Article

Digital Balanced Scorecard System as a Supporting Strategy for Digital Transformation

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Abstract: Reports of the high percentage of failed digital transformation ventures motivate the need to find a comprehensive framework with regulatory attributes to support these initiatives. Due to its structure, consistent strategy decomposition capabilities, and strategic map architecture, the assumption is that a customized version of the Balanced Scorecard can ensure the better overall success of digital transformation projects. The qualitative analysis methodology was applied to previous research, and this study identified critical issues and challenges related to the strategy and overall endeavor of digital transformation. Based on the methodology of the traditional Balanced Scorecard, a draft version of the Digital Balanced Scorecard was formulated. The Digital Balanced Scorecard is a comprehensive, primarily prescriptive model that is focused directly on the challenges, opportunities, and obstacles of transformation. The proposed BSC model can consistently interpret a digital strategy and assist organization leaders in successfully formulating and coordinating all necessary activities and projects to apply technologies. The Digital BSC provides the projection of financial results and improvements in sustainability after transformation. The proposed solution to support digital transformation can accelerate an organization's development, improve efficiency, and strengthen efforts to achieve an organization's sustainability goals.

Keywords: digital balanced scorecard; digital transformation; strategy; supporting framework; sustainability; technology

1. Introduction

Digital transformation is created by applying several vital new technologies, including mobile work, cloud computing, IoT, big data, artificial intelligence, process robotization, and 3D printing. DT denotes the introduction and application of new technologies in a business model that contribute to the improvement of organizational processes, creating new methods of value creation, the delivery of digitalized services and products, and better fulfilling of the needs of customers and clients [1,2]. The implementation of digital transformation is also characterized by changes in the organizational domain, not only in the technological field. Although there may be reasoning behind introducing and implementing one of the above technologies when a particular company is considered, these arguments are not always part of the organization's strategic plans.

Another crucial strategic element is the totality of initiatives and activities whose implementation is necessary, which are prerequisites for the effectiveness of digital transformation in an organization. However, these do not fundamentally depend on digital resources or outcomes. These activities concern human resources and skills, management and leadership training, organizational structure, organizational culture, agility, innovations, and similar concepts. Since digital transformation is an organizational change that encompasses much more than the purchase of equipment and the deployment of technology, the success of digital transformation needs to be considered through the prism of organizational initiatives that are aimed at realizing specific organizational (higher-level) goals. Therefore, digital transformation initiatives must be integrated into an organization's strategy and development implementation plans. The process of devising

a way to make that happen occurs under complex conditions that require the consideration and prioritization of initiatives, projects, and activities that are characterized by advanced technologies.

DT research indicated the primacy of strategy over technology [3,4]. The strategy of using digital transformation as the essence of the plan for the application of digital solutions in the physical domains of business, i.e., the creation of value through service and production, should have systematic organizational support. To provide a tool for such support that can monitor activities and projects [5,6], a modified BSC system was created.

A globally popular system to support strategic planning and management was created by Norton and Kaplan in the 1990s. This system, entitled the Balanced Scorecard (BSC), is a framework that was initially aimed at measuring an organization's strategic performance. Over the last two decades, reports concerning the application of the BSC by leading companies in different sectors have been published [7], and its successful implementation in the public sector was also recorded by various authors [8,9]. 2GC management consultancy published the Balanced Scorecard Usage Survey 2020, based on completed questionnaires from 21 countries [10]. Well-informed managers in corporate or employee roles participated, which guaranteed that quality answers were provided. The summary of findings (p. 4, [10]) states that the frequency of use of the Balanced Scorecard in organizations is dominated by the domain of strategic management (88%), followed by operational management (63%) and reporting (58%).

The main starting point in recommending the BSC system is to avoid exclusively focusing on finances at the cost of neglecting other critical objective areas. The financial result should be considered a consequence, while applying the BSC system should enable managers to identify and encourage actual growth drivers that lead to success. The BSC system balances traditional financial measures with essential non-financial perspectives: customers, internal business processes, and organizational learning and growth. Furthermore, the motivation for creating the BSC model of performance measurement is firmly founded on two identified strategic issues:

1. The worrying gap between the strategy expressed through plans and the strategy demonstrated in practice (Mintzberg [11]);
2. Managers tend to refuse to invest in developing and strengthening innovation potential due to the ambition to present good short-term results.

The Balanced Scorecard system was devised to reduce the gap in item 1 above and to discourage the neglect of investment in growth and learning in the organization (item 2). The use of employing a BSC framework in strategic maps as simple graphical representations of the cause-and-effect relationships between goals and measures within the four BSC perspectives [12] strengthens strategic communication in practice and contributes toward gaining insight into the value-creation process. The realization of a particular goal is ensured by the formulation of appropriate activities or projects.

The following section considers previous research on this topic, identifies the research gap, and formulates research questions. Next, we provide a short overview of the digital transformation phenomenon, critical issues and challenges, and the basics of the Balanced Scorecard system. Finally, we discuss the potential and expectations from the BSC application to improve the DT strategy and initiatives implementation.

1.1. Previous Research

Schallmo et al. [13] proposed a definition of DT that focuses on the value chain, networking, and application of new technologies. According to these concepts, DT requires data manipulation skills (exchange, conversion, analysis, and similar). Information obtained from the data is utilized effectively in decision making and activity initiation to increase organizational performance. DT's focus should not be on technology, as highlighted in Westerman [14]. It was shown that the focus should be on (organizational) strategic transformation rather than adopting new technology that facilitates results. A well-known article by Deloitte analysts, which was published in the MIT Sloan Manage-

ment Review [15], pointed to the absence of a strategy as an issue associated with digital transformation. In a study on attitudes toward digital strategy, only 52% of respondents reported that they "agree/strongly agree" with the statement "Our organization has a clear and coherent digital strategy" [15]. A considerable body of literature highlights the issue of the DT strategy since numerous cases of organizations have demonstrated that their managers do not possess a clear comprehension of strategic concepts in their digital transformation ventures [1,16,17]. A company's digital transformation strategy comprises more than merging its business strategy and information system strategy or information technology [18]. At the strategic level, vision comes before strategy development. As reported by Fitzgerald et al. [2], as many as 93% of respondents believed that sharing a digital transformation vision was positive, while that view was shared by only 36% of CEOs.

In their analysis of automobile companies, Chanias and Hess [19] reported that before a digital strategy is formulated by management (the top-down approach), the so-called realized (digital) strategy will have already been developed on the part of organizational sub-units through bottom-up process activities. Corporate leaders have the most significant responsibility regarding strategy; therefore, we also expand the associated analysis in this segment. The issue of leadership in digital transformation is discussed in a paper written by Schrage et al. [20] in which the existence of a digital gap concerning leadership is established. The conclusions of this study were based on data collected in the MIT Sloan Management Review and Cognizant survey conducted among 4296 global leaders to determine their attitudes toward the future of leadership in organizations [21]. Although the respondents agreed that an essential factor in the future success of their organizations would be the presence of a sufficient number of digitally savvy leaders, only 31% of the answers were positive when asked whether the improvement of managers' digital skills is actively monitored and evaluated. According to Sutcliff et al. [22], the challenges and reasons for the failure of digital transformation lie within two classes of problems: (a) disagreement between managers concerning goals that remain unresolved and (b) the digital capabilities available to provide support at the required scale.

Digital transformation preparations are often insufficiently practiced. In a study by Kane et al. [15] regarding the question of whether employees possess sufficient skills and knowledge to execute a digital strategy, a relatively smaller percentage (43%) of answers referred to a higher degree of agreement with the statement. A similar distribution of responses (47% agreed or strongly agreed) was obtained for the question regarding whether the respondents and their colleagues were provided with sufficient resources and opportunities for acquiring the required skills. These insights are essential for organizations, not only in considering their DT strategy but also in considering the possibility of implementing DT. Furthermore, McKinsey and Co. [23] claimed that only 16% of organizations improve their performance through DT and that approximately 70% of business transformations fail [24], raising the question of how to improve the performance of DT initiatives.

The low success rate of digital transformation ventures in various sectors has directed researchers to address success factors (of transformations), barriers, drivers, enablers, and performance frameworks. Barriers to digital transformation in high-tech companies were discussed in [25,26]. Flechsig et al. [27] addressed robotic process automation and revealed many barriers that they characterize as technical, organizational, and environmental. Yoo and Kim [28] identified factors that contribute to cloud computing adoption. Challenges for digital transformation in manufacturing companies in the dimensions of organization, strategy, management and technology, and drivers for these challenges are discussed in [29,30].

Several frameworks were presented or proposed that considered the concept of digital transformation, and Nwaiwu [31] summarized the most prominent. Kavadias et al. [32] developed the six-key model, which sought to demonstrate the impact of the suggested keys on innovation success and their overall contribution to solutions for linking an organization's technological capabilities with market needs and requirements. Equally unique is the approach to proposing a DT framework in which digital orchestration regarding

the dimensions of digital transformation to be accepted in DT is identified (IMD and Cisco Corporation) [33]. Although valuable, these frameworks are more interpretative and illustrative and far less prescriptive when compared with the Balanced Scorecard system approach. Berghaus and Back [34] developed the digital maturity model for analyzing digital transformation stages. The digital transformation framework established by Matt et al. [16] includes and connects three main DT changes: the use of technologies, changes in value creation, and structural changes.

