New Approaches to the Application of Business Intelligence in the Strategic Management Process

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Abstract

This article aims to find the optimal links and ways to use the outputs of business intelligence in strategic company management effectively. A total of 41 tools supporting individual phases of the strategic decision-making process were selected within the literature search. They were divided into six successive stages: mission and vision determination, environment analysis, setting long-term goals, strategy formulation, implementation, and, finally, monitoring. The particular techniques were subsequently assigned to the utilization rate of business intelligence within their application. The resulting model connects the outcomes obtained from the evaluation with the scheme of the strategic planning process inspired by literary review. The most appropriate application of business intelligence takes place in the phases dealing with analyzing the company situation, such as environmental analysis and strategy monitoring. According to the obtained results, the involvement of business intelligence outputs should not be overlooked even in the stages devoted to setting long-term goals and formulating strategy.

Keywords

Business intelligence; Strategic management; Strategy; Strategic planning process.

Introduction

The period of the last two years has convinced us even more that the only certainty in both personal and professional life is change. To quickly address these changes, organizations must be able to use business intelligence when creating a strategy. These procedures processing data into information can be effectively applied in agile risk management, the implementation of artificial intelligence systems and data analysis, which enable informed decisions to be made. Work processes and activities affected by the Covid-19 pandemic are additionally going to be improved.

The events of recent months have further "shortened" the period that managers expect in strategic planning. Moreover, the business intelligence should facilitate and, above all, speed up all the processes and procedures carried out within the framework of drawing up an appropriate strategic plan. The research subject is how and when to apply these methods in strategic management. The integration cannot be solely specified for the decision phase on a suitable strategy. The effort intentions to include business intelligence outputs appropriately in the entire strategic planning process.

The presented article first maps the approaches to the strategic planning process. It presents three models showing the whole process in clear diagrams. A specific strategic planning process represents a way to achieve defined strategies. Many approaches to phasing the whole process can be found in the literature. The primary stages that are repeated in publications

include situation analysis, strategy formulation, its implementation and subsequent ongoing control and monitoring [1], [2], [3].

The most frequently used tools supporting a strategic planning process are subsequently assigned to individual phases. Based on the literature review, a total of 41 techniques were included in the analysis. Each tool was also evaluated by the utilization rate of business intelligence in the application within strategic planning. The newly created scheme, based on own evaluation and a selected model from the literature review, represents the main benefit of the research. It shows the most appropriate involvement of business intelligence in the strategic planning process.

1 Literature Review

Today, the management of an organization is unthinkable without strategic thinking. The manager must know the strategic position of the organization, assess the impact of rapidly changing conditions, monitor the internal and external environment of the company, and choose the optimal time period for changing the strategy [4].

1.1 Business Intelligence and Strategic Management

To maintain optimal business processes and meet customer requirements, it is essential to manage activities across the enterprise and supply chain through agile management-based strategies. An agile approach to business intelligence means an organization's ability to respond to change through strategic risk management, the adoption of artificial intelligence technologies and the ability to perform comprehensive data analysis. Specifically, collecting, interpreting, and presenting meaningful data help managers make effective decisions and take necessary actions [5].

In one of the studies [6] dealing with the critical success factors in implementing business intelligence, the following factors were given the most importance: top management support, clearly defined business goals and needs, active employee engagement and user support. The results of this study can help companies allocate resources based on the assigned importance of indicators at the strategic planning stage and subsequently achieve better results [6]. Specifically, business intelligence can be used, for example, in creating a SWOT analysis, optimizing the reallocation of resources, ensuring cost efficiency or creating overviews of the state of the organization for immediate decision-making [7].

According to Grossmann and Rinderle-Ma [8], there are four possible scenarios for adapting business intelligence to strategic planning:

1) **BI and strategic management are separated**: BI outputs are just standardised reports intended for a specific part of the organisation. They only fulfil the short-term goals of a specific department.

2) **BI as support for monitoring organisational performance**: monitoring is done in the context of monitoring the set measurable objectives. The application of BI is already formulated within the framework of setting strategic goals.

3) **BI as a means of feedback in formulating a strategy**: a typical result of this scenario is an agreed balanced scorecard. BI is already used in the strategy optimisation process.

