs to possible facts that contradict their beliefs. For example, evidence that proves that investing in the launch of a particular product/service is a bad idea.

Is not the fact that researchers seek research that confirms a theory a case of confirmation bias? The answer is no, despite being also true that there are much less studies that offer ‘negative’ results about some hypotheses. After all, the scientific procedure imposes steps and procedures that must be followed to carry out the work. Even in the case of an absolutely unpublished work, the researchers check previous studies on the topic. In addition, academic work is rigorously evaluated by journal editors before being published.

People overestimate their ability to generate potentially innovative ideas by searching for evidence that they are creative enough to generate innovative products, failing to notice information that proves them wrong.

The interviewees, when stating that the generation of innovative ideas is not the greatest difficulty for the development of innovations, is configured as a typical case of confirmation bias.

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