In their papers on the Balanced Scorecard, Kaplan and Norton [35,36] explained this system's possible role in applying strategy maps when developing strategy-related measures and performance objectives. A well-designed quantitative framework of the BSC model and the formulation of cause-and-effect relationships in strategy maps ranging from individual learning activities to measurable financial goals can all be critical levers in managing DT changes and implementing DT strategies. Earlier work by authors who attempted to connect the BSC model and its implementation in the development and strategy of IT systems in organizations is noteworthy [37,38]. Stalmachova et al. [39] elaborated on a proposal of using BSC indicators for measurements within a company's new business model resulting from the COVID-19 pandemic. Kim et al. [40] quantitatively and thoroughly addressed the BSC performance areas and developed an evaluation mechanism of internal process management performance with applicability for small construction companies in Korea. Analysis of experiences of recent application of the BSC system in the public sector was presented by de Freitas et al. [41]. Papers [42–47] are among the most prominent recent publications on organizational performance and the BSC system, where [43,46] consider the application of the BSC model in digital transformation.

Yamamoto [48] proposed one version of the Digital BSC as a potential method for achieving the digital transformation promotional index (DPI). Zanon et al. [49] investigated using the BSC model for a digital transformation strategy in railway companies with a case report from Brazil. Valuable research on using BSC models for the digital transformation of global container shipping lines was published [50].

In contrast to the aforementioned research, this study developed a breakthrough in the form of a general BSC solution proposal for DT that took into account the synthesis of identified problems in DT ventures. The advantage of the BSC application approach proposed here is precisely in covering the gap regarding the search for a comprehensive, general systemic approach to support digital transformation initiatives, regardless of industry and DT technology. The crucial aspects of the complex BSC model are explained in detail regarding solving the challenges that were identified by the cited researchers in terms of the practice of digital transformation concerning resistance to changes, organizational culture, appropriate skills of employees, the readiness of leaders, and others.

1.2. Research Gap and Research Questions

Based on the above, a research gap was identified concerning the circumstances under which digital transformation is implemented within a particular "promise-of-success-to-come" paradigm without considering how certain technological investments contribute to the achievement of the organization's strategic goals and the activities required for DT success. The literature has not explored a model that would enable the calculation of the expected financial result of DT endeavors. However, the BSC was shown to be a successful quantitative model for traditional strategic initiatives.

In addition, there is also the issue of a systematic approach to the strategy. The DT strategy must be formulated or explicated, and the formulation and objectives must be linked to implementation activities and projects. The BSC system is a useful tool for supporting the implementation of strategies and the development of strategic goals. Conversely, there are few studies and reports that considered implementing BSC within the DT strategy and achieving transformation goals. The third challenge, which is most often solved ad hoc, is the existence of success factors and obstacles in digital transformation

efforts. This study explored the possibility of a systematic approach to solving problems related to the mentioned factors.

Based on the identified research gap, which consists of three parts, the following research questions were formulated regarding the general issue of implementing BSC in the context of DT:

RQ1: In which segments can the BSC methodology support the digital transformation strategy, and how?
RQ2: Can a specific BSC digital model be developed to ensure the overall success of digital transformation initiatives, and what are its main features?

2. Method and Research

2.1. Research Streams on BSC and DT

A content analysis methodology was applied to answer these research questions. This methodology includes the analysis of the previous research described in selected papers obtained by searching the WOS, Scopus, and Google Scholar databases. The first conclusion from the study of the scope of work was that a relatively large proportion of research covers segments that include the concepts of barriers, success factors, drivers, strategic support, and digital strategy or digital transformation. Some of the results and articles found using this search are cited in Section 1. Furthermore, the Balanced Scorecard methodology was investigated simultaneously through papers describing the application of the DT strategy support system. In the research part (Section 2), we also discuss the findings on issues of motivation for DT (drivers and goals) and the implementation of DT in practice (obstacles to implementation, barriers, success factors, and support).

The articles for analysis were selected according to the keyword search results (Table 1) in the first step. In addition to papers from the WOS database, some well-received papers available through Google Scholar, such as Kane et al. [3], Kaplan and Norton [35], and Kaplan [51] were included (step 2). Finally, due to the subsequent review of the content, some papers were omitted and the reference list containing a total of 124 references was finalized. The synthesis of research papers according to certain key topics and issues regarding the application of the BSC model in support of digital transformation is given in Table 2.

Table 1. The procedure of selecting research papers—step 1 (WOS excerpt and illustration).

Search No.	Keywords Used	Searching Clarivate and WOS	Categories
1	balanced scorecard (All Fields) AND methodology (All Fields) AND strategy (Topic)	39 results	Management or Business or Computer Science Information Systems or Economics or Education AND Open Access AND 5 citations at least
2	digital transformation strategy (All Fields) AND balanced scorecard (All Fields)	10 results	Web of Science Core Collection (all)
3	digital transformation (All Fields) AND balanced scorecard (All Fields) AND Open Access	13 results	Web of Science Core Collection (all)
4	digital transformation (Abstract) AND barriers (Abstract)	15 results	Same as in search no. 1
5	digital transformation (Abstract) AND success factors (Abstract)	8 results	Same as in search no. 1
6	digital transformation (Abstract) AND drivers (Abstract)	23 results	Same as in search no. 1

Table 1. *Cont.*

Search No.	Keywords Used	Searching Clarivate and WOS	Categories
7	digital transformation (Abstract) AND strategic support (Abstract)	9 results	Same as in search no. 1
8	digital transformation (Abstract) AND goals (Abstract)	24 results	Same as in search no. 1
9	balanced scorecard (Abstract) AND sustainability (Abstract)	20 results	Management or Business or Environmental or Green Sustainable Science Technology AND Open Access AND 5 citations at least

Table 2. Balanced scorecard methodology and DT issues research stream.

Research Stream	Illustrative Contributions
Balanced Scorecard methodology	Rodriguez-Bolivar et al. [8], Kaplan and Norton [35,36,52–54], Ferreira [42], Chopra et al. [55], Quesado et al. [56], Lee and Ko [57], Barnabè [58]
Balanced Scorecard and DT strategy	Kim et al. [40], de Freitas et al. [41], Tommasi [43], Yamamoto [48], Zanon et al. [49], Maydanova et al. [50], von Leipzig et al. [59]
Digital transformation incentives, goals, and drivers (*components of decision making related to DT*)	Fitzgerald et al. [2], Mergel et al. [9], Kane et al. [15], McKinsey and Co. [23], Flechsig et al. [27], Berghaus and Back [34], Ivančić et al. [60], OECD [61], Goldfarb and Tucker [62], Osmundsen et al. [63], Tijan et al. [64]
Digital transformation barriers, success factors, and support (*factors influencing the success of DT*)	Kane et al. [15], Matt et al. [16], Sutcliff et al. [22], McKinsey and Co. [23], Pasupuleti and Adusumalli [25], Yoo and Kim [28], Nwaiwu [31], Vogelsang et al. [65], Battilana and Casciaro [66], Diener and Špaček [67], Schumacher et al. [68], Fuchs et al. [69]
Sustainability balanced scorecard	Epstein and Wisner [70], Figge et al. [71], Bieker [72], Rabbani et al. [73], Hansen and Schaltegger [74,75], Hristov et al. [76], Jassem et al. [77], Kalender and Vayvay [78]

The Balance Scorecard methodology in this work was applied to three key segments, i.e., challenges that are dealt with by a large volume of the overall digital transformation research (incentives, expected results, and goals of digital transformation (decision-making process regarding digital transformation)), challenges of implementing the DT strategy, and factors influencing the success of the digital transformation venture (Figure 1).
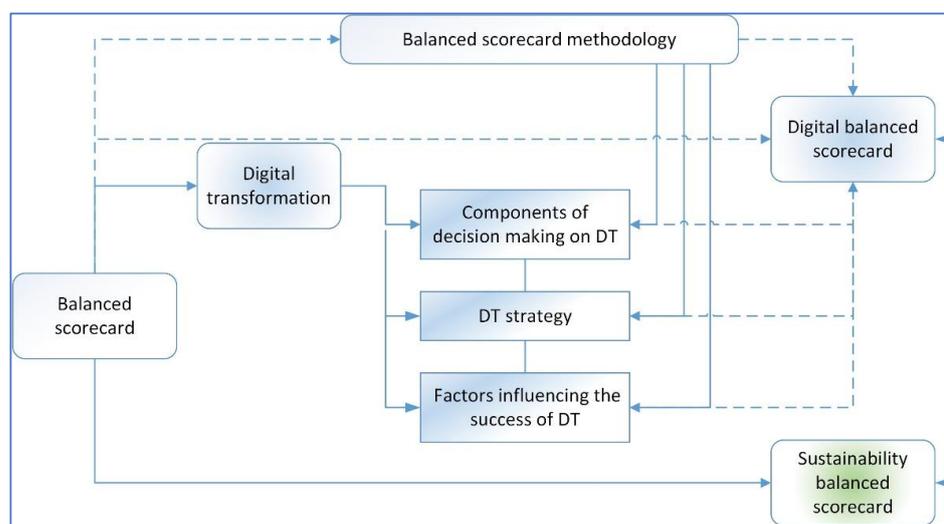

Figure 1. Illustration of the research approach.

