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Strategic information and its systemic processing in the space of current scientific discourse

ABSTRACT

Strategic information is a concept that has been known in management for a long time, but new ideas are constantly being born in the context of its systemic processing. In the following study, the thesis was adopted that the context of current conditions in the environment determines challenges in the field of systemic processing of strategic information. So what is the subject of scientific inquiry today and can any primary areas be identified?

The aim of the article is to establish a general framework of the current scientific discourse on strategic information and its systemic processing based on a review of the latest scientific publications and the identification of key threads.

In the research part, the method of systematic review of the literature on the subject using the resources of the EBSCO database was used. In the next step, the method of determining nomothetic binary oppositions was used. Such oppositions appear in a set of concepts that synthetically capture the content of individual texts.

The procedure used showed that the current leading issues are related to: identifying strategic information resources in previously ignored areas of reality; revealing strategic potential through new information resources; modifying the scope and parameters of information considered strategic; changing the rules of the market game based on the innovative use of information revealing strategic importance.

Keywords: strategic information, information system, strategic management

JEL Classification: L21, L22, L1

Introduction

Strategic information is certainly a resource that is crucial for the success of the organization [Picot et al., 2010, p. 154]. However, in the information era and the fourth industrial revolution, with the increasing complexity of the environment, the issue of systemic processing of the mentioned resource also becomes more complicated [Buchannan, 2019, p. 86]. Nowadays, new, previously unseen challenges have arisen, and the amount and scope of information requiring processing is constantly growing. The context of effective implementation of organizational strategy is changing [Olko, 2022, p. 78]. There is a need to develop the ability to simultaneously think strategically in terms of: taking coherent systemic actions, dynamics of processes, flexibility of actions, limiting or minimizing risks [Rybicki, 2022, p. 15]. Successive generations of competing entities gradually improve the tools used to process strategic information. As a result, ongoing evolution is reflected in published scientific works [Tallon et al., 2019, p. 218].

In the light of the concept of strategic thinking dimensions, systemic strategic information processing focuses on planned, analytical, exploratory, collective activities aimed at identifying opportunities [Piórkowska et al., 2022, pp. 113–114]. A systematically adopted attitude of openness to innovation, searching for and recognizing opportunities to achieve synergy effects, is the way to strategic success [Walecka-Jankowska, Zimmer, 2019]. At the same time, in the era of the fourth industrial revolution, progressive digitalization should be treated as one of the most important strategic changes [Klimczak et al., 2022]. Hence, technological intelligence currently serves as a catalyst for the success of effective strategic management [Adamik, 2023]. The readiness of the human factor, as an element of the system solution, to take advantage of the achievements of the fourth industrial revolution – especially in the form of artificial intelligence – is becoming a necessity [Jatobá et al., 2023]. Therefore, the strategic openness of the organization, which provides an advantage, should be based on the systemic support from information technologies [Weinert, 2019].

The fourth industrial revolution is characterized by such high dynamics of events in the sphere of strategic information management that it introduces a lot of uncertainty, creating unique challenges for organizations [Ross, Maynard, 2021, p. 159]. Therefore, the thesis that the context of current conditions in the environment determines challenges in the field of systemic processing of strategic information is justified. This leads to a key research question regarding how science sees this problem today: what is the primary subject of scientific analysis? Is it possible to distinguish universal areas that lead from the perspective of the ongoing discourse? What aspect of systemic strategic information processing is currently of particular interest to science? To explore these issues, a review of the literature was conducted and then the collected material was analyzed for elements that could constitute a common denominator in relation to the emerging subsets of identified texts. A qualitative method was used, in which involved searching for nomothetic binary oppositions occurring in a set

of concepts synthetically capturing the content of individual publications. After entering terms “strategic information” OR “strategic information” in the EBSCO database (eliminating non-peer-reviewed and non-management publications), 263 items were identified, written between 2000 and 2023. Among them, some works were devoted to unique issues and others were thematically similar analyses. This allowed to indicate the space of scientific discourse focused on the title issue.

