



The digital business strategy - a factor for the sustainable development of the construction company and the creation of a sustainable project/object

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ABSTRACT: Sustainable company development is a long-term process that requires the development of new strategy, policies and practices that are aimed at creating, offering and realizing additional economic, social and environmental value for the client, stakeholders and society as a whole. An essential factor that facilitates this process today is digitization, which transforms the structure of social relationships between users, between companies and between users and companies and creates conditions for developing a new digital business strategy. These new challenges determine the purpose of the research - assessment of the role and influence of the digital business strategy as part of the company's strategy for the sustainable development of the construction company and the creation of a sustainable project/object.

KEYWORDS: Construction Company, Digital Strategy, Sustainable Development, Sustainable Project/Object

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I. INTRODUCTION

The company's orientation towards sustainable development requires fundamental changes in the organization and management: a new philosophy of product design, management of the entire product life cycle, building an effective system of vertical relations, use of recycled materials, reconstructed components, by-products, passing from an ownership-based model to an access-based model, developing a system of logistics and feedback [1]. All this necessitates the development of a new strategy and making strategic decisions by the top management team that balance social, economic, and environmental and business challenges [2].

The transformation process is difficult and multifaceted, as each company uses complex technologies, products and services, resources from distant suppliers, works with many distributors, partners, and allies. Customers expect and demand innovative, high-quality, and cost-effective products and services. In addition, these expectations also apply to the operations, actions, and contributions of supply chain participants, who are directly and indirectly related to the company. Globalization, technological changes combined with the rapid transfer of information, knowledge and technology, the transformation to a digital world, increasingly intense market expectations and competitive responses define the new dynamic business environment.

To all the above, one of the most complex problems in the construction market should be added - there are many independent elements working that have a very low level of coordination and management [3]. Many different subjects with different characteristics and preferences participate in the creation of a project and its implementation (public and private investors, end customers, designers, architects, consulting, distributors, suppliers, contractors, and subcontractors). The relationships between them are often broken, based on short-term contracts, which gives rise to opportunism in their behaviour. In other words, each project/object includes companies that come together temporarily, solely for the realization of a specific task and specific goals. This makes it difficult to transition to a sustainable activity and create a sustainable construction project/object that has the following main characteristics (which also determine the differences from the traditional one) [4]:

First, mandatory inclusion of environmental goals, LEED certification, assessment of the size of additional green initiatives is required.

Second, the evaluation of the project's unique characteristics, economic and environmental objectives include a cost/benefit analysis (rather than a comparison with past or similar traditional projects) and a life-cycle cost assessment. In other words, when evaluating a sustainable construction project, the focus shifts from short-term to long-term return on investment.

Next, a sustainable project necessarily requires the application of integrated design principles that involve all key external stakeholders (representatives from the project team, designers, architects, developer, investor, environmental engineer, real estate consultant, including nearby property owners and representatives of other communities, local, government and regulatory institutions, etc.) from the early stages of design through to the final phase of project implementation.

Selection and contracting are with subcontractors who offer not the lowest bid, but a cost bid that considers sustainable project implementation and includes -use of recycled materials, on-site recycling requirements, agreements to return unused materials to suppliers, performance agreements, incentives and bonuses for implementing sustainable practices, as well as periodic staff training on sustainable construction requirements.

In compliance with the specified requirements, the developed construction documents do not require design changes, and the combination of the integrated team with the use of specialized technology, makes the compilation and submission of documentation for LEED certification efficient. Commissioning of the site ensures the functioning of all systems according to the criteria of the sustainable project because the construction company-contractor is hired from the beginning and understands the objectives of the owner and the investor.

Realizing a sustainable project/object requires new thinking, analysis, and evaluation of vast amounts of information and decision-making that takes into account and adapts to the social, political, economic, environmental, market and technological realities of the 21st century, which are increasingly difficult to predict.

Solving these problems can be facilitated by the development and application of information and communication technologies that change the world of business and lead to global connectivity (Internet and mobile network). Digital technologies are shaping new business infrastructure and influencing new strategy, organizational logic, and coordination patterns within company and between companies. From such a point of view, the purpose of the study is to evaluate the impact and role of digital strategy as part of the company strategy for sustainable development of the construction company and creation of a sustainable project/object.

II. THEORETICAL ANALYSIS

Digitalization is a process of a combination of information, computer, communication, and related technologies that leads to significant changes in the business and capabilities of the company [5]. This allows various activities to be carried out regardless of time and distance, facilitates the creation of new interconnections between products, processes and services, new business networks and inter-company relations, which necessitates a fundamental change and a significant transformation in business strategy. The process of integrating digital technologies into all aspects of business activities means a faster pace and higher quality of design and execution. By transforming information from physical to digital format and using it in an increasingly large part of business processes, end products (goods and services) are becoming more and more digital.

Digital resources are a complete infrastructure that includes interconnected institutions, practices, and protocols as well as traditional databases. The use of digital resources and the exchange of information through digital platforms inside and outside the company unite all operational activities and strategies at different levels. Digitalization stimulates and facilitates the sustainable development of the company, especially in a highly turbulent environment based on the collected and analysed information, transforms the structure of social relationships between users, between companies and between users and companies, through social media and social networks [6].