At the same time, we expect that by adapting the classical methodology, a consistent Digital BSC model could be formulated in a manner that meets the requirements of the average DT initiatives. Research questions were also included in the presented framework (Figure 1) because we were investigating how a modified BSC can support the digital transformation strategy and we intended to gain insight into the possible support for incorporating the newly designed BSC model into the overall efforts of digital transformation initiatives (regarding barriers, success factors, etc.).

The Digital BSC can be placed in relation to the S-BSC model and upgraded, which is also explored below.

2.2. Balanced Scorecard as a Methodology

The Balanced Scorecard fulfills the principles of structuring a managerial control system, as proposed by Otley [79], with key concepts such as goals, strategies, and plans; setting short-term goals; incentive and reward structures; and information feedback cycles. Owing to performance measurement, the Balanced Scorecard plays an essential role in many contemporary organizations, both in the analysis and implementation of strategy and in evaluating the achievement of organizational goals [7,8,42,55,80].

The Balanced Scorecard provides a balance between key development processes, such as learning and innovation and results that are of interest to shareholders and customers [56]. The proposed procedure and steps for the BSC model include the following:

1. Formulation of the mission and vision;
2. Creation of an organizational strategy;
3. Determining the strategic goals;
4. Defining the measures, indicators, and goals;
5. Identifying the strategic initiatives and activities (as in [52]).

As the first key concept of organizational establishment, the vision refers to a certain desired future or a state that we intend to accomplish. The organization's mission is a statement on the organizational purpose and its core values that should serve as an inspiration in formulating its strategic goals [81]. Strategic goals must be carefully defined, and in many cases, they are the main goals of organizational development. In addition, their elaboration is a crucial part of successful strategic management for which a SWOT analysis is often used. From the strategic goals, (SWOT) strategies and objectives are derived in the BSC model. The application of the SWOT procedure with the Balanced Scorecard to analyze the strategy or strategic goals was analyzed by Lee and Ko [57], Ip and Koo [82], and Manteghi and Zohrabi [83], as well as by other authors.

Identifying causal relationships is the next critical step in building a Balanced Scorecard model. They can be established between activities, that is, goals and measures of activities. The causal relationships need to be formulated as "if–then" statements, as in the following simple example: "If we increase the employees' knowledge of the products they sell, then their sales effectiveness will increase." Therefore, implementing the Balanced Scorecard system ensures a complex analysis of organizational performance [56], that is, of relevant goals and measures. It is essential to understand that the whole set of measures (or indicators) is divided into leading and lagging categories [53]. The lagging indicators speak of the past, and the current results have been achieved due to past activities. Therefore, it is worth identifying specific leading indicators related to priority activities, which are the drivers that lead the organization toward future good results.

Some authors further analyzed the topic in terms of metrics (leading and lagging measures), emphasizing that in developing a Balanced Scorecard, the option of "changing the business" and not merely "running the business" needs to be considered [84]. Generally, a schema of the full elaboration of a strategy or strategic goal can be represented in the way proposed in Table 3.

Table 3. Outline the basics of elaborating a hypothetical strategic goal via the BSC approach.

Strategies	Activities and Projects	Objectives	Measures	Targets	Relations
S1	A11_ improving employee skills	O1_LG[1]	Digital skills improvement (%)	20%	O1–O3
	A12_ . . .	O2_IP[2]	. . .	. . .	O2–O4
S2	A21_improving process quality	O3_IP	Reducing the number of defects (%)	10%	O3–O4
S3	A31_ . . .	O4_C[3]	. . .	. . .	. . .

Some specific abbreviations are LG[1] (for learning and growth), IP[2] (for internal processes), and C[3] (for customers), while an endash (–) signifies influence.

It is of particular importance to note the following three fundamental principles that enable the Balanced Scorecard system to be methodically linked to the strategy [53]:

1. Cause-and-effect relationships;
2. Performance drivers;
3. Relations to finance.

Therefore, the BSC system should include performance drivers in addition to cause-and-effect relationships. The drivers of strategic performance (with leading measures) are the fundamental perspectives of the model and are mainly in the field of learning and growth. The BSC model clearly shows how strategic goals are elaborated through perspectives based on subgoals, which results in the so-called *strategy map* that links goals and indicators from various perspectives into a consistent subsystem of relationships. As the third principle in the list above, relations to finance are also relevant when considered in digital transformation ventures. Although the distance from "finance only" was the main idea in designing the BSC, it was shown that too much creativity in practice could lead to activities and projects that are not rational regarding financial results. By elaborating upon the objectives in the form of maps, the BSC provides insights into achieving financial results with appropriate projects and activities.

The four characteristic perspectives of the Balanced Scorecard include the activities and objectives that are used to obtain answers to specific questions accompanying them. From the customer perspective, we wanted to identify the customer segment, achieve a vision of how customers should perceive us, and generally accomplish outcomes concerning customer retention, customer acquisition, customer satisfaction, etc., as pointed out by Norton and Kaplan [53]. Measures for this perspective were selected from measures that demonstrated a more significant impact on customer satisfaction and financial goals. The perspective of learning and growth in the BSC system is vital to achieving a vision of the organization's sustainable capacity for change and improvements. Learning and growth activities focus on strengthening the organization's internal capacity. According to the Balanced Scorecard Institute's description of the four perspectives [12], the components of human capital, technology, organizational infrastructure, and management constitute the organizational capacity perspective. Some authors point out the BSC method as one of the most prominent for evaluating organizational intellectual capital [85].

The simplification of the BSC system model lies in the assumption of a linear relationship between objectives (measures) and the one-way development of cause-and-effect relationships from a lower perspective toward finance. Designers can achieve a dynamic BSC by applying system dynamic models, which were researched and reported by, among others, Nielsen and Nielsen [86] and Barnabè [58].

2.3. The Issue of the DT Strategy and the Possible Contribution of the BSC Methodology

Digital transformation projects are characterized as having a significant impact on an organization and can impact the components of organizational design. The main components of organizational design include strategy, structure, business processes, human

resources, leadership, culture, systems, and rewards (for an example, see McKinsey's 7S model [87]). The organization's strategy regarding the implementation of digital transformation and its harmonization with other strategies is a prerequisite and the primary task. Kane et al. [3] emphasized the importance of the DT strategy, claiming that the introduction of digital transformation is, in the first place, an issue of strategies that should precede the focus on technology. An orderly arrangement of activities should be initiated and executed between implementing the DT strategy and introducing the technology. Hess et al. [1] researched the digital transformation strategy, pointing out that the strategy should guide managers through the transformation process. Conversely, the Balanced Scorecard is a supporting strategy system that enables the implementation of a (specific) strategy through a series of consistent adjustment steps in which the managers need to be involved.

Kane et al. [15] explored the lack of an adequate strategy as a relatively frequent issue in DT ventures. Their study on digital strategy showed that approximately (only) half of the respondents believed that their organization had a clear digital strategy. Of course, formulating a strategy is only the beginning of the strategic management process. The entire BSC model is structured in such a way as to reduce the gap between the strategy and the implementation and eliminate possible misinterpretations that would lead to unnecessary projects and activities. Consequently, the BSC implementation for DT development would also automatically imply establishing a DT strategy.

By identifying SWOT elements for particular strategic goals in the BSC model, it is possible to formulate specific second-level strategies based on the use of these SWOT elements through their unique combinations (joining two or three elements, e.g., SW, WO, and ST), as proposed in, e.g., [57,88]. Formulating justified (SWOT) strategies is a group endeavor that includes the additional analysis of the ranks of individual elements (strengths, weaknesses, etc.) and the evaluation of the feasibility of strategies and is thus defined in terms of necessary and available or achievable resources and organizational capabilities. One of the better-known techniques that experts can apply here is the so-called AHP (analytical hierarchy process) in which ranks are assigned to SWOT elements (for example, see [89]). Namely, when creating a strategy, it is sensible to combine the high-value (high-ranking) strengths with lower-ranked weaknesses or external threats. Therefore, the rank should primarily be viewed from the perspective of size, for example, digital assets, financial resources from funds, expected resistance to change, and similar concepts.

These carefully derived strategies must be further elaborated through activities from the four BSC perspectives. The formulated activities from the perspectives of related goals are directly aimed at achieving the appropriate SWOT strategy and, consequently, the initial strategic goal (Figure 2, Table 3). Applying the SWOT procedure to decompose strategic goals reduces the gap between the projects and activities in practice and the initially planned strategy. The structure indicated in Table 3 ensures the measurement of performance due to the implementation of the strategy (DT) and provides the corresponding targets for the determined objectives and measures (Figure 2).

By applying SWOT analysis, it is possible to identify organizational strengths, weaknesses, etc., in relation to launching a digital transformation project. The BSC model uses strategy maps to decompose and visualize the strategy [35,90]. It is an architecture with critical interrelated elements, such as growth objectives, changes in market share, value proposals, product quality, process innovation, and employee skills development. Strategy maps can also be understood as tools to facilitate organizational communication concerning the strategy.