Background: Strategic information in the context of its systemic processing

When starting the basic part of the analysis, one can ask an introductory question: what is strategic information that is an object of systemic processing? At the most general level, strategic information is the type that represents a resource processed as part of the decision-making process at the strategic management level [Nogalski, Surawski, 2003, p. 208]. This is consistent with the concept of utilitarian definition of information from the perspective of the needs associated with its use [Pyrek, 2005, p. 142]. The key role and importance of strategic information in management remains undisputed, however, over recent years, a lot has changed in terms of the possibilities of its systemic processing. The latter term should be understood as all activities undertaken in an organized manner to achieve benefits through the use of strategic information.

Information and processing challenges related to the fourth industrial revolution at the strategic level

By indicating what strategic information and its systemic processing are, we are faced with the question of the essence of contemporary challenges related to reaching for its resources. The fourth industrial revolution, whose course is becoming increasingly dynamic, brings many changes affecting the way we treat information and the approach to its management. The globalized economy is undergoing rapid transformation. The driving force behind these changes are technological solutions related to information processing. The existing rules for conducting economic exchange are evolving, which means that the relative bargaining position of individual links in the supply chain is shifting [Antonelli, 2014, p. 152]. The current distribution of power between organizations creating a complex system of interconnected entities is being disrupted, and the consequences of modifying the existing architecture of the entire system can be surprising. The speed of change from the perspective of an independent player means the need to constantly and carefully observe both itself and its surroundings. It is about constantly identifying new spaces that provide opportunities to achieve strategic goals.

The level of saturation of the environment with sources of potential information causes the problem of its excess. There is a race among competing entities to be the first to recognize

and accurately interpret new trends and phenomena (not yet noticed by others) that can be used to strengthen their own competitive position. Challenges resulting from the growing level of complexity of the environment trigger a response in the form of the development of advanced system solutions in the field of information processing. Such solutions are then systematically improved by professionally and consciously managed organizations in order to be able to operate effectively within the conditions set by the fourth industrial revolution.

The revolution that is currently taking place requires intense competition for access to information. Flexibility of action is what matters most. To achieve this, it is necessary to minimize the time needed to respond appropriately to changes observed in the market. Only by having a properly built and constantly expanding set of information, which is properly processed, can one pave the way to success in the coming years [Van Rijmenam, 2019]. However, in addition to the acquisition of information, it is necessary to develop competencies in the area of its effective processing – both in the procedural dimension and the technological background [Becker et al., 2009, p. 213]. More and more often, it is no longer a person but a machine that becomes the sender and recipient of information because the popularity of the use of artificial intelligence in many areas of life is growing dynamically [Zhou, 2013, p. 7]. This is visible, for example, in the implementation of autonomous devices accompanying people in everyday life.

Emerging solutions based on the Internet of Things and Services herald complex systems with a decentralized structure and a dense network of mutual dependencies and conditions [Manu, 2015, p. 5]. This brings the era of feedback, which means a new level of complexity in running a business. The robotization and the automation of extensive technological lines and processes of creating added value (also exceeding the boundaries of a single entity) are progressing rapidly. The human factor is no longer playing its current role [Larsson, Teigland, 2019, p. 31]. This is particularly visible at the operational level. The saturation of the technosphere with sensors operating in a feedback loop in the process of anticipating and forecasting changes in the environment enables flexible response to any new circumstances and prevents errors and mistakes in real time.

The described revolution means the emergence of a new strategy for organizing business in the form of so-called cyber-physical systems for producing products and providing services [Monostori, 2014, p. 9]. Thanks to smart products, suppliers collect feedback from the product (which is also a sensor) after it is delivered to the user. Data on what happens to a specific item when it is at the buyer's disposal are analyzed in order to improve goods and services, and involving the customer in creating value makes him or her one of the key participants in this process [Trstenjak, Cosic, 2017, p. 1745]. There are also solutions using incremental logic, which means that goods and services are given their final form only after some time [Lanza et al., 2015, p. 399]. Their form develops gradually as the scenario of subsequent events occurring under the influence of the user's actions develops.

