

A HOLISTIC APPROACH TO MERGERS AND ACQUISITIONS IN HIGH-TECH INDUSTRIES. DOES THE USE OF A HOLISTIC APPROACH REALLY AVOID FAILURE?

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Introduction/background: The aim of the article is to check whether the holistic approach in the case of high-tech industries is the optimal solution in the field of M&A process analysis.

Aim of the paper: Two research hypotheses were formulated:

H1 – It is impossible to create an effective universal holistic model for even a single high-tech industry.

H2 – The key element of the process of assessing the validity of M&A processes is the potential use value of the acquired knowledge and/or technology.

Materials and methods: A quantitative analysis of articles relating to holistic models and sources relating to the specificity of specific market M&A processes were used.

Results and conclusions: The results obtained revealed that the analysis of selected mergers and acquisitions allowed it to be stated that the key aspect determining the success or failure of the M&A process is the value of the acquired knowledge and technology and its applicability within the newly created organisational structures. It was also found that holistic models, apart from being cost-intensive and time-consuming, are also characterised by a lack of standardisation of the model and the lack of assessment at both the level of one industry and within a single branch of the economy. Thus, the creation and application of universal holistic models in high-tech industries may turn out to be ineffective and lead to decision errors at the level of the company's development strategy.

Keywords: holistic model, intellectual property, Mergers and acquisitions, determinants of mergers and acquisitions, intangible assets.

1. Introduction

Despite the fact that most mergers and acquisitions processes (hereafter M&A) are assessed negatively in the long term, most companies still perceive them as a traditional means of strategic development (Kumar, 2012). The implementation of M&A processes in high-tech industries is in many ways typical of other industries. To a large extent, it is the lack of understanding of the structure of the organisation and the processes taking place in it that determines the failure of the enterprise (Kohers and Kohers, 2000, Hagedoorn et al., 2000).

High-tech industries are particularly vulnerable to weaknesses because their most important product is knowledge and / or innovative technology, whose evaluation and assessment in terms of usefulness is extremely difficult except for experts possessing the requisite knowledge (Ahuja and Katila, 2001). In almost all sectors of the economy, M&A processes are driven by the need to acquire knowledge and/or technology quickly in order to maintain/gain a competitive advantage (Puranam and Srikanth, 2007). In the case of high-tech industries, wide-ranging activities in terms of patenting and intellectual property protection are particularly visible, as well as the orientation of R&D processes towards technologies with the highest possible degree of rapid applicability (Rossi et al., 2013). The lack of in-depth integration of decision-making, system and organisational processes results in the failure of M&A processes in most cases. This is evidenced by numerous case studies on M&A processes in high-tech industries (Ragozzino and Moschieri, 2014, Bannert and Tschirky, 2004, Laamanen and Keil, 2008, Cloudt et al., 2006). In M&A data analysis processes, in order to reduce risk, at least two perspectives for assessing a potential M&A process should be adopted: technological and non-technological (covering a number of processes not directly related to R&D processes) (Gioia et al., 2000). The wider the spectrum of the process assessment potentially accepted by the analyst, the greater the chance that the assessment of a potential M&A process will be credible. Thus, in order to optimise the process, the analyst may apply a holistic approach to the analysed process (Agrawal et al., 2015). The key issue then becomes the parameterisation of the model, the number of analysed attributes and the period of analysis. Is the holistic approach a cure for all that ails M&A processes? Many authors, incl. Hull (2011), Krugman (2008) indicate that many failures in the largest M&A processes (AOL Time Warner, Daimler-Chrysler, Oracle-Peoplesoft) are simply due to the fact that analysts and process designers ‘see nothing but financial matters, forgetting about trivial matters such as work efficiency or organisational culture’. The question is, does the holistic approach solve this problem for each process? Contemporary holistic models provide the potential user with a set of tools that he must adapt to a specific case study. The level of involvement in specific areas of the analysis is also a key issue, e.g. an analyst may attach more importance to the issue of financial indicators than to indicators relating to strategic or marketing activities.

This article focuses on the potential application of a holistic approach to the analysis of M&A processes in high-tech industries. The lack of a uniform definition of the holistic process makes it impossible to formulate a universal definition. For the purposes of this article, it was found that a holistic approach is one that assesses a given process from various perspectives of various stakeholder groups (this definition is based on Feix [2020] and Agrawal et al. [2015]). For this purpose, the parameters used in holistic models were revised, and the needs of M&A process assessment in high-tech industries were adjusted. In this work, two research hypotheses were formulated. One maintains that it is impossible to create an effective universal holistic model for even a single high-tech industry and the other claims that the key element of the process of assessing the validity of M&A processes is the potential use value of the acquired

knowledge and/or technology – thus, the author wants to check the validity of the claim by the duo of Puranam and Srikanth (2007). The cognitive goal of this work is to determine the specific parameters of high-tech industries that determine the success of M&A processes. The structure of this article can be broken down into five main parts. The first part is an introduction that outlines the problem at hand. In the second part, an analysis was undertaken of specific aspects related to M&A processes in high-tech industries, such as a specific form of employee remuneration or the need to maintain technical support for products removed from the acquiring company's portfolio. The third part presents a short description of the holistic models. The fourth part is a presentation of the author's own research relating to the analysis of M&A processes in high-tech industries. The work ends with a summary, which presents the final conclusions related to the author's own research and the verification of the two research hypotheses.