When applying the BSC to digital transformation initiatives, it is necessary to adhere to the previously mentioned main principles that enable a proper connection of the Balanced Scorecard with the strategy (Figure 3). The three principles that are necessary for the BSC system to support the DT strategy are the presence of cause-and-effect relationships, the identification and stimulation of performance drivers, and the inevitability of connection with finance [53].
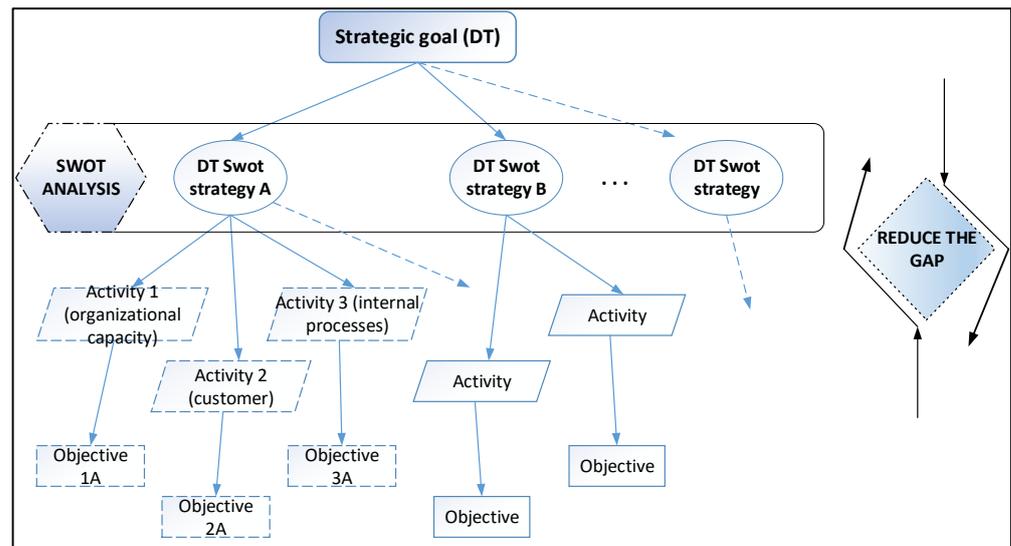
Figure 2. Illustration of BSC decomposition of strategic goals using SWOT analysis.
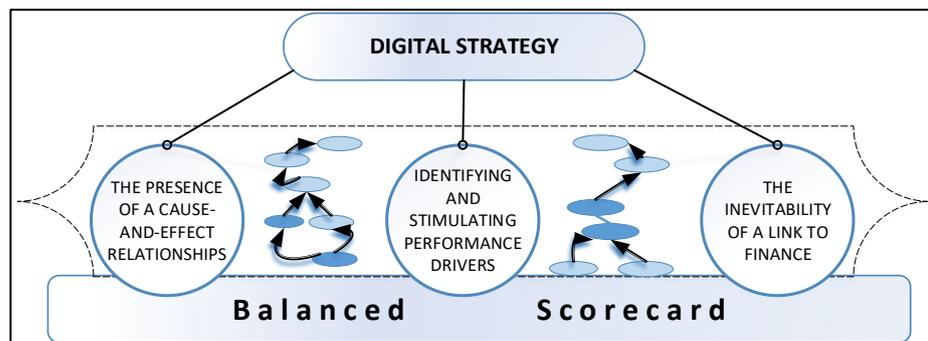

Figure 3. Balanced Scorecard principles in supporting digital strategy.

The strategy of digital transformation that could be deconstructed through a system of activities with causal links is far more than the statistical approach to digitalization and static formulations that can be found, for example, in EU digital progress reports [91]. The Digital BSC proposed by Yamamoto [48] is one of the few examples of directly linking DT and BSC concepts. The strategic goals of this system, which was initially designed for water supply information utilization, include "reducing operating expenses" and "improving efficiency".

2.4. BSC Model Support for the Decision to Implement DT

By applying a system of analysis and support for strategic management (BSC), the problem of a not entirely clear mechanism for creating benefits from DT initiatives [2], and assessing these benefits should be turned into a consistent model that can achieve the expected powerful performance. In this respect, the following two questions arise: what are the real benefits of implementing particular DT projects, and can the application of the BSC system provide answers that would support decisions regarding these projects? Flechsig et al. [27] exposed differences in the main motives regarding RPA adoption by comparing private and public organizations. The case studies of Ivančić et al. [60] revealed the primary goal of digital transformation in the automation of production processes and the modernization of the business model. Each organization's expectations regarding introducing digital transformation interventions should be connected to direct benefits. However, the levels of these benefits and potential benefits weighed against risks are often not overtly apparent. OECD publications highlight progress in productivity arising from new technologies (robots, artificial intelligence sensors, etc.) [61]. Examples of fields in

which the reduction in costs related to value creation is achieved due to digitalization include transportation, (identity) verification, monitoring (customer behavior), and (online information) searching [62].

Since the BSC system is quantitative and allows for calculations of expected changes/improvements of crucial indicators, developing a framework for digital transformation using the BSC would enable a quantitative prediction of expected benefits, as illustrated earlier in Table 3. The financial result is a final consequence of undertaking activities and achieving goals from the BSC leading area (learning and growth—developing new knowledge and skills and appropriate activation of human, organizational, and information capital). Zhou and Wu [92] and Kane et al. [15] highlighted the need to develop or possess appropriate digital skills to improve access to digital transformation.

The drivers and objectives of digital transformation through the established BSC framework are evident because the goals are assessed and calculated using associated indicators. Osmundsen et al. [63] claimed that the drivers and objectives of DT stated in their work should become an integral part of the architecture of the BSC support system. Customer demand and satisfaction, earnings improvement, digital readiness achievement, and digitally enhanced products and services mutually reinforce interrelationships within strategy maps. Likewise, digital transformation ventures deconstructed in an appropriate BSC system would allow organization managers, experts, and other BSC and DT team members to have predictions of financial success and customer success at their disposal in creating the model after its development.

Some examples of failed highly digitized business models and failed digital transformation ventures warn that organizations must undertake appropriate preparations, conduct analyses of financial expectations, and devise and prepare the groundwork to support the transformation. According to McKinsey's "Global Survey on Digital Transformation", which was conducted among 1793 online participants, only 16% of organizations improved their performance through digital transformation [23]. However, when considering the performance indicators enabled by the BSC system, digital transformation should make the entire business more transparent in terms of value creation and expected revenue or profit.

2.5. Factors Influencing the Success of DT

Since DT is an organizational change, the methodology of implementing organizational change or transformation involves a history of use before the phenomenon of digitalization. Transformational changes require unconditional abandonment of the previous state and previous principles, assumptions, attitudes, and values. Among the well-known models of change proposed in the literature are the Burke–Litwin model, the Beckhard–Harris model [93], etc. Most models assume preparatory activities that precede organizational change in the description of reality. Accordingly, in digital transformation, changes and preparations within organizational design components concerning appropriate leadership, necessary employee skills, support systems, and conceptual solutions for future structure and processes are indispensable before introducing technology. Resistance to change in DT and the so-called barriers are inevitable phenomena, as reported in [65,94] and other papers.

In devising ways to overcome barriers and resistance, we can also consider traditional practices that were developed within leadership theories. For example, the so-called situational approach to leadership conceives leader behavior by describing it in terms of different levels of task focus and focus on the support provided to group members [95]. When implementing DT, leaders need to rethink their styles and choose the best course of action. When the challenge of resistance to change is considered, the study by Battilana and Casciaro [66] is noteworthy. They investigated the impact of connections between networked agents of change, where strong connections between agents were shown to affect the chance of accepting organizational change positively. Diener and Špaček [67] identified categories that represent (or contain) the main barriers to digitalization in banking: benefits, customer, employee, knowledge, product, market, participation, strategy and management,

technology, and regulation. Each category includes subcategories. Deloitte [96] pointed out that the main reasons for the failure of digital transformation ventures are human resources, particularly the resistance of employees and the behavior of managers that are unwilling to support change. This behavior results in 70% of digital transformation efforts failing in practice. The critical orientation for organizations that want to achieve the success of transformation presupposes a change in leadership culture and approach, as well as the employees' willingness to learn. Therefore, both leaders and employees need to develop their digital skills. According to Sutcliff et al. [22], the challenges and reasons for failure lie within two classes of problems: (a) disagreement between managers concerning unresolved goals and (b) the availability of digital capabilities to provide support at the required scale.

Yoo and Kim [28] demonstrated the positive impact of task and technological characteristics on cloud computing adoption performance. Furthermore, they found that technological readiness and environmental factors positively impact cloud computing performance and viability.

Success factors should be understood as the tasks and achievements that are necessary for realizing the goals of the development or implementation of DT [64]. According to Schumacher et al. [68], success factors include financial resources, the willingness of managers, openness to new technology, interdisciplinary work, cyber security, automated quality control, the digitalization of customer contact, the connection of products via the internet, and the utilization of cloud technology. Once the key issues and challenges regarding the digital transformation strategy and the digital transformation endeavor have been identified and the basics of the BSC methodology have been outlined, a draft of the digital version of the Balanced Scorecard will be formulated below.