A modern organization acquires competences in developing relationships with all categories of stakeholders in a feedback system. There is a smooth transition to subsequent iterations, taking into account the user's expectations in advance. Organizations learn how to effectively

meet the buyer's future needs (even when the buyer is not yet aware of them). The methodical approach allows to build an optimized network of related entities in accordance with the intentions of decision-makers [Schuh et al., 2014, p. 435]. This naturally leads to the gradual disappearance of the existing boundaries between the organization and its environment. Ultimately, we can observe the phenomenon of advanced integration of cooperating systems, the effectiveness of which becomes impossible to maintain at a high level in the event of a return to the state of original independence [Bukowski, 2016, p. 76]. In a world of increasing complexity, covering increasingly larger areas of functioning of each representative of society and entire organizations, it is becoming common to integrate previously independent elements within the idea of smart. Self-regulating ecosystems create favorable conditions for the uninterrupted functioning of a single consumer as well as entire artificial organisms, such as a transport network or extensive territorial units. The phenomenon of personalization and customization is intensifying in all dimensions of human existence. Users accept this state of affairs somewhat thoughtlessly, getting used to new and comfortable standards [Rautenstrauch et al., 2012].

Products and services based on augmented reality are becoming more and more common in everyday life. Such solutions allow to enrich the traditional assortment with additional possibilities and integrate it with the mutually adapted offer of a given ecosystem. The most profound changes affect the sphere of very broadly defined production, due to the degree of integration with complementary business areas [Kagermann, 2014, p. 235]. There is a revolutionary change in the model of consumption of goods and services in the form of gradual abandonment of the desire for ownership in favor of fees for use in accordance with the idea of sharing economy [Strømmen-Bakhtiar, Vinogradov, 2020, p. ix]. There is a transformation in the way enterprises operate thanks to the implementation of service orientation instead of product orientation. The proliferation of strategic alliances leads to mutual strengthening of the effectiveness of promotional and sales activities of organizations participating in a common data exchange system. However, for such a solution to bring appropriate results, it is necessary to develop rules regulating mutual openness and sharing of collected information on a wide scale. This also leads to an increase in the level of interdependence of cooperating entities. In the rapidly changing technosphere, many innovations are constantly being created, which make it possible to achieve synergy and set new rules for market competition, but also increase the risk of encountering a substitute offer that better responds to market demand.

The fourth industrial revolution leads directly to solutions in which human perception turns out to be too limited to function independently in a world that is emerging as the next stage in the evolution of civilization. People are beginning to accept that artificial intelligence algorithms interpret complex data sets more effectively. However, this raises serious controversy due to the issue of responsibility for autonomous decisions. Changes are also taking place in the organization itself as the trend of outsourcing operational activities intensifies in order to concentrate all efforts on taking strategic actions in accordance with the logic of disruptive thinking [Schwab, 2016, p. 108]. There is a need to constantly reconfigure the business, both in terms of the internal solutions adopted and the relationships established

with the environment. For this reason, actions at the strategic level become even more important. The work of top-level managers begins to focus on three key issues. One of the priorities is to pursue strategic goals through flexible and continuous redesign of implemented processes, taking into account relationships involving all partners and users. It is also about effective monitoring and improvement of processes during the implementation phase. All parameters adopted, procedures created, and standards set are only ad hoc and the task of the management board is to effectively manage this entire sphere. The tasks outlined above are complemented by making decisions about delegating parts of the process to employees, robots, autonomous modules, and subcontractors, taking into account a number of additional circumstances and conditions, such as maintaining control over the generation of added value, safety issues, and costs.

To summarize the above observations, we state that technology has changed the balance of power in supply chains as well as the meaning and principles of cooperation and sharing information resources. The amount of data that needs to be acquired and processed has increased dramatically. This implies the need to acquire new competences and develop innovative organizational solutions.