2. M&A processes in high-tech industries – characteristics

As already mentioned in the introduction, M&A processes related to high-tech companies distinguish them significantly from other companies. This is visible, for example, in the method of financing M&A processes – in the case of high-tech industries, acquisitions are most often made with cash, and the profile of the acquired entity is to complement the company's available portfolio in a justified way (Koene, 2019). The growth potential and the uncertainty associated with unproven and unexplored technologies mean that research into the potential path of income growth or market share is often based on data of questionable quality (Kohers and Kohers, 2000). Thus, even a partial understanding of the new technology and the structure of the organisation in which the innovation is created is crucial. The continuous diffusion of innovation that reaches investors in many cases refers to secondary innovations and those based on interpretation of research and test results (Diamandis, 2015). Potential investors receive numerous forecasts of future revenues that often do not have a rational basis for forecasting. The completion of the M&A process may be dictated by the company's periodic strategy (Graebner et al., 2017). The most frequently sought-after enterprises are young, often underfunded and without long-term plans to generate positive cash flows (Ranft, 2006). In the case of such acquisitions, both explicit and tacit knowledge are sought. A Ranft study of 75 high-tech companies shows that tacit knowledge transfer is both desirable and difficult in technology acquisitions. The author points out that the employees of the acquired companies, in order to maintain their autonomy, voluntarily limit the transfer of knowledge, while at the same time rich communication and retaining key employees and ensuring their job stability facilitate the transfer of knowledge during takeovers. Cho et al. (2018) noted that numerous technological acquisitions are aimed at shortening the supplier chain for the final product.

The buyer thus aims to save operating costs by sharing common resources between the buyer and the acquisition target. Cost savings can therefore result from economies of scope as well as of scale. At the same time, the potential buyer may intend to improve and/or develop the product. The knowledge and skills transferred from the acquired entity may enable the buyer to improve the quality of the product or extend the line of available products. The buyer may also intend to acquire an additional customer base in order to expand the market, penetrate the market or enter a foreign market if it is not yet operational or has a structure of questionable quality. These actions are essentially aimed at increasing the revenues generated in the long term, with partial decline in profitability in the initial period. Gomes et al. (2013) indicate that the lack of connectivity and fragmentation of research negatively influences further research on M&A processes. The authors point out that there are dynamic relationships between different perspectives of M&A processes and critical success factors. Identifying these relationships can help deepen our understanding of the results of mergers and acquisitions.

It is extremely difficult to assess the validity of the M&A processes carried out in a wide time interval – research shows contradictory conclusions (this was noted, among others, by Bower, 2001, Zollo and Meier, 2008). Previous research relating to mergers and acquisitions in high-tech industries has distinguished two types of technological acquisitions. One, where the purpose of the acquisition is to exclude the acquisition of knowledge and/or technology, and the other, where intellectual property is treated as a typical element of the company's assets (Ahuja and Katila, 2001). The assessment of the course of the connection depends mainly on the adopted perspective. For example, you can use an approach based solely on financial indicators (knowledge as an asset), but you can also adopt a broader perspective where non-monetary factors will also be assessed (e.g. knowledge as a future benefit). Then, regardless of whether the discriminant model or the factor model is adopted – the results can be extremely different.

2.1. A variety of perspectives for assessing the merits of M&A processes

So far, there is no clear line between the holistic and non-holistic approaches in the analysis of M&A processes. In the consulting industry, a holistic model in the assessment of the M&A process is one that takes into account "non-financial values" in the analysis of the entire process (Stamford, 2017). In turn, Feix (2020) and Agrawal et al. (2015) define a holistic model as one that also assesses the legitimacy of the process or only "from many" non-financial and qualitative criteria. Steynberg and Veldsman (2011) make a distinction based on the use of a process approach, on the basis that a holistic approach requires the design of an assessment process and a potential improvement of this or future process.

In the case of non-holistic models, there is a wide variety of methods for assessing the legitimacy of M&A processes – various methods are used in the research that generate extremely different results. It should be noted that most of the available studies were national in nature, thus the economic and legal specificity of a given country may also turn out to be a specific factor.