2.6. Sustainability Balanced Scorecard

When considering recent approaches to BSC implementation, the most prominent newly developed BSC versions involve architecture with sustainability attributes. Performance measurement and a supporting system called a Sustainability Balanced Scorecard (S-BSC) were proposed by Epstein and Wisner [70] and Figge et al. [71], and later analyzed in [72–78,97] and others. Nowadays, sustainability in the strategy of contemporary organizations is probably the primary determinant.

Modifying the classic BSC tool to meet the inclusion of sustainability goals has led to the creation of various potential solutions. Butler et al. [98] suggested three main possible approaches: (a) traditional BSC with a newly added sustainability perspective, (b) integrating sustainability measures along with the four existing perspectives of the traditional BSC, and (c) developing a distinguished architecture for a Sustainable Balanced Scorecard (SBSC). Among these diverse goals, Kalender and Vayvay [94], for example, focused on the alternative solution of the new SBSC model by creating an additional perspective encompassing economic, social, and environmental aspects.

Regarding BSC perspectives, possible hierarchical and non-hierarchical BSC alternatives were classified and analyzed by Hansen and Schaltegger [74]. The authors found that the SBSC model with a strictly hierarchical architecture, where financial goals are at the top, is the most common version. In such a model, the integration of social and environmental objectives in all BSC perspectives is also implied. Concerning the suitability of different SBSC implementations for organizational transformations, Hansen and Schaltegger [75] concluded that most architectures and approaches cannot support significant transformations. Similarly, Hristov et al. [76] discussed how a common mistake in the structure of the SBSC model is a "lack of consideration of performing sustainability goals". Based on their research, the authors suggest selected factors for improving the SBSC.

In the corporate world, organizational sustainability goals that reflect environmental and social aspirations often conflict with the market, along with financial ambitions and goals [99]. This paradox is also reflected in the formulation of a sustainable BSC model. For the business sector, but especially for public sector organizations, the goals of sustainable development contained in the Agenda for Sustainable Development [100], which was

adopted by the UN Member States in 2015, should be highlighted. Seele and Lock [101] highlighted the situation of advocating for 17 Sustainable Development Goals (SDGs) and the overall transformation of society through sustainability but in the context of a connection with another growing phenomenon, namely, digitization, primarily through big data analytics, which can support the achievement of sustainability in the environmental, social, and economic spheres.

Gupta et al. [102] explored the relationship between digitalization and artificial intelligence on the one hand and sustainability goals on the other. The Digitalization–Sustainability Matrix was proposed as a valuable tool for bridging the gap between AI and digitalization and SDGs. The topic of merging sustainability and digitalization was considered by Lichtenthaler [103], where he recognized the potential that could result from combining high levels of digitalization with high levels of sustainability. Formulating the notion of *new digitainability opportunities*, he emphasized the possibility of "establishing new strategic initiatives that are directed at combining and merging digitalization and sustainability" (p. 71, [103]).

3. Results

Relying on critical insights into the potential of the BSC system and taking into account the specifics of digital transformation projects (Sections 2.3–2.5), in this section, we consider the development of a Digital BSC system for DT initiatives.

3.1. Conceptual Solution of the Digital BSC Model to Support Digital Transformation

According to the Balanced Scorecard Institute model [104], the top priority is a category of needs related to customers' and stakeholders' needs and interests. Afterward, a strategy should be developed from the organizational mission and vision. Figure 4, shows the Digital BSC (D-BSC) closed management system that can be used for digital strategy execution.
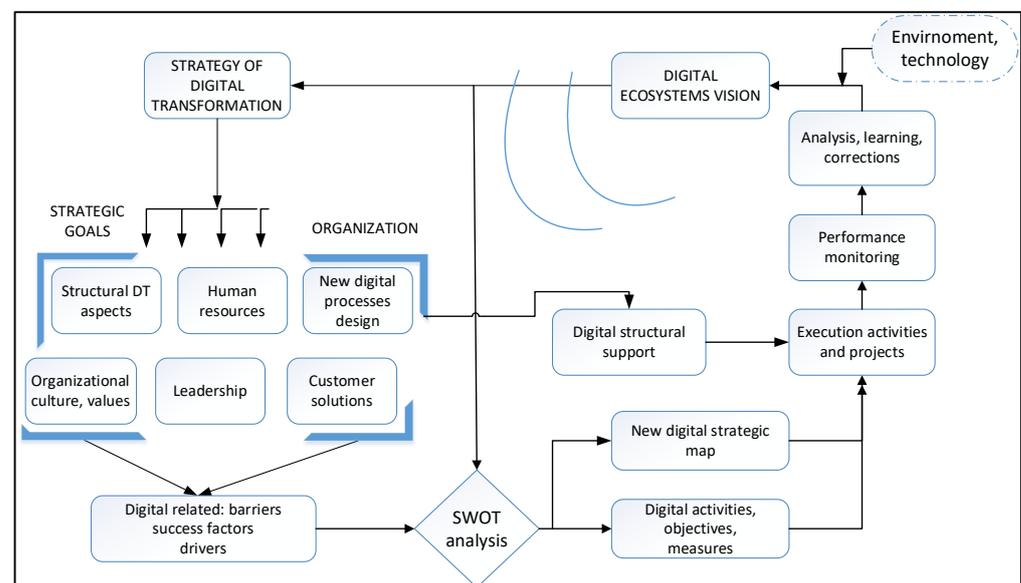

Figure 4. The BSC digital transformation management system.

The fundamental change compared with the traditional BSC system implementation initiatives is the mission and vision of the organization's digital transformation and vision of digital ecosystems. Therefore, everything starts with a vision of future technological setups and digital ecosystems inside and outside the organization. The Digital Balanced Scorecard, which should ensure success in the implementation and performance of digital subsystems, is achieved through the steps indicated by the main arrows in Figure 4.

Valuable ideas in the context of performing DT are related to forming an appropriate structural entity or organizational unit. One solution is the concept of the Digital Initiative

Transformation Office (DITO), which would bring together people, processes, methodology, and metrics, as well as manage a set of different digital projects or initiatives [105]. Furthermore, for the success of DT in the MIT and Deloitte study, the importance of creating an agile structure is emphasized (p. 15, [15]). In addition, it is necessary to work on the digital harmony of culture, people, structure, and tasks. Fuchs et al. [69] wrote about digital units (DUs) that are designed for particular purposes and require unique resources. These entities can be innovation laboratories, incubators, or "builders" of the company. One of the basic orientations of the DUs is innovation activities.

The "execution" part is about starting a strategic transformation process, which Zaoui and Souissi [106] wrote about, believing that it is an analogy to the phrase "DT process". Given its definition, it would probably be more appropriate to discuss the project here. In their analysis, Correani et al. [107] talk about "DT Projects" and then place these projects within the common framework of digital strategy implementation. The methodology of digital project management for DT initiatives should be agile. Compared with the traditional methodology, where testing goes at the end, an agile approach (e.g., Scrum) is achieved through iterations that address product features and requirements but over shorter periods [108,109]. Due to frequent testing and feedback, DT solutions can be continuously improved, and there are no costly misconceptions about the assumptions of users, experts, and others.

3.2. Digital Strategy Decomposition and Strategy Maps for the D-BSC Model

Digital transformation should be understood as initiatives or activities that lead to DT strategy goals. Generally, these initiatives can be represented by a single BSC strategy map, although one can also assume the existence of a *set of strategy maps*. The strategic map as an architecture with critical interrelated elements, such as growth goals, changes in market share, new digital product quality, innovation processes, and employee digital skills development, play a critical role in structuring the Digital BSC. Through the strategy map model, D-BSC encompasses DT-related components from four traditional perspectives (Figure 5).
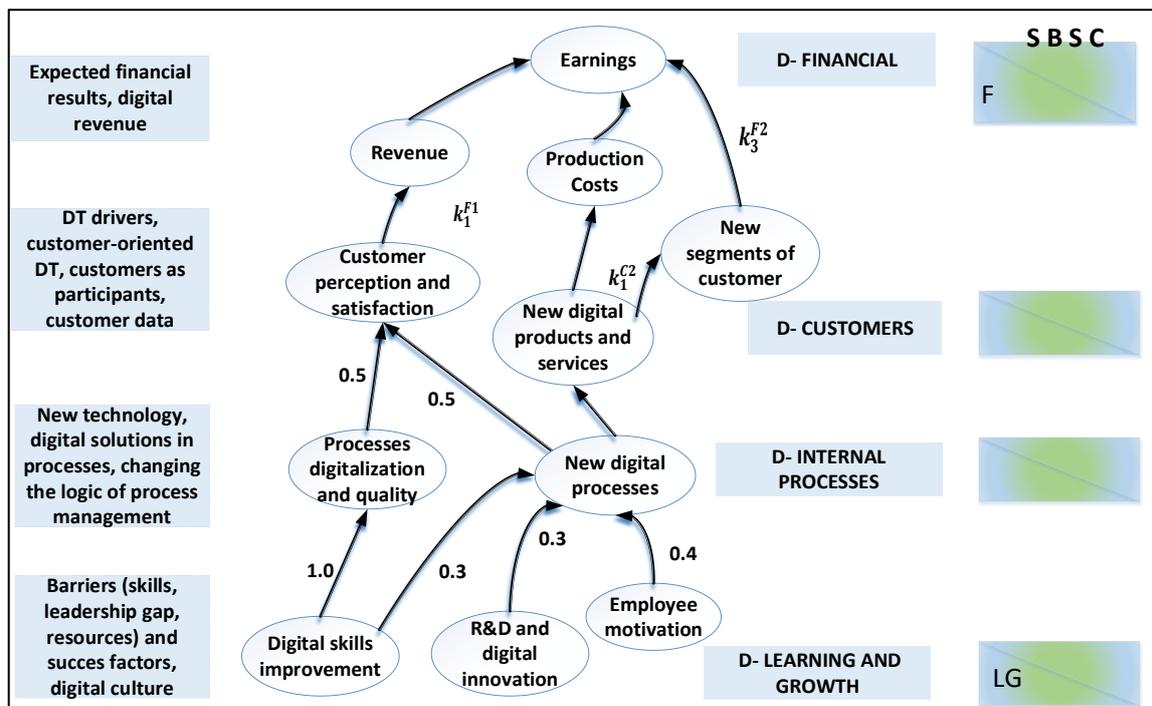

Figure 5. The proposed solution of a digital transformation strategy map (draft of the general D-BSC model).