Trends in describing strategic information and its systemic processing

The question arises: what does management science offer in response to the challenges presented above? To clarify this issue, the sources cited were diversified in the presented analysis in order to capture the characteristic threads of the current scientific discourse. The primary driving force is the constant effort to update and organize meanings. It is expressed in the improvement of the definitions needed to effectively move in the discussed area, taking new challenges that every organization will have to meet in the near future into account [Schlögl, 2005, p. 11]. The systematic collection of information of strategic value implies the need to create solutions, structures, mechanisms and extensive procedures that will be adequate to the currently emerging conditions [Neto et al., 2008, p. 255]. One of the key threads is to indicate the scope and method of using the potential provided by constantly improving IT technology and to outline the principles of designing processes implemented with its use [Tallon, Pinsonneault, 2011, p. 463].

As a result of globalization and other similar phenomena, the competitive pressure is becoming stronger. It is worth noting that the procedure of assessing the competitive situation currently requires more attention and greater competences. This means that it is necessary to strive for a higher level of professionalization in the area of systemic processing of strategic information [Newkirk, Lederer, 2006, p. 380]. However, this is not possible without prior identification of key success factors dedicated to the system solution being created (Kim, 2022, p. 20). The importance of these factors is sometimes underestimated and therefore proactive implementation of remedial actions is recommended. The common denominator, which are the key success factors specific to a given system, is therefore to make all involved parties aware

of what should become the essence of the new solution [Hooijmaijers, Stumptner, 2006, p. 18]. Multi-criteria methods turn out to be a useful support in the optimization of the system that will be responsible for the processing of strategic information [Henriques de Gusmao, Pereira Medeiros, 2016, p. 1] and whose area of application is constantly expanding.

Game theory is another set of tools described in publications devoted to strategic information and its systemic processing. In a world with a dynamically growing level of complexity, the use of game theory allows to more accurately identify the strategic situation even in a turbulent environment. The observations developed are translated into principles shaping the operation of systems serving the purposes described in this analysis [Jehiel, Koessler, 2008, p. 533]. Thanks to game theory, the operation of the information system can proceed without significant disruptions and as conflict-free as possible [Wiśniewski, 2013, p. 20]. Game theory also makes an additional contribution to the issue of shaping the rules for protecting strategic information when it is the subject of exchange between cooperating entities [Fang, Ren, 2019, p. 12] and helps to adopt a favorable initial position when the problem of feeding the system with strategic information is only being negotiated [Forges, Renault, 2021, p. 475].

Observing the realities of economic and social life, it should be recognized that a very important phenomenon today is the increasing digitalization of all organizational processes. As a consequence, this requires changes in the architecture of the circulation and processing of strategic information [Pai, Lee, 2005, p. 149]. This issue, going beyond the strict framework of a single entity, leads to a change in the perception of the very essence of the resource that is strategic information [Hovelja et al., 2013, p. 465]. Researchers point out the need to set flexible (but at the same time safe for the organization) boundaries in access to strategic information resources [Dachowicz et al., 2018, p. 242]. Efforts should also be made within the organization to expand awareness of what strategic information is and what competencies need to be developed to manage it effectively [Camodeca et al., 2018, p. 125]. The postulates and solutions described have a significant impact on the design of modern information systems, setting standards for this type of undertaking [Chen, 2010, p. 233]. This takes place both in the context of implementing innovative technological solutions [Piccoli, Ives, 2005, p. 747] and, more importantly, in the context of improving organizational solutions [Rodger, 2019, p. 3].

To sum up this part of the considerations, we can state that in response to the contemporary challenges posed by the fourth industrial revolution in the area of the systemic processing of strategic information, management science first of all tries to improve the precision of the description of the new phenomena under study. Specific solutions adequate to the identified challenges are also proposed, based on advanced modeling tools that increase the level of understanding of the laws governing the experienced reality. In particular, in-depth standardization, improvement of procedures, game theory and multi-criteria methods are used.