Porrini (2004), using a regression model, identified the key determinants of mergers and acquisitions, such as the aforementioned requirement to acquire new knowledge and technologies as well as the desire to diversify activities and processes and to obtain innovation in organisational structures.

Zollo and Meier (2008), with the support of consulting companies advising in M&A processes, undertook the creation of a structural model covering many planes of decision making. They determined that the key to success is to maintain the existing customer base and the synergy of the implemented processes. These two key activities are to achieve satisfactory financial results of M&A processes in the long run. At the same time, the authors point out that any evaluation of the process should be made only in the long term, because in the short term most of the successful mergers and acquisitions did not have favourable strategic and financial indicators. Thus, the usefulness of short-term indicators in assessing the efficiency of the M&A process is negligible.

Das and Kapil (2016) focused on the impact of place – of country and region – on the success of the M&A process. They noted that the main drivers of mergers and acquisitions in China, Taiwan and Hong Kong are different from those in M&A in advanced economies. At the same time, large companies (most often multi-industry conglomerates) with low debt are more vulnerable to takeover attempts regardless of their technological strength.

Tarba (2009) and Chakrabarti et al. (2007) undertook the assessment of the impact of the cultural dimension on the success of a merger. They prove that the failures of M&A processes are found in the lack of integration of systems and human resources. This problem is particularly visible in the case of international M&A processes.

In his study, Grimpe (2007) divided the types of integration of post-acquisition firms into the fundamental categories of symbiosis, absorption and regulation. The obtained results allowed him to conclude that if the goal of the process is to acquire new knowledge and introduce a new innovative product, the optimal approach is either to quickly absorb all the newly acquired resources or to have both entities coexist in symbiosis. Thus, intermediate solutions, e.g. preserving partial autonomy, are ineffective from the point of view of profitability of the completed process.

The study by Cummings and Teng (2003) made a significant contribution to the development of research on M&A processes in high-tech industries. As part of an international study that covered 15 technology industries, they determined that the integration of R&D departments as well as the creation of tools optimising the process of knowledge transfer in both directions is of key importance.

Laamanen and Keil (2008) in their study focused on acquisitions by the largest high-tech entities in terms of market capitalisation. They proved that the size of the acquiring company has a negative impact on the entire M&A process. The changing scope of the acquisition process, as well as the 'artificial' creation of relations between entities in accordance with the acquirer's plan, have a particularly negative impact on the course of the process.

As part of his research, Dalziel (2008) conducted numerous interviews with both parties to the M&A process. The analysis of the interviews and questionnaires allowed him to conclude that both parties to the process evaluate it in the longer term with completely different criteria. In the case of acquired companies, the decision-makers in them assess the legitimacy of the process only in financial terms, realising that a potential partnership is a short-term solution. At the same time, the majority of respondents believe that sooner or later they will be completely absorbed into the existing structures of the acquirer. The other party to the transaction, i.e. the buyer, puts more emphasis on strategic and social issues related to the ongoing process than on financial issues. In many cases, the buyers realise that they are paying an inflated price for an acquisition.

Ensign et al. (2014) analysed case studies of technology acquisitions and mergers focusing on non-financial factors. They determined that the success of M&A processes mainly depends on the geographic, procedural, and organisational similarity of both entities. The similarity in these aspects determines the quality of the process of knowledge transfer and diffusion of innovation.

Garrie et al. (2014) undertook a summary of numerous studies in the field of technological mergers and acquisitions. They determined that most of the M&A processes performed are failures, and the failure rate is in the range of 50-80%. The authors determined that M&A processes neither add nor create new value, but often result in significant financial losses for the merging or acquiring entities.

The conducted review suggests that it is currently not possible to create a uniform and coherent theory for assessing the merits of mergers and acquisitions in high-tech industries. Rossi and Tarba (2013) also reached similar conclusions. There are also some aspects of mergers and acquisitions in high-tech industries that have not yet been widely covered in the literature. They often relate to legal relationships related to employee remuneration issues, as well as issues related to the financial structure of the business.

2.2. Specific issues related to technology companies

In technology industries at an early stage of enterprise development, employee share ownership is often encountered (Liu et al., 2014). Potential promotion of employee shareholding can have a negative impact on both the employee and the company. This leads to a large dilution of decision-making processes within the shareholder community, as well as a long-term reduction in the results achieved by the company. At the same time, employee shareholding results in the fact that M&A processes, in a way, create multi-millionaires who,

as employees of the acquired entity, are a valuable shareholder (Huang et al., 2016) – such cases are particularly visible in the case of American and Asian companies. In the case of potential M&A processes, the acquiring company may also acquire Poison pills (Hull, 2015). Examples of such poison pills are, for example, extended product support following a merger or acquisition, the ability to recover part of the fee paid for software purchased after a merger or acquisition, or stock options for employees whose exercise is conditioned on a potential acquisition. The use of the so-called poison pills is most often the result of advice, for example, from investment banks, which advise interested companies/groups of shareholders on how to defend themselves against a potential takeover. The use of the so-called poison pills in recent years has been increasingly restricted. They are illegal in many countries, and where they are permitted, such security products can only be issued upon their approval by the majority of shareholders.

