

ORIGINAL PAPER



DOI: 10.26794/2304-022X-2024-14-2-104-115

UDC 331.446.4(045)

JEL J24, O15, E24

The Impact of Cognitive Distortions on Decision Making in Agile Project Management Frameworks: Current Positions and Perspectives in the Academic Community

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ABSTRACT

The purpose of the study is to review the current positions and views of the scientific community regarding the influence of cognitive distortions (both individual and group) on decision-making within such an approach to project management as agile framework. The article defines the concepts of "project", "project management", "agile project management framework", "heuristics", "cognitive distortions"; it describes what kind of decisions (according to the hierarchical structure) can be made when using agile project management frameworks. On the basis of analysis of a number of scientific works, the existence of the problem of success (efficiency) of implemented (including IT) projects even if modern flexible frameworks of project management are used is fixed. The author of the study considers the concept of heuristics and cognitive distortions (both individual and group), describes the manifestation of individual and group cognitive biases, gives examples of individual and group cognitive biases' impact to decisions taken in Agile project management. As a result, the author proposes a classification of likely to manifest individual and group cognitive biases at each of the three levels of decision-making in Agile (according to the hierarchical structure): operational decisions, tactical decisions, strategic decisions. The author also provides an overview of the development of decision-making theory and describes three main approaches to the consideration of the empirical decision-making process: according to D. Kahneman and A. Tversky (*heuristic approach*; *behavioral economics*), according to G. Gigerenzer (*ecological rationality approach*), according to G. Klein (*naturalistic approach*). The author also identifies a possible further vector for the development of research in this direction. The result of the work was the classification of probable individual and group cognitive distortions at each of the three levels of decision-making in flexible project management frameworks (according to the hierarchical structure): operational, tactical, and strategic.

Keywords: cognitive biases; group cognitive biases; individual cognitive biases; Agile project management; the impact of cognitive biases to decision-making; heuristic; decision-making in Agile project management; classification of cognitive biases; mistakes in project management; efficiency of Agile teams

For citation: Khamitov D.A. The impact of cognitive distortions on decision making in agile project management frameworks: current positions and perspectives in the academic community. *Upravlencheskie nauki = Management Sciences*. 2024;14(2):104-115. (In Russ.). DOI: 10.26794/2304-022X-2024-14-2-104-115

INTRODUCTION

Today, the development of information technologies and their deep integration into all areas of life and activity are becoming more and more tangible. As a result of digitalisation, new segments in business are emerging and developing, in particular, projects to create digital products.

At the same time, there is a dramatic increase in the amount of information that is freely available and updated lightning fast. This has both obvious advantages and less noticeable disadvantages: a flood of unreliable data and fakes appears in the information field, the level of uncertainty increases, the process of searching for necessary information becomes more complicated, and the time for making managerial decisions is reduced.

Most of the scientific community agrees that the changes affecting both society as a whole and each individual in recent decades occur (including those influenced by information technologies) at a pace faster than the speed of response to them (i.e., the speed of adaptation). It is important to note that this judgement is also true in the context of project management: the existing approaches to the latter are transformed and altered in relation to the changes mentioned in the previous paragraph much slower than the changes themselves, therefore, in practice, decision-making, including in flexible project management frameworks, usually takes place under conditions of uncertainty.

It is for this reason that the author considers the decision-making process of a small group working in agile project management frameworks as the *object of the study*; the *subject of the study* is cognitive biases arising in this process, which influence the quality of decisions made and the effectiveness of the results obtained.

Despite the seemingly obvious existence of subjectivity in decision making in IT projects (including those managed with agile frameworks) under uncertainty [largely based on

individual characteristics and properties of decision makers (DMs)], as well as a large number of different factors affecting the success of projects, the author, based on the results of his previous work¹ believes that it is the cognitive biases of decision makers that have the greatest impact on decision making. If we proceed from this judgement, we can notice their common patterns and, on this basis, propose a method for optimising decision-making in IT projects managed with agile frameworks under conditions of uncertainty.

The author has identified the following *research question* within this paper: what cognitive biases arise in small group decision making in agile project management frameworks?

AGILE PROJECT MANAGEMENT FRAMEWORK

In order to give a qualitative characterisation of the designated object area, it is necessary to first define such concepts as “project”, “project management” and “agile project management framework”, and then find out what kind of decisions can be made in agile project management frameworks.

Thus, according to C. Heldman, “a project is a temporary activity with clear start and end dates. It creates a unique product, service or result and is considered completed when the goals and objectives have been achieved and approved by the project stakeholders” [1].

One of the first mentions of the concept “project” can be considered its use to describe various plans and proposals in the work of F. Bacon [2] written in the XVII century.