4) **BI as an essential source for strategic planning**: the results of BI are used directly in the definition of the strategy and thus provide essential inputs for the creation of a strategic plan at the top management level.

The submitted research aims to identify the possibilities and optimal use of BI in checking the suitability of the strategy (scenario no. 3) and in its formulation (scenario no. 4).

1.2 Strategic Planning Process

In a broader sense, overall strategic management can be understood as a management method that, thanks to which, managers design and implement a selected strategy that is subsequently intended to lead the organization to a sustainable competitive advantage [1]. In the next part of the chapter, three selected approaches are presented with a brief description of their pros and cons.

1.2.1 David's Strategic Management Process Model

Perhaps one of the most widely used models was presented by Fred David in 2009. The strategic management process is divided into three primary phases: strategy formulation, implementation and evaluation conclusion [3]. Each phase is further divided into several steps, which are shown in Figure 1.
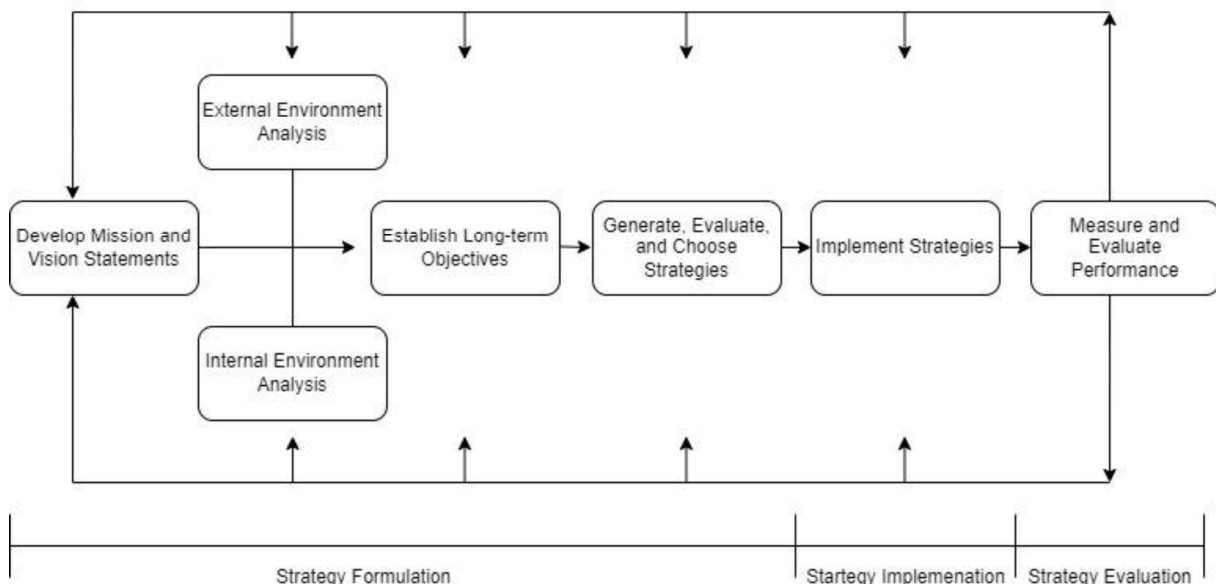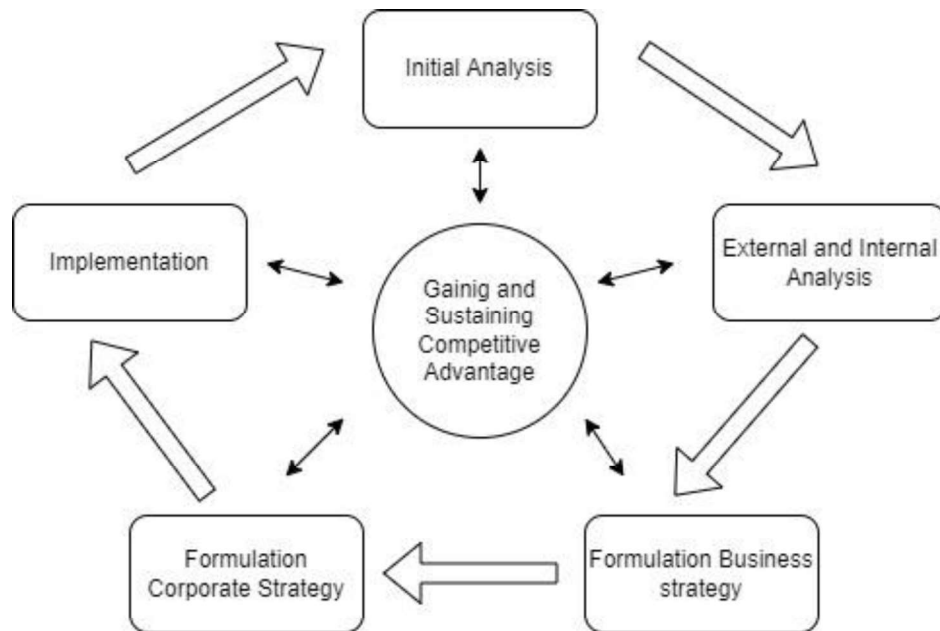