Another rarely discussed aspect of M&A processes in technology industries is the difficulty in, for example, accessing preliminary research related to the technology (Wassermann, 2015; Kelley et al., 2017). For about 20 years, dynamically developing young technology companies have more and more often decided to help marketing companies in creating an image for the purpose of attracting future investors. For this purpose, for example, a non-binding opinion of a scientific centre about the innovation and usefulness of the proposed solution or authorised interviews with management in business magazines are used. Potential investors, encouraged by marketing activities, are in most cases interested in making the technology available, for example in a closed space, so that they can see the innovation and usefulness of the proposed solution with their own eyes, and would like to learn at least some of the documentation relating to the safety of the technology and its reliability. A qualitative case study and a quantitative study by Wassermann (2015) show that over-control of the resources of young tech companies is often linked to the person of the founder who has excessive control over resources. Such companies have much lower valuations than those in which the founder has relinquished control. This is especially true when the tech startup is three years old or more and the centralisation of power is still unchanged, hence the so-called the control dilemma between private benefits and corporate benefits.

Another rarely discussed aspect is the analysis of the profile of clients and capital providers for the acquired entity. In the case of small technology companies that may become the target of takeover, there are often connections with the financial sector – whether as a recipient of a solution or a liquidity provider, e.g. in the form of a loan (Deloof and Vanacker, 2018). The authors stated that in times of economic slowdown, startups dependent on financial institutions on both levels are particularly vulnerable to liquidity constraints, which may limit further development or lead to insolvency. Thus, the issue of diversifying the portfolio of both clients and capital providers becomes important.

Another relatively new aspect taken up in research on technological M&A processes is the structure of connections between the characteristics of the assets held and the methods of financing activities (Mann and Sanyal, 2010). The authors found that young technology companies with more tangible assets, or those whose management runs other similar companies, are more likely to use external debt in the financial structure because these assets have a high liquidation value. On the other hand, entities in which intellectual resources have the main value have a lower probability of using debt, which is consistent with the higher specificity of assets and lower value of the collateral of these assets. The authors also examined the influence of the gender and education of the founders on the structure of the entity's financing. They determined that financing from external sources is dominant among founders with higher education, at the same time the gender of the founders does not have a significant influence on the choice of the financing structure. Similar conclusions were obtained in her study by Badulescu (2011).

Ebben (2009) focused in his work on the impact of using leverage at an early stage of enterprise development and its medium and long-term impact. He found that the use of leverage at an early stage of development negatively affects the financial results generated in the future. The author, using the bootstrapping approach, states that understanding the aforementioned method may allow the company to maintain smooth development while taking proactive, not reactive, activities in terms of financing the conducted activity.

In their work, Land et al. (2005) undertook an analysis of the impact of information systems integration on the success of the analysis of mergers and acquisitions. They noticed that the key element influencing the success of the entire process is to define a realistic vision of the future integrated system, as well as how to obtain it at the point where the analysis of the merits of a potential M&A process is undertaken. For this purpose, it is possible to use both available IT methodologies as integration models as well as consultancy by IT practitioners. It is also important to create knowledge about integration based on previous experiences in the implementation of similar processes (Cho et al., 2016). This significantly reduces the cost-consumption of the entire process.

In summary, the wealth of acceptable aspects requires a prudent investor to apply a holistic concept as an attempt to comprehensively capture the various aspects of a technology company subject to an M&A process. The review of the research results from different periods shows that the given aspects of the company's operation have a various impact on the assessment of the company's functioning depending on the given study. This may result from both macroeconomic reasons relating to the study sites and the changing specificity of the evaluation of the activities of technological entities. Thus, it is extremely difficult to create a universal model adapted to each technological entity.

3. Holistic models in the technological processes of mergers and acquisitions in high-tech industries

This part of the work presents holistic models that can be used in M&A processes in high-tech industries. A common feature of many holistic models is the fact that they were developed on the basis of past mergers and acquisitions. In some cases of holistic models, they focus only holistically on a certain aspect of functioning, e.g. on employees, while others involve many resources using one common holistic approach. Andriuskevicius and Ciegis (2017) indicate that holistic models are not something completely new, but only the result of a certain development process of M&A process evaluation methodology. In the opinion of some researchers, they can also be described as a temporary trend. Susan et al. (2012) go a step further in their criticism of the holistic approach, claiming that due to numerous methodological gaps it currently is not possible to create a merger and acquisition theory, and thus to distinguish the currents within this theory. They indicate that a holistic approach is simply a combination of other solutions on the basis of some exploration, done repeatedly and without adapting tools to a specific problem. Agrawal et al. (2015) also see the problem of the freedom to define the M&A process assessment framework. The flexible structure of selecting parameters for holistic models may make it difficult to compare projects, e.g. within one industry. Modifying the assessment framework may relate to the circumstance, company, industry or environment.