Many experts [3–6] agree that at the initial stages of development of new products (in particular, digital products) there are quite a lot of questions (controversial points, nuances). In order

¹ Khamitov D.A. Influence of cognitive biases on decision-making in projects of digital products creation under conditions of uncertainty. Master's thesis. Moscow: RANEPa; IBDA; 2022.

to make the work done from the day the idea of creating a new product is conceived to the beginning of its actual use as effective and productive as possible, project management techniques are used, which are universal to a large extent and can be successfully used in various fields.

At the same time, it is important to note that each specific area has its own unique aspects affecting the organisation of the processes of managing the projects implemented in it.

The information technology sector (due to its specificity) is no exception. Based on the judgement that it is multifaceted and includes many different areas, it is fair to assume that the most complex projects in terms of implementation and management can be singled out. According to V. I. Grekul, “in the IT sphere the most complex and large-scale projects are the projects of development and implementation of information systems — the project of creating IT solutions” [7]. We believe that digital projects (digital product creation projects) belong to the same group of projects: they have a number of peculiarities determined by the digital product being created, the organisational structure of the enterprise, the solution development team, and the object of automation.

Even taking into account the fact that today the importance and complexity of digital projects is quite obvious, and various proven methodologies are used to manage them, the statistical indicators of the success of such projects are disappointing.

Thus, the article by A. Shenhar and D. Dvir describes the following results obtained in the study of various project management practices: about 90% of the total amount of work is performed under budget (at the level of 50%) and under schedule (at the level of 70%) [8], which clearly indicates a decrease in the effectiveness of the existing approaches to decision-making in the course of project implementation (including IT). This thesis is confirmed in the 4th edition of the Project Management Body of

Knowledge Guide (PMBOK Guide),² according to which the success of projects is measured by the following indicators: timeliness, budget compliance, product quality and customer satisfaction.

According to D. Ozkan and A. Mishra, agile frameworks (Agile project management) are becoming more and more of a priority for digital project management because they allow to increase the speed of project implementation [9]. According to the data obtained by these researchers, the majority (71%) of organisations believe that projects managed using agile frameworks are 28% more successful than those managed using traditional methods.

In the study by R. Hoda, N. Salleh and D. Grundy it is mentioned that according to the results of the widely known and the longest survey of its kind “State of Agile”,³ by 2018, 97% of respondent companies used agile project management frameworks, although in 2007 their number was 84% [10].

R. Mokhtar and M. Khayyat called the agile project management framework “a repeatable strategy that helps to manage digital product development projects by improving them with bug fixes through continuous feedback from the customer” [11]. Agile project management frameworks are characterised by short, time-limited project cycles (sprints), daily “stand-up” meetings (dailies), as early as possible demos and retrospectives, continuous analysis of possible improvements, and rapid adaptation of project team resources to solve problems to achieve optimal results [12].

In February 2001, at a meeting of 17 representatives of various digital project management practices (calling themselves the “Agile Alliance”), an Agile manifesto of 12 principles

² A Guide to the Project Management Body of Knowledge, 4th ed. USA: Project Management Institute; 2008.

³ An annual survey with respondents from thousands of IT professionals around the world to explore current trends and developments in the application of Agile.

was developed, united by the cross-cutting idea of the need to adapt to change in order to create a quality product.

PROJECT TEAM AND COGNITIVE BIASES

In agile project management frameworks, the project team (development team) plays a particularly important role, which, according to A. Poth, is the key that ensures the creation of customer value [13].

We agree with P.B. Paulus who believes that such a team is a small group consisting of “two or more individuals who have common goals and established relationships, as well as interdependent on each other to a certain extent and perceive themselves as part of this group” [14].

Moreover, according to the study of N.B. Moye [15], in agile frameworks it is especially important for a project team to be autonomous, in this regard, we can say that it independently (according to the hierarchical structure described in [16, 17]) makes quite a large number of decisions, including:

- operational: prioritisation of improvements, task decomposition (modular design);
- tactical: planning — for example, estimating the labour required to perform each task, distributing tasks among project team members, setting deadlines;
- strategic: decisions about switching to other development tools, optimising current team processes.

It is also important to note that in agile project management frameworks, contrary to professional attitudes that suggest giving the project team the opportunity to make decisions independently [18], in practice, managers/leaders periodically do not observe this rule and leave the last word to themselves.

According to D. Kahneman, the factors affecting the success of the project are some cognitive biases inherent in decision makers (in case of agile project management frameworks — all members of project teams) [19].