Methods of identifying the current discourse on strategic information and its processing

In this part of the analysis, an attempt will be made to find an answer to the crucial question: what is currently the subject of the scientific discourse devoted to strategic information and its systemic processing? The creation of the framework of the analyzed discourse has the characteristics of a qualitative research procedure. This approach is fully justified in the case of access to a set of objects (in this case in the form of a set of publications), the nature of which excludes the possibility of making simple comparisons (Creswell, Creswell, 2018, p. 88). The aim of the qualitative approach described is to find characteristic elements of the content and determine the relationships that create a unique and previously unnoticed context of the analyzed discourse. The requirement of representativeness does not apply to this type of qualitative research [Krippendorff, 2013, p. 121]. This approach allows us to use selective data sets of a diverse nature, the composition of which seemingly raises objections related to the subjectivity of selection. In this case, however, it is about inspiration and seeing potential new perspectives for the analysis (even based on single premises) of the selected space. Therefore, there is an analogy with the procedure known from methods such as “brainstorming” or “focus group research”. It should be emphasized that in the case of the topic discussed, the aim is to detect a common denominator in the description of the space examined based on the identified semantic context. For this purpose, certain assumptions were made. The unit of analysis was the abstracts of the publications discussed in the previous section. On this basis, the nature of the concept of “strategic information” and its role within the framework of systematic activities using it were determined. It was possible to identify more than one such context in each publication. Finally, the strategy of searching for binary oppositions through nomothetic explanatory induction was applied to the set of selected contexts (Wang, 2020, p. 128).

Results of identifying the current discourse on strategic information and its processing

As a result of the analysis, a set of terms was selected that show the nature of strategic information in the previously mentioned publications. The identified elements include: advantage, change, commodity, complement, condition, confirmation, constructing material, definition, determinant, discovery, explanation, good, indication, medium, resource, tool, value. When it comes to the role of strategic information in connection with its systemic processing, the following statements come into play: it adds, changes, complements, conditions, constructs, controls, decides, determines, directs, discovers, enables, explains, feeds, fulfills, guides, indicates, orders, prioritizes, professionalizes, requires, strengthens, transforms. In accordance

with the assumptions adopted, when considering the contexts that can be created on the basis of the above sets, they can be divided into smaller subgroups according to the criterion of binary opposition (however, this division does not have to include all elements of the set constituting the starting point of the analysis).

Table 1. The space of contemporary scientific discourse devoted to strategic information and its systemic processing

	Activity	Passivity
Static	Supplementing strategic information thanks to previously ignored areas of an increasingly complex reality	Passive gradual disclosure of hidden strategic potential through subsequent areas of information resources
Dynamic	Redefining the scope and parameters of strategic information adequately to the challenges of the fourth industrial revolution	Submitting to new rules of the market game based on the innovative use of information with strategic potential

Source: own study.

Thanks to the procedure described above, it was established that the first of the binary oppositions identified in the set studied is marked by opposites in the form of elements indicating static and dynamic, while the next pair is formed by passivity and activity (Table 1). In the first case, the oppositions sought are revealed, among others, between “value” (i.e. indicating something that constitutes a permanent and therefore static reference point) and “change” (i.e. the process of redefining the conditions that determine reference points). Another example is “certification” (i.e. permanent evidence of the state of affairs over time) and “complementation” (i.e. modifying the assessment of the state of affairs). Similarly, an opposition can be seen between “resource” (i.e. something with established properties) and “indicating” (i.e. identifying unknown properties). The opposition described can also be identified between “condition” (i.e. something with a precisely defined meaning) and “discovery” (i.e. striving to extract new meanings). The connection with staticity is characterized by the word “requirement” (i.e. a clear definition of a specific expectation), while the concept of dynamics is naturally associated with the word “transformation” (i.e. the gradual pursuit of meeting new expectations).