Steynberg and Veldsman (2011), examining the causes of failure of M&A processes, found that in most cases the human factor is responsible for failure. Thus, they focused on the development and validation of a comprehensive, holistic model of the process of integrating people during mergers and acquisitions. They developed a 4-phase model consisting of the following phases: strategic evaluation of the project, preparation and trial of the process, integration and transmission, and ongoing monitoring and possible coordination to improve the process. Basically, most holistic models follow a similar pattern – hence the exact specification of most of the models presented below has been limited. Figure 1 shows a simplified human resource integration model based on the Steynberg and Veldsman model.

As part of their model, the authors also determined that:

- the speed of the employee integration process is influenced most by the geographical aspect;
- macro trends influence integration at the resource assimilation stage;
- industry trends determine activities within the first two phases of the process, i.e. strategic evaluation of the project as well as preparation and trial simulation of the process;
- the assessment of the proprietary supply chains should be part of phase 1, i.e. the strategic assessment of a given project.



Figure 1. A simplified model of human resources integration based on the Steynberg and Veldsman model. Own elaboration based on: Steynberg and Veldsman (2011).

Steynberg and Veldsman (2011) also indicate that the mere application of a holistic model does not guarantee the success of the entire undertaking. The key is to adopt multiple perspectives for assessing a given element and on this basis alone to define a sequence of strategic activities.

Mahajan (2019) also sees positive aspects of using a holistic approach in M&A processes. Among the advantages of a holistic approach, he mentions a positive environment in which participating companies will benefit with a high degree of certainty as well as stimulate the growth and development of society. At the same time, Mahajan (2019) focuses in his work on the high value of knowledge in the process of enterprise integration.

Moore (2011) presented a rare approach to holistic ethnography. The author noted that both the holistic and traditional models ignore the ethnographic aspects that are extremely important for many employees. The holistic ethnography approach should have some proportionality in the M&A planning processes, meaning that different ethnic groups should have an influence on the design of the project. Until now, the power of decision has rested with the headquarters of both entities, or high-ranking managers of both companies selected by the management of their employers.

In their holistic model, Vistnes and Sarafidis (2013) also considered the change in the bargaining power of the acquiring company. They noticed that the intensification of M&A processes may have a negative impact on the bargaining power of buyers of products and/or services. They notice that with the following M&A processes, the negotiations between the two parties to the transaction become progressively unequal. This problem applies to both domestic and international processes.

Kode et al. (2003) indicate that a solution is to be had by way of the holistic approach that supplies synergy in the given case. The potential benefits of synergy are most often an argument for huge bonuses over and above the independent value of the acquired companies. The authors indicate that the lack of a well-thought-out approach to integration and excessively high

acquisition costs are the most common reasons for the failure of an entire acquisition process. They recognise that the popularisation of holistic approaches may result in diminished consideration for the financial aspects that nevertheless retain a key role.

Chanmugam et al. (2005) recognise that the holistic approach is a good solution for entities that already have some experience and knowledge base in the field of M&A processes. Having a set of good practices in this regard can significantly accelerate the process of potential integration of the structures of both entities. The authors, at the same time, define the location (within the existing organizational structure) of the strategic integration process in a fashion quite other than that outlined by Steynberg and Veldsman (2011). According to Steynberg and Veldsman (2011), strategic integration (its evaluation) is the final goal of the M&A process. On the other hand, in the model of Chanmugam et al. (2005), it is a continuous element at the subsequent stages of the process implementation.

Feix (2020) proposed an extremely interesting approach. He decided to use the holistic model and the theory of process management to create a universal holistic model based on a modular structure. Figure 2 shows the modular structure of this model.

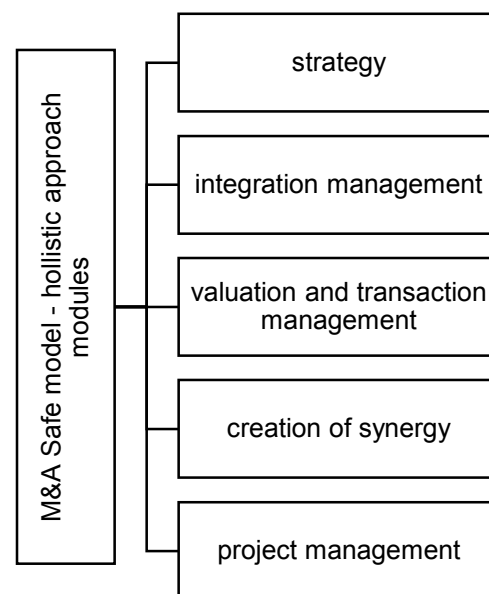


Figure 2. Simplified holistic Feix model based on: Feix (2020).