Source: Own processing according to [3]
Fig. 1: *David's strategic management process model*

The model includes the main and intermediate phases strategic planning should go through. The diagram represents the entire process as a continuous sequence of individual steps that follow one another. If necessary, the two-sided arrows show how the whole process can be taken back one or more steps without the manager going back to the beginning of his planning. It primarily differs from other models in that the analytical part is included in the formulation phase, and the assessment of the implementation of the strategic plan is not preceded by monitoring of the implementation [9].

1.2.2 Analysis-Formulation-Implementation (AFI) Strategy

Rothaermel in [1] designed a different scheme. The main phases (analysis, formulation, and implementation) and their steps are shown in a circle, illustrating the strategic planning process as a continuous activity. However, the arrows only show a one-way procedural direction. When the environmental conditions change, for example, in the formulation phase, the model does not show the possibility of going back even one step [10]. As can be seen in Figure 2, the author also divides the analysis phase in the first stage into two separate steps:

the initial analysis is followed by an external and internal analysis of the situation. At the center of the model associated with all these activities Rothaermel emphasizes the main objective of strategic management: "Gaining and maintaining a competitive advantage".
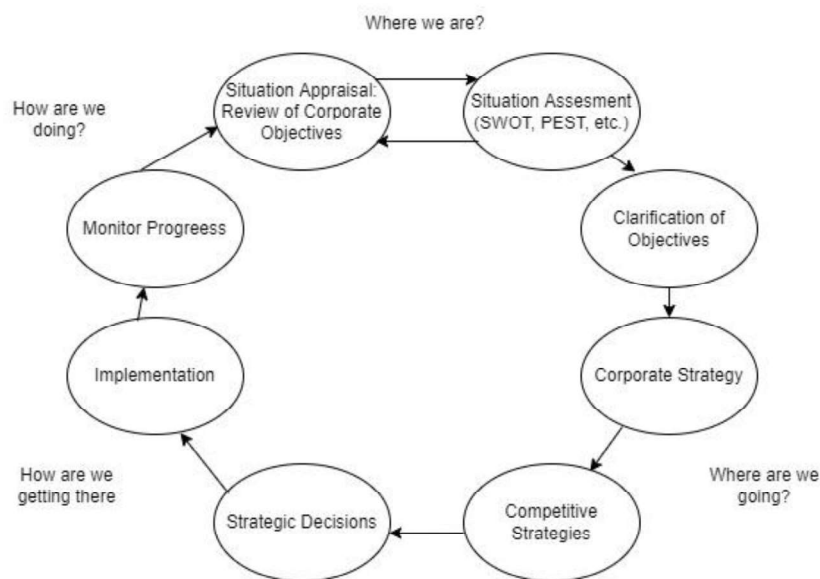

Source: Own processing according to [1]
Fig. 2: *Analysis-Formulation-Implementation (AFI) strategy*

1.2.3 Thompson and Martin's Strategic Management Framework

Thompson and Martin in [2] proposed a similar type of scheme to Rothaermel in [1]. The individual phases are arranged in a circle, and the sequence of steps is also shown in only one direction. However, the authors divide the whole process into a little more detail, into a total of 8 phases. They are also accompanied by basic strategic questions that managers should not forget when planning strategy. Thompson and Martin's framework for strategic management is presented in Figure 3.