A. Vikhman and A. Popov believe that “the irrationality of our consciousness can manifest itself not only in simple, automated actions, but also in the performance of complex thought operations that require conscious control. For example, the decision-making process in a situation of uncertainty is saturated with cognitive biases and heuristics. Heuristics are subconscious techniques to simplify the process of analysing complex situations and probabilities. <...> cognitive errors and heuristics are not mere defects in thinking, but universal properties of the thinking system, operating autonomously or in parallel with intelligence and critical thinking” [20].

As is known, the process of human decision-making affects the “reptilian brain”, which is responsible for the most basic functions necessary for survival (breathing, sleeping, etc.), which, due to its specificity, tends to accelerate information processing and minimise time for decision-making by developing patterns of thinking that take into account previous experience. We also believe stereotypes and form certain patterns of behaviour for different situations, and then, getting into them, we do not look for a new strategy every time, but resort to already known (ready-made) options.

These are cognitive biases. But it should be noted that they are not some kind of brain malfunction or brain disease — they are an inherent feature of the brain, a response to environmental conditions. The term “heuristics” is used to denote a pattern of thinking that takes into account previous experience (one’s own or someone else’s), a stereotype and pattern of behaviour in a certain situation, used unconsciously by a person. And cognitive biases can be defined as gaps (resulting from the use of heuristics) between normative (rational) and heuristically determined behaviour.

The concept of “cognitive biases” was introduced by D. Kahneman and A. Tversky. In 1972, they demonstrated a number of reproducible pat-

terns of behaviour in the course of experiments: people made decisions different from those falling under the theory of rational choice [21].

It is important to note that cognitive biases are typical for all representatives of human society without exception: it is a basic property of the brain, independent of the level of intelligence and education. However, knowing the nature of such biases, the subject is able to minimise their impact on the objectivity of perception of the surrounding world and, consequently, make better decisions. By 2019, more than 175 cognitive biases have been identified [22], the article by A. I. Yakovchuk [23], published in 2022, already refers to almost 2000s, and this list continues to expand. At the same time, according to N. I. Loginov and A. S. Aleksandrova, one of the topical issues in this subject area remains the determination of the status of two-process and two-system decision-making models [24].

It should also be emphasised that, in addition to the individual cognitive biases discussed above, the decision-making process is influenced by the group biases described by R. Barron: “The willingness of individuals to view themselves and others as members of groups that determine their actions is an inherent characteristic of human experience, so that psychologists have introduced the expression ‘fundamental attribution error’ to denote this characteristic” [25]. Indeed, it is common for humans to underestimate the degree of influence of the group they are in at a given time on the decisions they make. Moreover, the degree of our confidence in whether a particular answer is correct, and an approach is correct depends on the people we are talking to at that moment and the position they occupy in the group. If our views are confirmed by the group’s opinion, our confidence in the correctness of the answer (according to R. Orive [26]) will increase.

L. Festinger in his works [27] on the theory of social comparison notes that group members

tend to be in agreement with each other; in case of disagreement, they will try to change each other’s minds, and if they fail, they will reject the opinion (even the most optimal one in a given situation) that goes against the opinion of the majority.

S. Ash, conducting a classical experiment in which groups of Haverford College students (each consisting of one real subject of experiment and the experimenter’s assistants) were required to compare the size of the “control” line with three others; the subject answered after listening to other group members who, according to the experiment, gave the same wrong answer. As a result, it was proved that it is characteristic of human beings to demonstrate conformity to what is accepted as a norm at the group level [28] — when the majority comes to a group consensus (multiplication of sources of influence occurs), conformity increases. It is important to note that such a manifestation of social pressure on the individual fulfilled important social functions, providing the group with tools of control, and increasing the probability of the subject’s perception of its interests on a par with his own, and thus increasing the probability of group survival. However, in the modern realities of project management and decision-making, conformism can lead to negative consequences.

Another example of group cognitive bias is the “enveloped” thinking described by I. Janis [29]. This term refers to the regular inability of a person to express his or her own judgement after other members of the group in which he or she is a member (and especially its leader) have expressed an opinion different from his or hers: as a result, “dissent” or “dissidence” is suppressed or restrained, and the group begins to feel that from the point of view of morality it acts correctly and is invulnerable.

It is also worth citing the words of D. Stoner about the phenomenon of group polarisation [30], which manifests itself in the following:

Table

Classification of cognitive biases in Agile project teams

		Nature of manifestation of cognitive biases	
		Individual	Group
The level of decisions according to hierarchical structure	Operational	Exaggeration of danger	Group thinking
	Tactical	Overconfidence effect	Group conformism
	Strategic	Maximalism	Group polarisation

Source: compiled by the author.

in the framework of collective discussion of complex problems associated with risk, instead of smoothing out “extreme” ideas (arising among individual participants) and transforming them into more “soft” decisions, on the contrary, riskier (compared to the decisions that in similar cases are made individually) decisions are made.).