The author points out that regardless of the industry, most M&A processes should be treated as technological, because more and more often the transferred resources are digital and constitute intellectual property. Thus, the importance of fixed assets, which until recently played the role of the main acquired asset, is diminishing. Feix (2020) recognises the growing role of the digital competences of the people responsible for M&A processes, as well as how an economy based on digital resources changes the approach to assessing the legitimacy of the implementation of M&A processes. It should also be pointed out that it is extremely difficult to assess how the integration process of digital solutions related to the M&A process has proceeded. In the published financial statements and the accompanying additional information, descriptions of problems in connection with the lack of IT systems integration are extremely

rare, so it is difficult to independently assess the integration of such systems. In their work, Hanelt et al. (2020) used regression methods to determine that there is a significant relationship between digital mergers and acquisitions, the digital knowledge base of the buyer, and the consequences for digital innovation and company performance.

To sum up, the main difference that distinguishes traditional models from holistic models used in the analysis of technological M&A processes is the degree of focus on certain aspects. In traditional models, the superior function is performed by issues that are usually measurable with financial resources, while holistic models also analyse (most often with greater intensity than financial issues) non-monetary aspects that relate to issues related to people (the management of them, their satisfaction, their motivation). Both types of models are criticised in many respects by many authors, so it cannot be assumed that there is one appropriate approach to the analysis of M&A processes for at least one narrow branch of the economy. Undoubtedly, however, it can be said that the holistic approach allows for a better presentation of the M&A process in the eyes of stakeholders not focused on future cash flow forecasts. In addition, it should also be noted that many of the processes / results of activities related to M&A departments submit to prediction by any model; instead, there is a certain randomness to unpredictable events that may impact the evaluation of the process in a wide variety of ways (Andersen, 2007).

4. Holistic approach to mergers and acquisitions – own research

As part of the author's research, the validity of two formulated hypotheses was checked. One hypothesis claims that it is impossible to create an effective universal holistic model for even a single high-tech industry, whereas the other hypothesis holds that the key element of the process of assessing the legitimacy of M&A processes is the potential use-value of the acquired knowledge and/or technology. As part of the analysis of the case studies, the frequency of occurrence of specific attributes within 40 M&A processes on an international scale was determined (threshold entry into the research sample – the size of acquisitions above USD 20 billion from 1990-2015). A significant limitation of the obtained results is the various definitions of the strategy element within M&A activities. Some researchers believe that if strategic aspects are taken into account, then the M&A process is holistic. High-tech industries have been classified into four categories of enterprise – electronics, aviation and aerospace, automotive, and medical technologies – in order to discover the deeper specificity of particular industries.

The first presented study refers to the presence of the knowledge/innovation factor as the main determinant of M&A processes. Overall, 40 entities used case studies and/or interviews with decision-makers behind the M&A processes. Figure 3 shows the frequency of the

knowledge/innovation attribute as the main determinant of M&A processes divided into high-tech industry categories over two time periods: 1990-2000 and 2001-2015. The time division was made to check if the relevance of knowledge/innovation varies over time in the perspective of the process analyst's assessment.