Source: Own processing according to [2]
Fig. 3: *Thompson and Martin's Strategic Management Framework*

The literature review also included an examination of tools that support management decision-making at each stage of the strategic planning process. For better clarity and continuity in their further utilization, these tools are presented in the following chapter.

2 Research Methodology

In the next phase of the study, 41 tools that support the individual stages of the strategic planning process were selected to the research [1], [2], [3], [9], [10], and [11]. The designated techniques were subsequently assigned to the individual phases. The classification of tools into individual phases is based on David's Strategic Management Process Model. This approach offers a division involving all crucial phases. In contrast, AFI Strategy omits or merges some phases together, and Thompson and Martin's Strategic Management Framework divides the whole process in too much detail. For this reason, the optimal variant of the division into a total of 6 phases was found. From these approaches, the principle of a circular scheme with a smaller number of steps (AFI Strategy) and supporting questions supplementing the individual phases (Thompson and Martin's SMF) were included in the model.

The selected approach serves to link the obtained results with the theoretical basis and divides the entire process into the following parts: develop mission and vision statements, environment analysis, establish long-term objectives, strategy formulation, strategy implementation, and monitoring of the strategy. Table 1 shows the tools already categorized to the phases.

In the third column of Table 1 the assigned rates of business intelligence utilization in applying individual techniques can be found. In other words, the business intelligence utilization rate expresses the ability of business intelligence to support the appropriate application of tools or techniques that are used in strategy planning. Therefore, if the management plans to define the mission of its business, it is very likely that it does not use the outputs of business intelligence (none utilization rate). In contrast, the involvement of business intelligence in the processing of PEST or SWOT analysis appears to be very suitable (high utilization rate).

The values were determined based on the author´s long-term research on business intelligence with the involvement of a literature search of tools supporting the strategic planning process. Each of them was examined individually, and the utilization rate of BI during its application was evaluated. It was based on previous research focused on the role of business intelligence in business processes, primarily of a decision-making nature [12], [13], [14], and [15]. The scale divided techniques into four categories. For those for whom the use of data and its conversion into relevant information plays a key role, a high level of engagement was determined. Tools applying BI outputs as practical support have been categorized as having a middle utilization rate. The rest of the tools were sorted into categories with low use (business intelligence results as one of many supportive tools) and no utilization rate, where the BI application can be labelled as nonessential.

Tab. 1: *Assigned utilization rate of BI to selected techniques*

Phase	Tool / technique supported strategic management process	Utilisation rate of BI	Numeric Expression
Develop mission and vision statements	Develop mission statements	None	0
	Develop vision statements	Low	1
Environment analysis	PEST	High	5
	SWOT	High	5
	Core competencies	Middle	3
	Porter's 5 Forces	High	5
	Competitor profile matrix	Middle	3
	External factor evaluation matrix	High	5
	Internal factor evaluation matrix	High	5
	Benchmarking	Middle	3
	Business financial analysis	High	5
	Financial ratios	High	5
	Scenarios forecasting	High	5
	Market segmentation	Middle	3
	Value chain analysis	High	5
	VRIO	Low	1
Establish long-term objectives	SMART	Low	1
	Critical success factors	High	5
	Unique selling proposition	Middle	3
Strategy formulation	Scenario planning	Low	1
	SPACE matrix	High	5
	Boston Consulting Group matrix	High	5
	GE-McKinsey matrix	High	5
	Porter's generic strategies	Middle	3
	Bowman's strategy clock	Middle	3
	Porter's diamond	Middle	3
	Game theory	Low	1
	What if analysis	Low	1
	QSP matrix	High	5
Strategy implementation	Policies	None	0
	Motivation	None	0
	Resistance management	Low	1
	Leadership	None	0
	Stakeholder impact analysis	High	5
	Changing organizational structure	Low	1
	Performance management	Low	1
Strategy monitoring	Strategy evaluation framework	Middle	3
	Balanced scorecard	High	5
	Benchmarking	Middle	3
	Customer satisfaction	High	5
	CBA	High	5

Source: Own

For further processing, the verbal assessment was converted into a numerical expression (see the fourth column). The conversion is presented in Table 2.