EXAMPLES OF COGNITIVE BIASES AT DIFFERENT DECISION LEVELS

Based on the above, we can conclude that each of the three categories of decisions (operational, tactical, strategic) made by the project team in agile project management frameworks is char-

acterised to a certain extent by the occurrence and manifestation of both individual and group cognitive biases.

For example, in operational decisions when decomposing tasks or prioritising them, enveloped thinking can “work” which leads to “dumping” (accepting options that are not always optimal, especially if they were voiced by the most experienced or authoritative member of the group), as well as *exaggeration of danger* (in the context of each member of the group the importance/complexity of the task will be significantly overestimated and will not correspond to reality, as a result of which the task will be excessively decomposed and the integ-

rity of its implementation will be violated, and also during the sprint⁴ the team does not fully realise its production resource).

In tactical decisions, for example, *group conformism* is possible (the more members of the group are inclined to a certain variant of the plan, the more difficult it will be for an individual to propose and defend another solution, even if it is more correct), as well as the manifestation of the *self-confidence effect* (each member of the group may overestimate his/her own abilities and skills, as a result of which in a sprint a team member will have to perform more tasks than he/she can actually realise).

There is a possibility of *group polarisation* in strategic decisions (for example, instead of “smoothing out” radical and risky decisions in the course of discussion and, as a result, refusing to switch to, say, a technological stack that has not been adopted in the company, the team will decide to make such a switch, although each of its members individually will consider such a decision to be poorly justified), as well as *maximalism* [in the context of each member of the group, under the influence of this cognitive bias, thinking is built on the basis of absolutes in assessments and judgements, and the presence of any middle ground is not allowed, which may result in a strongly *positive* (“we can do anything”) or *negative* (“we can do nothing”) instead of an *objective* assessment of the current state of affairs, i.e. in either case the decision will be suboptimal]. One cannot also exclude the possibility of a “superposition” of group and individual cognitive biases — for example, a point of view put forward by a group member for collective discussion may already contain an individual cognitive bias.

The *Table* presents the proposed classification of cognitive biases arising in project teams working in agile project management frame-

works in terms of the nature of their manifestation (group/individual) and the decision level at which they arise in a clearer way.

EMPIRICAL DECISION-MAKING PROCESS

It is generally believed that B. Pascal with the ideas from his work “Thoughts” [31], published for the first time in 1670 (including the so-called “Pascal’s Wager” about God), became one of the founders of a decision-making theory. “Decision-making theory is a theory about what to decide to do when it is not known what will happen. Making that decision is the first and most important step in any attempt to manage risk” [32].

Another influential work on this topic is considered to be D. Bernoulli’s article “Outline of a New Theory of Risk Measurement” [33], that was published in 1738, and which mentions the “St. Petersburg Paradox” — it illustrates the difference between the expected optimal human behaviour and “common sense”.

This idea was further developed in the series of works [34] by G. Simon as “the concept of bounded rationality”, which consists in the fact that decision makers stop at a satisfactory, but not at the optimal option. That is, “the description of the decision-making process should take into account the cognitive limitations of computational power”.⁵

To date, the empirical decision-making process can be viewed according to three different approaches proposed by: D. Kahneman and A. Tversky (*heuristic approach; behavioural economics*), G. Gigerenzer (*ecological rationality approach*), G. Kline (*naturalistic approach*).

“In the very first works of the founding fathers of behavioural economics, D. Kahneman and A. Tversky, the emphasis was precisely on the innate statistical ignorance of the human race” [35]. Indeed, scholars have argued that “many decisions are based on beliefs about the

⁴ A short time interval (usually 1 to 4 weeks) during which a development team performs a certain amount of work, creating a finished product or part of a product (incremental).

⁵ Herbert Simon’s concept of bounded rationality. Big Russian Encyclopaedia. 2022. URL: <https://bigenc.ru/c/kontseptsiia-organichennoi-ratsional-nosti-gerberta-saimona-dc2d9a>

probability of uncertain events — such as, for example, the outcome of an election, a defendant's guilty plea in court, or the future exchange rate of the dollar". These beliefs are usually expressed in statements such as "I think that...", "the probability is...", "it is unlikely that..." "it is highly likely that...", etc. Sometimes beliefs about uncertain events are expressed numerically as odds or subjective probabilities. What determines such beliefs? <...> ...people rely on a limited number of heuristics that reduce the complex tasks of estimating probabilities and predicting values of quantities to simpler judgement operations. Generally, these heuristics are quite useful, but they sometimes lead to serious and systematic errors.' [19]. R.I. Kapelyushnikov in his work says that "according to D. Kahneman and other behaviourists, the unconscious part of our psyche (System-1 in their terminology) prevents the conscious part (System-2 in their terminology) from acting rationally, and it is because of this that the decisions we make often turn out to be far from the best and poorly compatible with each other" [35].