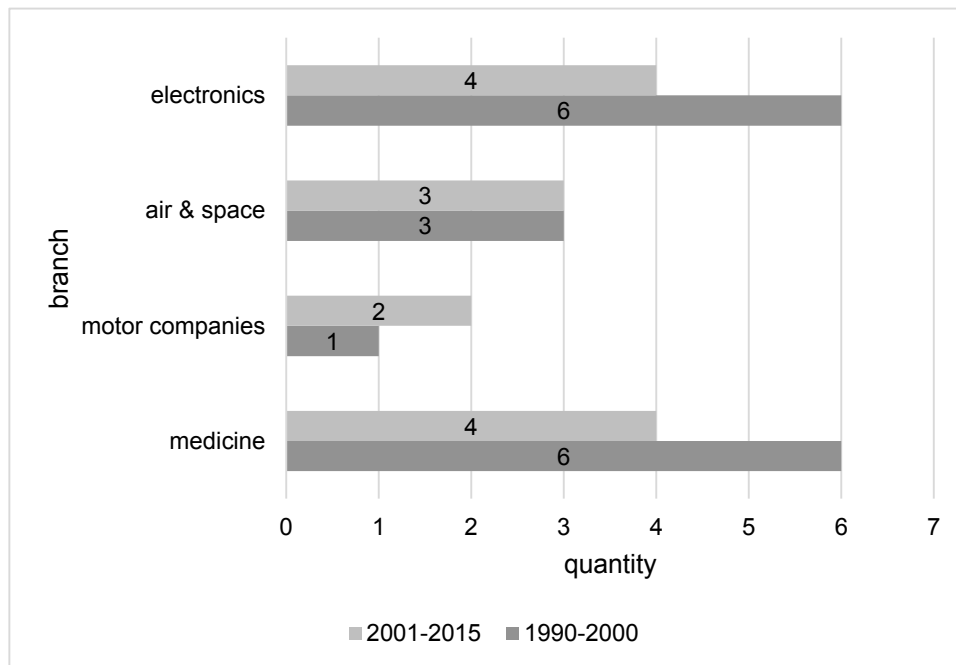


Figure 3. The frequency of the knowledge/innovation attribute as the main determinant of M&A processes. Own study based on a sample of $n = 40$, 10 samples from each of the four categories, number of successes $p = 29$, where success is an attribute of knowledge/innovation as the main determinant of a given M&A process. Success rate without breakdown by industry = 72.5%.

The presented data on the frequency of this seemingly key attribute in the decision-making process indicate that in the case of the medical and electronic industries, knowledge resources are a key attribute. In all the surveyed companies from these industries, knowledge/innovation was indicated as the main determinant of mergers and acquisitions. In the case of the automotive and aerospace industries, the importance of this attribute is lower – in the case of aviation and aerospace by 40%, and in the automotive industry by 70%. At the same time, it should be mentioned that the significance of this attribute does not change significantly over time. Thus, it can be confirmed that the importance of knowledge and innovation that is acquired along with other assets is of significant value in the decision-making processes.

The next study sought to determine the main causes of failure of M&A processes. Most often, the failure of M&A processes is assessed through the financial prism, e.g. in the form of falling market capitalisation (Attah et al., 2020). The study presented below looked at 14 mergers in technology industries that did not increase shareholder wealth as measured by market capitalisation (and the rate of inflation) and attempted to identify key factors (and their frequency) that contributed to the failure of M&A processes.

Table 1.

The main factors behind the failure of M&A processes. Own study based on a sample of $n = 14$, for one examined technological enterprise from the research sample, there may be many key factors

analysed period/ high-tech branch	medicine	motor companies	air & space	electronics
2001-2015	finance (2) organisation culture (1)	technology (1) organisation culture (1) communication (1)	technology (1)	strategy (3) communication(1)
1990-2000	technology(3) organisation culture (2)	technology (2) strategy (1) macrotrends (1) finance (1)	technology (1) macrotrends (1) IT (1)	human resources (1) technology (1) strategy (1) macrotrends (1) IT(1) communication (1)

The results presented in Table 1 indicate that merger failures most often result from a mismatch between technologies and the macroeconomic situation. Issues related to employees and their environment played a relatively small role in ‘building failures’. These findings may suggest that social issues do not play a key role in shaping shareholder value. It should be noted that the attribute of technology in the study was interpreted in several variants: mismatch between the technology acquired and the assets held; rapid depreciation of the acquired knowledge/technology resources; and extraordinary costs related to the maintenance of support for the technology acquired (in this case, for example, providing technical support for products sold before the takeover in the acquired entity, a problem especially visible in the automotive and electronics sectors). The obtained results also indicate that the specificity of failures of M&A processes in each of the examined high-tech industries is diverse and variable over time. Thus, were it created, a uniform holistic model (even for a single industry) for the evaluation of the project would like turn out to be ineffective. This is due to two issues. The first is, in-depth holistic analysis requires expert knowledge in many areas, which significantly increases the cost-consumption of the process and its duration; the second is, the holistic model is not able to determine how the potential benefits, even those of a strategic nature, will retain their value in the future. To sum up, the costs of process design, the duration of the process and the lack of certainty as to the direction of development in the future mean that the holistic approach is not always the optimal solution to the question about the evaluation of the selected M&A process.

The next study that was performed was to analyse the factors used in holistic models to assess M&A processes. As part of the study presented below, it was decided to present the frequency of specific groups of attributes. Universal models without regard to industry were analysed. Figure 4 shows the results of examining the frequency of specific groups of attributes within 8 models considered as holistic (percentage approach).