Tab. 2: Conversion table

Utilization rate	Numeric expression
None	0
Low	1
Middle	3
High	5

Source: Own

3   Research Objectives

The article aims to find a suitable business intelligence application in the strategic company management. The utilization rate of business intelligence was assigned to the techniques facilitating the strategic planning process, and the results were subsequently incorporated into the selected scheme of the strategic planning process from the literature review.

4   Research Results

The assigned business intelligence utilization rates (UR) for each tool were averaged for each stage of the strategic planning process. The results are shown in Table 3.

Tab. 3: Average utilization rate of business intelligence (min 0, max 5)

| Phase	Average UR
Develop mission and vision statements	0.50
Environment analysis	4.14
Establish long-term objectives	3.00
Strategy formulation	3.20
Strategy implementation	1.14
Strategy monitoring	4.20

Source: Own

As mentioned above, the phases were selected according to the literature search to capture the essence of the partial steps of the strategic planning process best. The given division was further supplemented by simple strategic questions according to Thompson and Martin, which aptly supplement the titles of individual stages and give them a clear direction of thinking. The final model can be seen in Figure 4.

Specifically, it is based on a circular scheme; two versions were presented in the literature search. The process's continuity is maintained, further underlined by the addition of fundamental strategic issues. The own processing results of business intelligence involvement in the strategic planning process were then included in the middle of the model using a ray graph.

From the obtained interconnection, it is evident that the most probable and, likely, also the most frequent application of business intelligence takes place in the phases dealing with the current analysis of the situation in which the company finds itself. So, this is an environment analysis phase where the manager asks the question: where are we? For example, using techniques such as PEST or SWOT is typical for this step, where the correct transformation of data into information plays a crucial role in their compilation.

Business intelligence can similarly be applied in the monitoring phase, where management already responds to the question 'how are we doing?' that means again where we are, but this time after the implementation of the strategy. When companies implement business intelligence, they primarily count on them in processes where a deep analysis of the available data, typical of both phases expressed above, is required.
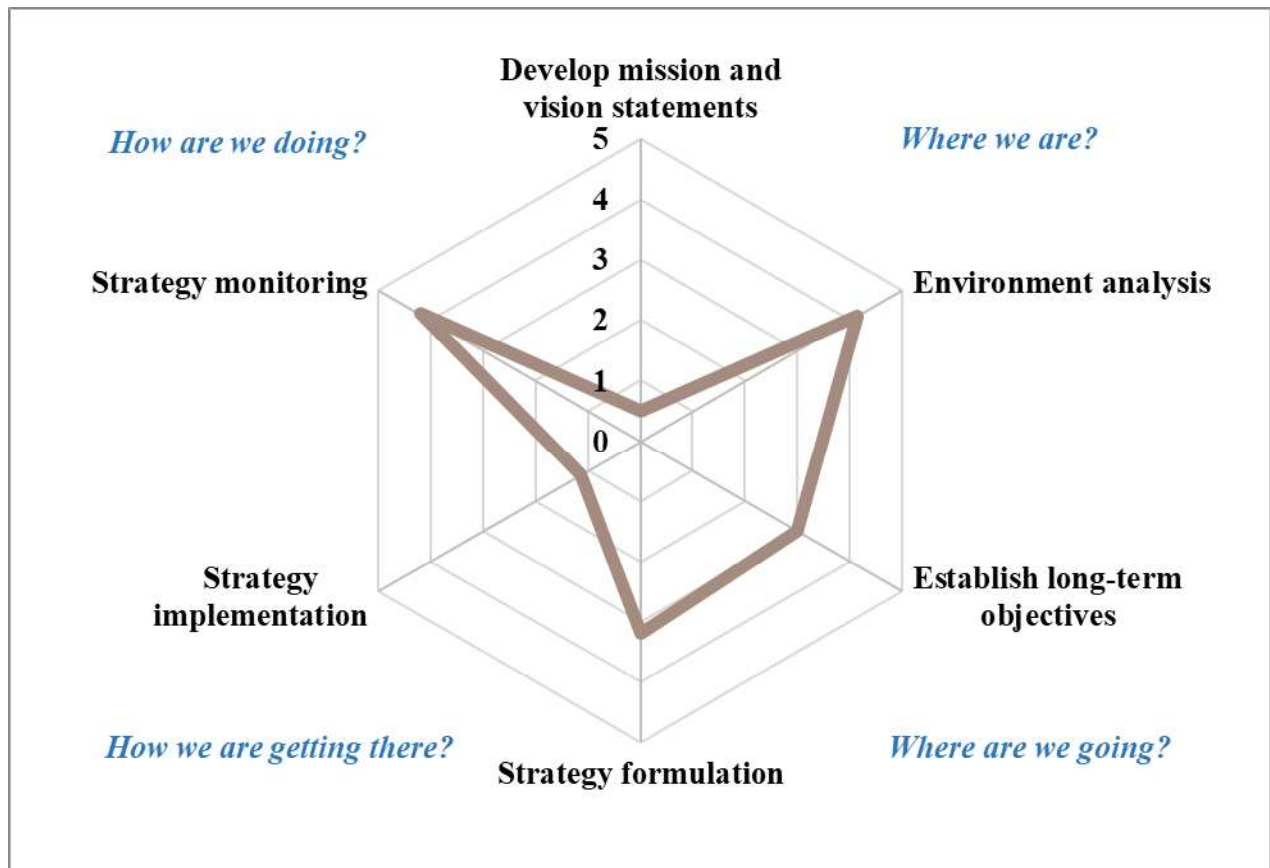
Source: Own