Thus, this approach gives a negative (from the point of view of rationality of choice) assessment to the use of heuristics, because the substitution of optimisation procedures for heuristics in decision making leads to a significant number of cognitive biases and errors. That is, according to D. Kahneman and A. Tversky, in the decision-making process a person unconsciously (through the use of heuristics) substitutes a complex problem with a simple one for which he has a formed heuristic, and as a result faces cognitive biases and errors that reduce the quality of the decision made.

Despite the fact that "in modern economic science, the dominance of behavioural economics ideas associated with the names of D. Kahneman, A. Tversky and R. Thaler in the study of decision-making processes of individuals is almost absolute, <...> in modern psychological science there is a largely different situation"

[35]. Indeed, supporters of the concept of ecological rationality, the most prominent among whom is the German psychologist G. Gigerenzer, consider D. Kahneman's ideas quite critically, which is most clearly manifested in the attitude to heuristics. Thus, according to the approach of ecological rationality, heuristics for a person with his limited rationality in difficult situations act as accessible "supports" or "crutches" with the help of which adequate decisions are made and although not the best, but satisfactory results are achieved.

At the same time, G. Gigerenzer does not deny that an unsuccessfully "chosen" heuristic can cause losses in welfare; what is important is that heuristics cannot be bad or good (irrational or rational) — everything is based on their adaptation to the characteristics of the specific environment in which they are applied [36]. In general, the scientist says that instead of perceiving heuristics as sources of cognitive biases and errors, they should first of all be seen as adaptive tools that help to ensure effective and sufficiently accurate decision-making in certain situations.

In turn, G. Kline expresses the following point of view: "Most studies of decision-making based on artificial laboratory tasks treat subjects as inexperienced individuals with biases that interfere with their decision-making processes" and suggests a naturalistic approach, suggesting that "people gain experience that allows them to use intuition combined with analysis when making decisions". <...> a decision is a choice point in which there are several reasonable options, and the commander could have chosen a different option. In other words, even if no other option was consciously considered, if at least one was available and known to the commander, then the decision was made. <...> If decision-making is defined as the judicious selection of one plan of action from several competing plans of action, the study of decision-making may lose relevance to most forms of everyday activity. A growing

body of evidence indicates that people rarely compare options among themselves. <...> Naturalistic decision-making researchers tend to doubt that errors can be easily isolated and attributed to flawed logic. D. Reeson of Manchester University has coined the term “latent pathogens”, which he uses to refer to problems such as deficits in technique, poor training and bad procedures that can go unnoticed until the operator is trapped. It’s easy to blame operator error, but problems that developed even earlier made the error almost inevitable’ [37].

Thus, G. Kline says that when making a decision a person does not choose among several options, but goes through a series of thought procedures, as if “drawing” a scenario (making a mental simulation): if such a scenario is acceptable for him/her, then he/she stops there, if not — “simulates” the next one, etc.

CONCLUSIONS

Despite the growing popularity of using agile management frameworks, the problem of success of implemented projects does not lose its relevance. One of the significant factors that have such an impact is cognitive biases (individual and group). They can manifest themselves at each of the three levels of decision-making:

operational, tactical, strategic. There are three different approaches to considering the empirical decision-making process (behavioural economics, the concept of ecological rationality, naturalistic approach), but they all agree that a person most often makes not the most rational decisions possible in each particular situation.

As a further vector of research development on this topic, in our opinion, it is necessary to choose:

- design of the experiment (including vignette and field experiments to identify the fact and degree of influence of individual and group cognitive biases arising during the work of small groups) and its subsequent implementation on target groups through cooperation with Russian accredited IT companies using flexible project management frameworks;
- analysis of the experimental results and development of recommendations to minimise the occurrence of individual and group cognitive biases in teams, which can be introduced into existing project management processes to improve their success rate.

The work carried out by the author of the article can serve as a starting point for further scientific research in this subject area, as well as a stimulus for the development of new and existing project management frameworks.

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Conflicts of Interest Statement: The author has no conflicts of interest to declare.

Article was submitted on 11.12.2023, revised on 05.04.2024, and accepted for publication on 19.06.2024. The author read and approved the final version of the manuscript