DT success factors and barriers should be identified in strategy decomposition, especially in the fundamental perspectives, where guiding measures and objectives are set. In other words, these are factors related to the competence and digital awareness of leaders, skills and capacity of employees, digital organizational agility, etc. [23,64]. Furthermore, DT barriers relate to an inadequate organizational structure, a lack of awareness of the possible effects of transformation, resistance to change, lack of digital skills, inappropriate culture, and more [64]. While defining a particular organizational strategy (using SW, WO, ST, etc.; Figure 2), as proposed in, e.g., [88], the construction of a Digital BSC should include at least the *barriers and success factors* of digital transformation. Therefore, a general "DT SWOT strategy i" (DTSS$_i$) can be developed based on the extended SWOT factors:

$$\text{DTSS}_i = f \text{ (strengths, weaknesses, DT barriers, DT success factors, opportunities, threats)} \quad (1)$$

In the further characterization of DTS strategies (Equation (1)), we assumed operations such as addition, where some strengths can be used to achieve success factors, thereby taking opportunities and neutralizing a particular barrier (e.g., DTSS$_1$ = f (S1, Digital SF5, Digital B4, O1, O4)) (Table 4).

Table 4. DTSS "Robotization strategy" (hypothetical example).

Strengths	Weaknesses	DT Barriers	DT Success Factors	Opportunities	Threats
S1—Financial resources	W1—Archaic business model	B1—Resistance to change	SF1— …	O1—Digital skills training	T1—Lose competitive advantage
			…		
S3—Stakeholders' vision	W3— …	B4—Inadequate employee skills	SF4—Cyber security	O3- …	T3— …
S4— …	W4— …	B5—Organizational culture	SF5—Utilization of cloud technology	O4—RPA robotics	T4— …
			…		

Any particular BSC SWOT DT strategy (DTSS) is a component in the development of the main goals of the overall DT strategy (Table 4, Figure 2). Furthermore, each DTSS strategy should be consistently interpreted and deconstructed following the Figure 2 and Table 3 illustrations and related observations. In summary, specific related activities, objectives, measures, and targets should be formulated. The mentioned activities should have the priority of engaging resources.

Finally, the corresponding digital strategy map can be consistently formulated based on the interactions and connections of goals (and measures) as required by the concept of the BSC strategy map (Figure 5). While Table 4 is intended to clarify the formulation of the hypothetical "DTSS Robotization strategy" (with elements of Schumacher et al. [68]), Figure 5 shows a more general structure, namely, a characteristic strategic map of the D-BSC model with the assumption of common digital objectives and measures. The links and influence coefficients in this illustration are arbitrary but still consistent. The illustrative D-BSC model shown in Figure 5 contains the assumption of respect for the "DT strategy—BSC principles" regarding cause-and-effect relationships, performance drivers, and the final connection with finance. The outline of the general D-BSC model contains sustainability elements in the perspectives, on the right side of Figure 5, in accordance with the corresponding considerations in [74].

Suppose the DTSS strategy formulation contains the dimensions of obstacles and DT success factors (Figure 5). In that case, the activities and projects of the D-BSC strategic map will include primary, driving activities of the learning and growth perspective with an impact on goals in higher perspectives, all of which are in the digital domain. In formulating the DTSS strategy, it is possible to consider incorporating certain other DT elements besides barriers and success factors, such as DT enablers or drivers (in Equation (1)) or sustainability supporters (in Equation (3)). Such an approach ensures incorporating the

identified organizational strategic challenges directly into implementing a digital and sustainable strategy.

A well-designed D-BSC for DT should ultimately lead to improved financial results, which will usually occur if a hierarchical model is applied in the formulation of the BSC. Since each BSC model should support the idea of the importance of financial success (principles; Figure 3), digital transformation ventures should be oriented toward financial success. The simulation of the D-BSC model should enable estimates of financial achievements and insight into the changes in these achievements. This attribute of D-BSC is essential when evaluating the expectations associated with DT, in other words, when the motivation of leaders and managers for DT is considered.

A quantitative basis allows for *validation of the D-BSC model* and its possible corrections (if, over time, the achievement in higher perspectives, e.g., financial, approaches the calculation obtained by applying the model, then the model is correct at least for some time; Equation (2)). The F-codes in Equation (2) refer to measures (objectives) from higher perspectives of the BSC (processes, customers, finances), whereas t_k represents the time instant.

$$| \text{Measure } F_j(t_k, \text{achieved}) - \text{Measure } F_j(t_k, \text{calculated}) | \geq$$
$$| \text{Measure } F_j(t_{k+1}, \text{achieved}) - \text{Measure } F_j(t_{k+1}, \text{calculated}) | \tag{2}$$

Owing to the cyclical system of the Digital BSC (D-BSC, Figure 4), it is possible to monitor the effect of transformation on organizational success, outcomes of individual activities, and initiatives compared with expected achievements.

In DT projects, the customer perspective acquires new dimensions, which are reflected in the following concepts that are highlighted in the literature: customer engagement (Sebastian et al. [110]), customer-centric approach (Loonam et al. [111]), and digital customer behavior (Verhoef et al. [112]), wherein digital customer behavior can be understood as one of the critical drivers of DT (Figure 5). Baiyere et al. [113] discussed the "new logics of business process management" in digitalization. DT is strongly reflected in organizational processes, as suggested in [1,9]. The focus is often on entirely new processes rather than improving existing ones. Achievements in the concepts of leading measures and drivers (Figure 5) are distributed through a map with consequences from the financial results perspective. There is a financial forecast based on the quantification of the D-BSC model. Disadvantages and obstacles for organizations with lower digital maturity can be gradually addressed through analytics and logic imposed by the Balanced Scorecard. It assumes that effort is required to formulate projects and activities that precede major digital actions (digital skills improvement, agile culture development, digital leadership, etc.).

For complex digital transformation interventions where a corporation introduces a range of DT technologies, a single strategy map would not be satisfactory as a model of support. Such cases imply a significant number of strategic goals that the BSC system is built upon such that a more considerable number of strategy maps could also be required. Strategic themes, which are applicable as sub-models in developing a strategy, are another potentially helpful concept for DT support. Several strategic themes can form a single strategy map, as illustrated in Figure 6. Themes are derived from the decomposition of vision and mission and are often interpreted as pillars of excellence [114–116]. The resulting structure can also include elements of sustainability, i.e., embedded selected SDG objectives.

The related designed activities in the digital transformation initiative and their causal links in the model (strategic map) lead to the expected outcomes in terms of digitization and performance (Figures 5 and 6).
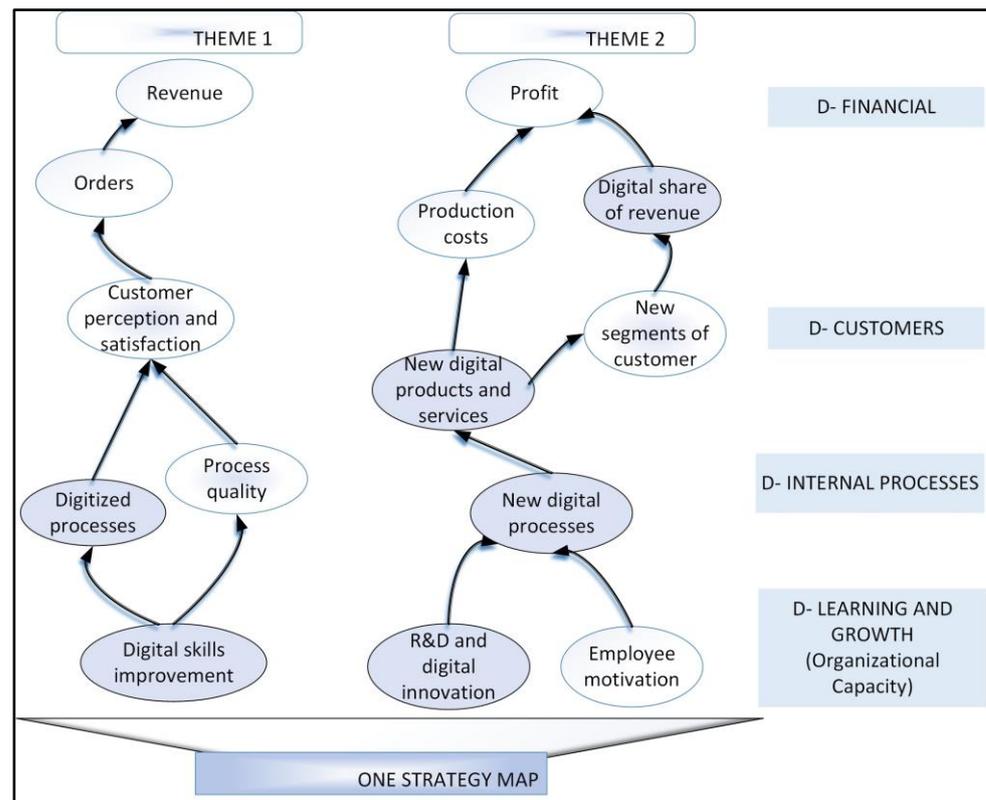
Figure 6. Illustration of the fusion of several digital strategic themes into one strategy map (D-BSC).