Fig. 4: *Model of business intelligence application in strategic management process*

The presented model suggests another possible (for some companies completely new) application of business intelligence within strategic management. In order to fulfil the third or even the fourth scenario, managers must involve the information obtained from the company data in the following stages of the process. The outputs indicate that their appropriate use can be expected in formulating the long-term company goals (the average value of BI use was 3). Techniques such as Critical Success Factors or Unique Selling Proposition may be involved at this stage.

However, according to the results, the phase of the formulation strategy, where the average value of BI utilization was 3.2, requires integration that is even more effective. Thus, the possible application of BI in this phase of the process could already be described as significant. Different types of matrices are frequently applied in the strategy formulation stage. These offer a systematic approach to the allocation of investments between business units (GE-McKinsey matrix), product portfolio analysis (Boston Consulting Group matrix) or help to determine the appropriate strategy (Space matrix). They are connected, as is traditionally associated with business intelligence, by the concept of situational analysis. From corporate management point of view the involvement of business intelligence outputs should not be overlooked even at this stage and scenario No. 3 could then be gradually fulfilled within the organization.

Conclusion

This article aimed to find the appropriate application of business intelligence in strategic planning. A new interconnection scheme was compiled by evaluating the significance of the application of business intelligence within the most frequently used tools supporting strategic

planning. The newly introduced model presents the best-known directions of BI use in business processes and suggests new possibilities for the application.

A ray graph was selected for the presentation of the results, which suitably complemented the theoretical model showing the strategic planning process in a circle. This connection thus offers a new perspective on the possible use of BI on a theoretical level. In terms of subsequent practical application across organizations, business intelligence promoters face problems from the very beginning.

Although the outputs presented in the article show a broad application of business intelligence across such a complex process as setting the overall company direction, its implementation is not entirely standard in companies. As follows not only from the author's previous research, business intelligence is not implemented in many companies [12], [16], [17]. However, previous specific research has shown that active users of business intelligence outputs do not hesitate to incorporate available results into their decision-making process [14]. Their involvement then increases with the experience gained. Therefore, owners and managers should not delay the possible implementation of these innovative practices.

The limitation of the presented research may be the sole inclusion of selected self-evaluation tools in connection with business intelligence. Although the author has been dealing with the topic for a long time, the perception of using business intelligence can be (positively) influenced. In the next phase of the research, it is planned to expand the results with qualitative research among experts. Furthermore, a more comprehensive range of techniques and tools could be included in the research so that the obtained outputs give the most objective picture of the researched situation.