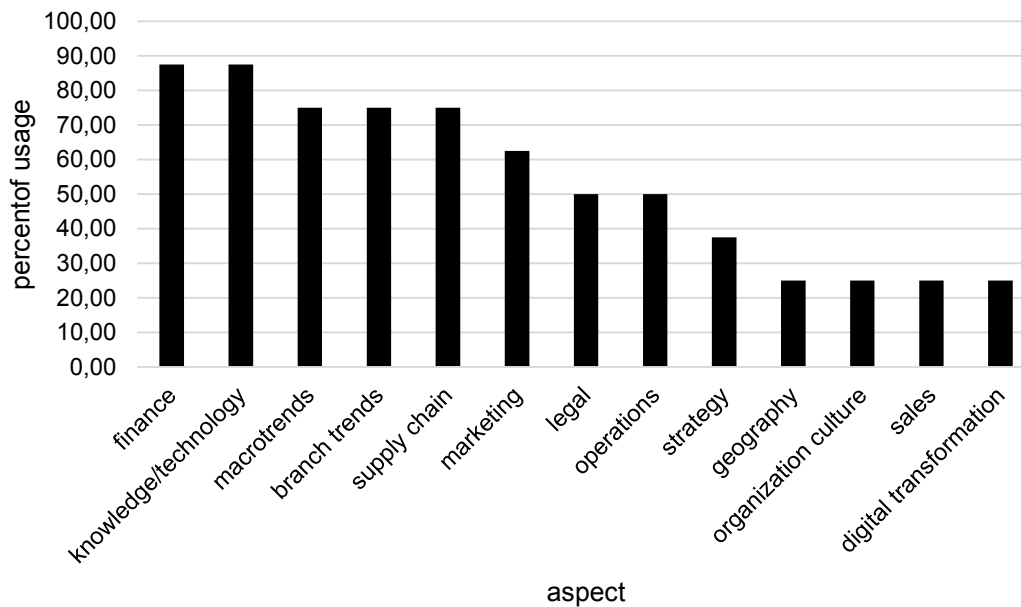


Figure 4. The frequency of occurrence of selected aspects of M&A processes in holistic universal models. Own study based on a sample of $n = 8$. Entry threshold – the presence of at least 25% of universal holistic models tested.

As shown in Figure 4, in universal models the factors that often determined the failure of mergers and acquisitions are of marginal use or are attributed other aspects. Examples of such activities may be the marginalisation of the importance of organisational culture or combining IT and human resource management aspects with other issues/aspects. Marginalization of the meaning of these seemingly important attributes by including them in other aspects only in a limited spectrum (e.g. within factor models) may significantly distort the analysis of these issues. In addition, despite the use of a holistic approach, the above-mentioned issues may not be analysed as a whole. This may be due to the fact that various experts, who are not actively involved in the communication process with other experts dealing with seemingly unrelated aspects of the process, are responsible for specific issues within the holistic process. Thus, another fundamental disadvantage of holistic models appears, namely the depreciation of the importance of both internal and external communication. The conducted literature review indicates that communication has a significant impact on the failure of certain technological M&A processes. However, the issue of communication was nevertheless not considered important in both traditional and holistic models. In summary, the review of the holistic models shows that despite the use of a holistic approach, many aspects are neglected or treated superficially, which may result in an incorrect assessment of a potential future M&A process.

5. Summary

A review of holistic methods for assessing merger and acquisition processes allows us to believe that many aspects of these processes are still not properly taken into account. Holistic methods, despite numerous advantages, are also time-consuming and cost-intensive, which may mean that they are rejected as the basic tool for assessing the M&A process. Returning to the question posed in the introduction, is the holistic approach a cure for all that ails M&A processes? Undoubtedly, had the holistic approach been applied to what instead became the failure of the largest M&A processes known to us today, would have reduce to the magnitude of the failures, but would it have served to prevent them? The key role here is played by the designer of such a model who, due to cognitive limitations, will never be able to create a fully holistic model. The final conclusions related to this article fall into two parts, one related to the literature review, the other to the author's own research.

Conclusions relating to the literature analysis:

- the holistic approach is a desirable approach in a rapidly changing economic reality where the interconnectedness of seemingly independent factors is growing. At the same time, the effectiveness of the solution largely depends on the design of the model, i.e. the mere use of a holistic approach does not reduce the probability of failure;
- this is largely due to the enterprise owners view that an acquisition is a quick and relatively safe solution to lack of development/innovation;
- previous research on M&A processes has focused on various aspects with an emphasis on those selected in the creation of a given model. So far, little research has attempted an analysis of the overall process;
- acquiring knowledge and technology are the main goals of M&A processes, regardless of industry;
- the problem of real valuation of acquired intellectual resources is an extremely important issue that determines the success of M&A processes.

Conclusions relating to the author's own research:

- acquiring knowledge and technology is the most common determinant of M&A processes;
- the application of universal holistic models may turn out to be ineffective in the knowledge-based economy;
- specialisation of the economy imposes additional obligations on experts assessing the M&A process, requiring them to have specialist knowledge related to various aspects of the acquired entity and interactions between them.

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