In the second case (searching for the opposition in the passivity-activity system), the following pairs of terms registered in the study can be mentioned: “material” (i.e. substance subjected to influence) and “advantage” (i.e. source of influence) or “tool” (i.e. object, which can be used) and “explaining” (i.e. determining how to use the object) or “conditioning” (i.e. being a reference point) and “directing” (i.e. determining the area of search for a reference point). The continuation of the analysis would allow for the detection of further criteria determining opposition pairs. However, based on the reasoning carried out, it can be shown that in the contemporary scientific discourse, strategic information is seen, on the one hand, as a (passive) object subject to increasingly sophisticated methods of processing, and on the other hand, as a causative factor (active) that is a catalyst for releasing the opportunities that await hidden in modern technologies and improved organizational solutions. The issue of

considering or not considering the aspect related to the dynamics of events over time is of great importance as well. This is a clear set of determinants of the space of the contemporary scientific discourse devoted to strategic information and its systemic processing.

Summary

The considerations presented were intended to establish the general framework of the current scientific discourse devoted to strategic information and its systemic processing. The main point was to show certain determinants or a common denominator that outlines a space that has been particularly interesting to the research community in recent years [Wang, 2020]. As the analysis showed, the implementation of such a task is possible [J.W. Creswell, J.D. Creswell, 2018]. Strategic information is an object that has a number of attributes that allow it to be considered both from the perspective of game theory and from the perspective of engineering or social sciences. However, in all these cases, it is always an essential element to ensure the success of the organization. This is an unchanging feature of strategic information that has attracted the attention of researchers since the dawn of scientific management.

The analysis showed that the issues currently shaping the ongoing discourse are those related to: supplementing strategic information resources by exploring previously ignored areas of an increasingly complex reality, revealing hidden strategic potential through subsequent areas of information resources, redefining the scope and parameters of strategic information adequately to the challenges of the fourth industrial revolution, changing the rules of the market game based on the innovative use of information revealing previously unknown strategic importance. These themes highlight the dynamic nature of using strategic information resources as well as its static dimension as a reference point for assessing the situation. At the same time, strategic information sometimes plays a passive role (as an object of processing), and in other situations it is a causative factor determining the success of the organization. Thus, the research question formulated at the beginning was answered, showing the key threads of contemporary scientific analyzes regarding the title issue.

From the perspective of the importance of the analysis for management practice, what comes to the fore is the need for the organization to reconsider its choice of sources of strategic information – information that is, after all, the basis for making key decisions. It turns out that the modern environment is an extremely complex system that generates a huge amount of information that cannot be processed simultaneously. Additionally, the usefulness of this information changes very quickly over time. Therefore, even if it is possible to capture a static image of the real situation that allows to see a strategic opportunity, after a while it is no longer valid given the dynamics of events taking place. At the same time, passively processed information of strategic importance at some point begins to actively limit the range of key decisions that can be made. Therefore, the organization must consciously develop solutions that allow it to respond as quickly as possible to the most important information and to flexibly modify

the business model of its operations. This is about the organization's constant ability to escape the trap of a narrow field of vision in order to focus on what actually enables success. The analysis presented in this paper proves to be very helpful in understanding the relationships occurring here and in helping the organization learn how to overcome the observed challenges.

As a first attempt to confront the recommendations formulated in the article with management practice, the case of a medium-sized construction company (which had the opportunity to familiarize with the considerations presented) was additionally analyzed. The management of the above-mentioned organization paid particular attention to the created map of the space for considering strategic information and its systemic processing, and adapted it to their needs. This opportunity turned out to be very inspiring because it resulted in a new view of the company's strategy, taking following activities aspects into account: identification of future optimal locations for construction investments (which led to the purchase of a plot in a temporarily underestimated but promising location), modification of the adopted pricing strategy (which led to taking into account trends shaping future possibilities and purchasing decisions of customers), opening to the introduction of new elements in the offered product range (which led to a construction of a new format of apartments).

A structured look at the current scientific discourse on strategic information and its systemic processing allowed us to identify common denominators that can be a valuable inspiration for further research [Krippendorff, 2013]. The presented analysis had a limited scope and was based only on the use of qualitative research methods. Nevertheless, the publications included in the study, which were fragmentary in nature, when combined into one collection, revealed universal threads. The fact that the scientific community explores certain issues with greater intensity allows us to assume that these are key issues related to the most current challenges of the fourth industrial revolution and the information age [Buchanan, 2019].

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