Acknowledgements

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Nové přístupy k aplikaci business intelligence v procesu strategického řízení

Tento článek má za cíl najít optimální vazby a cesty, jak efektivně využít výstupy business intelligence v rámci strategického řízení podniku. Tato integrace napomáhá manažerům implementovat podnikové strategie a snadno je přizpůsobovat změnám prostředí. V rámci literární rešerše bylo vybráno celkem 41 nástrojů podporujících jednotlivé fáze strategického procesu plánování, které byly rozděleny do šesti po sobě jdoucích etap: stanovení mise a vize, analýza prostředí, stanovení dlouhodobých cílů, formulace strategie, její implementace a nakonec monitoring. Následně byla jednotlivým technikám přiřazena míra možného využití business intelligence v rámci jejich aplikace. Výsledný model propojuje získané výsledky z hodnocení se schématem strategického procesu plánování inspirovaného literární rešerší. Nejčastější uplatnění nástrojů BI probíhá ve fázích zabývajících se rozborem situace, ve které se daná společnost nachází, jako jsou analýza prostředí a monitoring strategie. Dle získaných výsledků by zapojení business inteligence výstupů nemělo být přehlíženo ani v etapách věnujících se stanovení cílů a formulaci strategie.

Neue Ansätze zur Anwendung von Business Intelligence im strategischen Managementprozess

Dieser Artikel zielt darauf ab, die optimalen Verbindungen und Wege zu finden, um die Ergebnisse von Business Intelligence im strategischen Management effektiv zu nutzen. Im Rahmen der Literaturrecherche wurden insgesamt 41 Werkzeuge ausgewählt, die einzelne Phasen des strategischen Planungsprozesses unterstützen. Sie waren in sechs aufeinanderfolgende Phasen unterteilt: Missions- und Visionsbestimmung, Umfeldanalyse, Festlegung langfristiger Ziele, Strategieformulierung, Umsetzung und schließlich Überwachung. Anschließend wurde den jeweiligen Werkzeugen der Nutzungsgrad von Business Intelligence innerhalb ihrer Anwendung zugeordnet. Das resultierende Modell verbindet die aus der Evaluation gewonnenen Ergebnisse mit dem Schema des strategischen Planungsprozesses, das von den Literaturrecherchen inspiriert ist. Die häufigste Anwendung von BI-Werkzeugen findet in den Phasen statt, in denen es um die Analyse der Unternehmenssituation geht, wie z. B. Umfeldanalyse und Strategieüberwachung. Nach den erzielten Ergebnissen sollte jedoch die Einbeziehung von Business Intelligence-Ergebnissen auch in den Phasen, die der Festlegung langfristiger Ziele und der Formulierung der Strategie gewidmet sind, nicht übersehen werden.

Nowe podejścia do stosowania analityki biznesowej w procesach zarządzania strategicznego

Celem niniejszego artykułu jest znalezienie optymalnych powiązań i sposobów na efektywne wykorzystanie wyników analityki biznesowej w ramach strategicznego zarządzania przedsiębiorstwem. Połączenie to pomaga menadżerom we wdrażaniu strategii przedsiębiorstwa i ich łatwym dostosowywaniu do zmian otoczenia. W ramach kwerendy literatury wybrano łącznie 41 narzędzi wspomagających poszczególne etapy strategicznego procesu planowania, które podzielono do sześciu po sobie następujących etapów: określenie misji i wizji, analiza otoczenia, określenie celów długoterminowych, sformułowanie strategii, jej wdrożenie i monitoring. Następnie do poszczególnych technik przyporządkowano stopień możliwego wykorzystania analityki biznesowej w procesie ich stosowania. Końcowy model łączy uzyskane wyniki oceny ze schematem strategicznego procesu planowania zainspirowanego kwerendą literatury. Narzędzia analityki biznesowej są najczęściej stosowane na etapie zajmującym się analizą sytuacji, w której znajduje się dane przedsiębiorstwo, czyli analizą otoczenia oraz monitorowaniem strategii. Bazując na uzyskanych wynikach należy stwierdzić, że zastosowanie analityki biznesowej efektów nie powinno być pomijane również na etapie poświęconym określeniu celów i sformułowaniu strategii.