3.3. Sustainability Digital BSC Model

Sustainability is the next important topic that the D-BSC model cannot ignore. Digitization and sustainability are the dominant global social phenomena in strategic management processes. Therefore, the supporting model for organizational transformation, which is primarily concerned with digital transformation, must also include attributes regarding sustainable development goals.

The model, which is primarily a hierarchical-type D-BSC, can be upgraded to a digitally sustainable BSC (D-SBSC). There are various alternative options for designing such an SBSC model. Suppose we follow the frequency of the application indicator and the fact of our proposal with the hierarchical structure. In that case, intuitively, the best solution is *to integrate the social and environmental components in all conventional perspectives* (illustration in (p. 205, [74])). The symbolic scheme of the connection between the partially green perspectives in Figure 5 on the right indicates the possible development of the presented model into the D-SBSC model.

When building the D-BSC model, more advanced organizations that want to meet sustainability goals or even implement innovative solutions for new digitization opportunities [103] could further enrich their measures and goals. The symbolic scheme of relationships shown in Figure 7 is utilized in this approach, with elements of Lichtenthaler's proposal [103]). A Digital BSC should adjust the characteristic goals of sustainable development and reconcile visions that are not always aligned and can create pressure to commit limited resources.
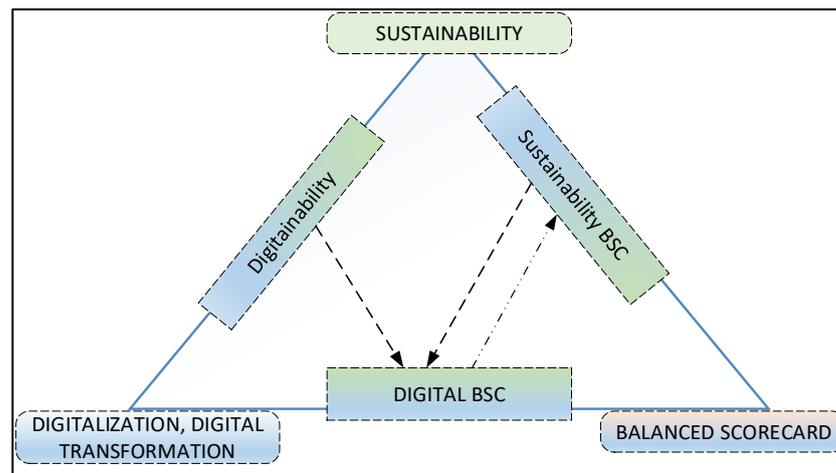
Figure 7. Improving the D-BSC model by respecting sustainability goals.

By analogy with the formulation of digital SWOT strategies (Equation (1)), we conceptualized sustainable digital strategies. The "D-BSC SWOT Sustainability Strategy" is referred to as DTSSS$_i$ (Equation (3)), where the "ese" labels indicate economic, social, and environmental components:

$$DTSSS_i = f (strengths^{ese}, weaknesses^{ese}, DT \text{ barriers, DT success factors,} \\ opportunities^{ese}, digitainability \text{ opportunities, threats}^{ese}) \tag{3}$$

Thus, an individual DTSSS strategy is a component in developing the main objectives of DT and sustainable development. Furthermore, each DTSSS strategy (Equation (3)) should be consistently interpreted and broken down by related activities, objectives, and measures (Figure 2, Tables 3 and 4). While for the "pure" DT initiative, the initial strategic goals (Figure 2) concern primarily digital ecosystems mission, the inclusion of sustainability implies elaborating SDG goals or derivatives of these goals. When applying a stricter quantitative approach, an explanation of the weights of the SWOT factors can be found in [89,117].

4. Discussion

A set of digital transformation challenges and issues was identified based on the results of the observations and analysis discussed in Sections 1 and 2. The categories that encompass the main challenges are decision making about the DT venture, DT strategy, and factors influencing DT success (Figure 2). The related concepts of the Digital BSC (D-BSC) methodology for digital transformation (Section 3), which are suitable for addressing the characteristic issues/challenges of digital transformation and digital strategy, are listed in Tables 5 and 6 next to these specific issues.

Table 5. DT strategies and potential contributions of D-BSC system concepts.

DT Strategy Challenges	Common Observations, Responses, and Alternative Solutions	The Possible Contribution of the Digital BSC System (D-BSC)—Concepts
Digital strategy formulation and implementation	Formulation and importance of digital strategy [1,19] Failures of DT result due to an absence of DT strategy or undervaluing of its importance [15,17]	The D-BSC model's DT strategy should be formulated and deconstructed into a series of interrelated, mainly digital activities and projects (Figure 2, Tables 3 and 4) Adherence to three fundamental principles (Figure 3) is necessary for formulating an exemplary D-BSC Deconstruction of a digital strategy (Figures 4 and 5) according to the D-BSC model (cyclicality, drivers, measures, *cause–effect* connections) ensures its success

Table 5. *Cont.*

DT Strategy Challenges	Common Observations, Responses, and Alternative Solutions	The Possible Contribution of the Digital BSC System (D-BSC)—Concepts
Strategic management in digital ventures	DT strategy should guide managers through the transformation [1] Generally different main goals of digital transformation [107]	The strategy map of D-BSC (Figures 5 and 6) serves as a logical and comprehensive architecture for implementing the DT strategy The BSC, in general (and thus, the D-BSC), provides less arbitrary interpretations when defining priority projects and activities D-BSC enables corrective actions for the improvement of the system to support the strategy (Figure 4, Equation (2))
Leadership issues (strategy level)	Frequent failures owing to inadequate leadership [22] Digital gap regarding leadership [20] The issue of sharing the vision in the organization [2]	In D-BSC, the leadership issue is dealt with through activities from the perspective of learning and growth (leading indicators; Figure 5) D-BSC activities should start from the first perspective, which enables the preparation of the organization's leadership for DT BSC supports the sharing of vision and common goals
Digital strategy support frameworks	Some conceptual and theoretical DT frameworks have been developed [31] but are primarily descriptive Digital maturity model [34]	D-BSC is a prescribed and exact tool and provides a coherent framework for the analysis and implementation of the DT strategy D-BSC can be integrated with some of the existing DT theoretical frameworks (e.g., structural approach and project approach; Figure 4)

Table 6. The potential contribution of the D-BSC system to DT initiatives' development.

Digital Transformation Decision Making and Influencing Factors	Common Observations, Responses, and Alternative Solutions	A Possible Contribution of the D-BSC Support System
Motivations, drivers, and goals of DT	Often unclear mechanisms of the emergence of costs and benefits from DT [2] A desire for success that results in imitating the behavior of competitors (initiating DT) Customers' behavior, emerging technologies, and competitors as external drivers for DT [64] Possible awareness of potential cost reduction and increased productivity due to DT [62,118] Pursue goals in the field of sustainable competitiveness [9] Opportunities for organizations owing to the existence of funds (e.g., EU-funded research)	Once established, D-BSC provides insight into the anatomy of value creation (Figures 5 and 6) [54]; application of strategy maps is possible and preferred with digital assets (resources) engagement in processes or projects Setting measurable D-BSC targets from the perspectives of growth, processes, customers, and finance (Table 3, Figure 5) ensures the prediction of future results and improvements Monitor the progress of DT goal achievement by analyzing the anatomy of values in D-BSC maps to compare what was expected and what has been achieved (Equation (2)) Key settings of D-BSC enable focusing on the development component (lead indicators) rather than only on technology (digitalization) or fund grants
Barriers and resistance to change in DT	Overcoming resistance to change in employees and managers [66,94] Failures due to leadership issues—e.g., solutions through large-scale agile transformation [119] DT traps [2] Inappropriate organizational culture—solution through "facilitating a culture of change and innovation" [120]	*Answers through the D-BSC system:* In building the D-BSC model, when analyzing the strategic goals of digital transformation, barriers and success factors should be considered by analogy with the SWOT elements (Figure 2) Specific digital activities or projects must be designed to remove barriers and exploit or ensure success factors (Equation (1)) Since most barriers and success factors relate to human resources (employees, managers, and leaders), the majority of D-BSC activities addressing these issues should be formulated from a learning and growth perspective (Equation (1), Figures 5 and 6) Within the overall D-BSC efforts, it is possible to launch projects that will contribute to changing organizational culture, agility, willingness to learn, reward innovation, etc.
Success factors of DT initiatives	Factors concerning competence and digital awareness of leaders, digital enhancement of systems in an organization, etc. [23] Realization of the organization's digital maturity [121] Actively shaping future strategies [64]	
Digital skills and knowledge of employees	Barriers or success factors Skills and knowledge to execute the digital strategy [15] Employee skills [23,92] Understanding of new digital technologies in the organization [4]	*Solutions through the D-BSC system:* In establishing the D-BSC, we need to consider activities in learning and growth perspective regarding innovation and acquiring digital skills and new knowledge (Figures 5 and 6)

Table 6. *Cont.*

Digital Transformation Decision Making and Influencing Factors	Common Observations, Responses, and Alternative Solutions	A Possible Contribution of the D-BSC Support System
Structural models that support DT implementation	A significant part of the DT support framework is based on structural or design organizational aspects. These are concepts related to changes in structure, process, culture, and leadership, derived from models, for example, "5 Star" (Galbraith, [122]) or "7S" [87,123] According to Nwaiwu [31], these include the Digitization Piano, Digital Orchestra, Matt et al. Framework [16], and other models Recent contributions include Fuchs's [119] proposal of digital organization for particular purposes, the DITO concept [105], and the agile company architecture for DT [124]	The advantage of the DT-related frameworks in the left-hand column is that they are illustrative, while the D-BSC is a prescriptive system For the cited frameworks, Nwaiwu [31] addresses the question of how to transform (are the actions to be taken detailed?) and the answer is "no", while the D-BSC is detailed in its activity proposals (Tables 3 and 4, Figure 5) The D-BSC enables and requires restructuring or redesigning organization phase (Figure 4), which comes with business processes intervention activities Redesign initiatives can be integrated with effort through the D-BSC system, and due to complexity, the application of an agile methodology should be considered
Sustainability goals	Concept of digitainability [103] SBSC architecture [74]	The D-BSC is an upgradeable model for SDGs (Equation (3), Figures 5 and 7)

4.1. Digital Strategies and Potential Contributions of the Digital BSC System

The Digital BSC could facilitate DT by enabling a direct focus on financial indicators and their quantification. These indicators are not abstract drivers that arise from new technology but form part of the D-BSC system scheme (Figures 5 and 6). The D-BSC ensures the priorities of initiatives and integrates them in a complementary and synergistic way. The outcome of any organizational transformation should be better performance and the same is true for digital transformation. The D-BSC is a system for measuring and improving organizational performance, and in the D-SBSC version, for supporting the SDG goals.

For each identified challenge of the digital transformation strategy (Table 5), we find the necessary answer through the appropriate concepts of the D-BSC and the solutions found based on those concepts. Based on the overview given in Table 5 and other considerations in the previous sections, we can address the research question *RQ1* (*In which segments can the BSC methodology support the digital transformation strategy, and how?*). The answer is by building consistent strategic maps based on elaborating digital transformation goals through strategies that integrate barriers and success factors (Equation (1), Table 4). The priorities of D-BSC activities are transparent and quantitatively linked through perspectives toward the projection of financial results (Figure 5). The outcome of transformation using the D-BSC should lead to better organizational performance. The segments within which the positive impact of the BSC model on the digital strategy is evident are digital strategy formulation and implementation, strategic management, leadership issues, digital strategy support framework (Table 5), and sustainability goals for the D-SBSC version (Table 6).

4.2. DT Initiatives and Potential Contributions of Digital BSC System

The formulation of a DT strategy and strategic-level activities (Table 5) is insufficient for successfully implementing digital transformations since digital transformation development is a broader concept. Table 6 contains some critical observations regarding research question 2. The importance of the concept and issues of DT barriers, success factors, and drivers is the subject of previous research, for example [2,63,64,94,119,120]. The SWOT factors that help deconstruct the strategy in the D-BSC model are extended by including these concepts, as well as economic, social, and environmental components for D-SBSC (as explained above). Furthermore, the decision to enter DT projects, the review of expected results, and other decision-making elements are important areas in which the D-BSC model can provide support (Table 6).

The result of the research on *challenges and issues of digital transformation and key features of the BSC strategy support system* is contained in the presented conceptual solution of the Digital BSC (Figures 4–7, Tables 3–6, Equations (1)–(3)). The strong coherence between the D-BSC system structure and the digital transformation endeavor is evident from the similarity of the essential perspectives of the BSC model (learning and growth, processes, customers) and sets of required digital transformation activities, which are most often addressed by scholars. DT is about developing digital solutions for customers, digital transformation processes, and employees' digital skills and awareness. Numerous studies that explored the digital transformation phenomenon focused on customer-oriented transformation and the customer relationship strategy [110,124], which correspond to the elements inherent in the D-BSC system. The proposed D-BSC digital transformation management system (Figure 4) contains the main steps of a cyclical system that is characterized by digital technology solutions, digital assets, the application of the agile methodology in coordination, and the implementation of flexible cycle phases.

Digital transformation as a set of initiatives or activities leading to the achievement of DT strategy goals can be supported by the representation of these initiatives using the D-BSC strategy map (Figure 5). In practice, this should be preceded by the decomposition of the DT strategy, setting priorities, and designing related objectives and measures along with the perspectives of the D-BSC model. In presenting the means of achieving excellence in implementing digital transformation, it is possible to use the construct of strategic themes (Figure 6). Building a hierarchical D-BSC model for the DT initiative assumes a "cause-and-effect" relationship between objectives (and measures).

Concerning RQ2 (i.e., can a specific BSC digital model be developed to ensure the overall success improvement of digital transformation initiatives, and what are its main features?), the conceptual design of the Digital BSC (Figures 4–7, Tables 3–6, Equations (1)–(3)) serves for the complete elaboration of an affirmative answer. The contributions of the D-BSC model regarding the opportunities and challenges of digital transformation efforts (Table 6) are evident because the model successfully addresses specific significant issues. These DT issues are leadership motivation, drivers, and the goals of DT; barriers and resistance to changes in DT; success factors of DT initiatives; digital skills and knowledge of employees; and support for DT implementation. The main features of the specific D-BSC model are described in the tables, formulas, and figures given in Sections 3 and 4. Additionally, they represent the essential advantages of the D-BSC system. Among the benefits that the proposed D-BSC contains are the comprehensiveness of planned activities, the prioritization of strategy and the detailed decomposition of strategy, a normative approach, a focus on barriers (weaknesses) and success factors, guiding measures (drivers), agility, value creation enabled by strategy maps, the quantitative basis for expectations of DT (and SDG) goals and objectives, and a possible estimate of DT's financial performance.

Potential weaknesses of the D-BSC system in supporting DT development include the mathematical model behind strategic maps (the problem of accurately determining weighting factors in cause-and-effect relationships, linearity approximation, and subjectivity of estimations). The following challenge concerns implementing all projects and activities within the D-BSC model, whereby one should consider an agile approach. It requires the participation of both customers and experts and enables faster feedback and the delivery of finished parts and packages. Due to the comprehensiveness of the D-BSC, which would require the engagement of a large number of people from the organization, it is possible to expect resistance to the introduction of the BSC system.

5. Conclusions

In search of answers to the challenges of competitiveness and performance improvement, modern organizations focus on digitalization or digital transformation projects. As Westerman [14] states, technology enables different modes of business management and thus provides new value. The success of the transformation and good financial results after digital transformation can be expected, especially for leading companies in digital

technology management. If support in implementing digital transformation is not applied satisfactorily, the overall endeavor will likely fail, as evidenced by research in, for example, McKinsey and Co. [23]. Although digital transformation initiatives should be understood as strategic and challenging endeavors, in practice, insufficient attention is paid to this issue [1,3]. Strategic planning and management support systems, such as BSC, are a part of organizational infrastructure capital, and their importance is well recognized, especially in larger organizations. In the Balanced Scorecard Usage Survey 2020 [10], the number of respondents who said that their Balanced Scorecard tool was extremely or very useful was high at 93%.

Sections 3 and 4 of this paper explain the possibility of integrating DT initiatives into strategy maps and how they can be supported by the D-BSC system. The topic of supporting DT strategy and DT project/program development is mainly considered through descriptive frameworks [31], while D-BSC provides instruction regarding an orderly system of cause-and-effect relationships between activities on a quantitative basis. These activities go from employee training measures and objectives to strategic goals and financial results. In the extended possible D-SBSC model, SDG goals are built into the perspectives and become part of the expected results of digitization and sustainability efforts.

In the presentation of the results and the final discussion, an overview of the possible contributions of the digital BSC system regarding supporting the decision-making process of the DT undertaking, the implementation of the DT strategy, and the successful incorporation of influential organizational factors into DT projects and activities, is given. The related sections include the final positive answers to the research questions concerning the potential of the D-BSC model to support DT ventures. New reports on applying the D-BSC model to support digital transformation are expected to be published soon, which would open up space for further analyses and conclusions.

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