Therefore, in the new dynamic conditions, the strategy related to the accelerated development and application of information technologies can no longer be only a strategy at the functional level - tailored, but essentially always subordinate to the business strategy, but one that reflects their fusion and leads to the creation of a digital business strategy that has several key characteristics - reach, speed, efficiency [7]. It is a type of organizational strategy formulated and implemented based on the use of digital resources, which allows creating, offering, and obtaining additional value for customers, company and society. Digital business strategy recognizes the role and importance of the diffusion of digital resources and technologies to develop a sustainable strategy, through learning and knowledge transfer, which changes, reconfigures the operational capabilities and the different functional areas of the firm (operations, purchasing, supply chain, marketing, innovations) and ultimately ensures the realization of company goals through strategic differentiation.

Customers, stakeholders, and society expect and demand superior products, services, and operations with less waste, reduced negative impact on health, safety, and the environment, increasing corporate responsibility for decisions, technologies, products, processes, and activities in every aspect of business the enterprise. All of them require more transparency and information about the company's activities, the impact on nature and how the company ensures the protection of the interests and rights of its own workers and those in the vertical value creation chains in which it participates. This necessitates a redefinition of goals - from maximizing profit for the company/shareholders to creating value for all stakeholders. Company management is becoming more and more complex and requires expanding the scope of analysis, evaluation, inclusion of many more considerations in decision-making.

Digitization of processes in the company facilitates the development of an effective system for monitoring, processing and exchange of significant information about the characteristics of users in different market segments, about consumer behaviour, stimulates active communication and support from direct and indirect interested parties, analysis and evaluation of possible alternatives for future development and decision-making to ensure social and environmental investments with measured risk and stable company positions. Synchronizing interests and building trust in customers and stakeholders is essential for developing successful strategies oriented towards sustainable development, which also defines the first hypothesis:

Hypothesis 1: The digital business strategy facilitates communication with stakeholders, which has a positive impact on the sustainable development of the construction company and the creation of a sustainable project/object.

Customer satisfaction today remains critical to achieving positive results, but it is only one component of an increasingly broad vision that also includes satisfying the interests of stakeholders and society (in the 1990s, the goal was realization of company goals through product differentiation). The task facing the company today is to make decisions that achieve a balance between social, economic and environmental aspects. In the conditions of a constant flow of information (provided by the global network), increased opportunities for its analysis, assimilation and transformation into knowledge, customers and stakeholders have facts and specifications about products and processes, which was impossible to happen ten years ago years. In other words, customers/buyers and those who manufacture and market them know too much (whether they always know the truth is another question).

Information and knowledge supports, and facilitates the process of evaluating competitors and their products, comparing alternatives and making a rational and effective decision (from their subjective point of view) to choose, purchase a suitable product at an acceptable price. One can also add the undeniable fact that customers and stakeholders can share their opinions and evaluations, product and company attitudes, the credibility and accuracy of advertising messages, waste issues and negative impacts related to production and use, with thousands, others on social networks. In other words, it is increasingly difficult for any company to achieve good results through traditional production (creating an exceptional product) and marketing (advertising, promotions) methods.

The strategy based on digitization includes managing the entire product life cycle - using digital resources for design, implementation, sales management, recycling, reuse of products, taking into account their interoperability with other complementary platforms. Digital resources speed up decision-making, provided the necessary organization is in place that prevents information from leaking into a complex, hierarchical management structure. Investments are needed to ensure effective decentralized management with the ability to access various streams of information, both from all units of the given firm and from key partners and allies. It is especially important to build an organization that allows fast processing of customer requests in real time through various social media platforms and quick feedback.

Based on information about customer preferences from social networks, many companies restructure their activities and create individual offers. Digitization creates conditions for the development of new forms of consumption, based not on ownership, but on sharing, redistribution and reuse in newer and more useful forms. The success of the digital business strategy is a function of providing integrated access to resources, improving overall company activity, creating new, specific internal processes and procedures supported by information technology that facilitate the transfer of information between all company units and allow codification, sharing and using knowledge about markets, supply chains and customers, which defines the second hypothesis:

Hypothesis 2: The digital business strategy accelerates of developing company processes and operations, reconfiguring and adapting resources and competencies, which has a positive impact on the sustainable development of the construction company and the creation of a sustainable project/object.

In the conditions of digitization, the creation and realization of additional value for customers and stakeholders involves many more companies. This means that strategies (determining the scope, product portfolio and activities carried out within the framework of direct control and company ownership) and also business models are not independent, but intersect and interact, due to the increasing dependence and interdependence of companies. A digital business strategy allows a firm to go beyond the traditional boundaries



of the market in which it operates, traditional supply chains and expand its scope of activity by building and/or engaging in strategic alliances, formal and informal partnerships, and competitors, especially in areas in which individually have no competitive advantages [8]. This process requires rethinking goals, tasks, merging and sharing information with other players (regardless of whether they are partners or competitors), joint use of digital resources, knowledge, competences, which increases adaptability to changes in the external environment:

Hypothesis 3: The digital business strategy expands the scope and management of networks of interconnected companies, which has a positive impact on the sustainable development of the construction company and the creation of a sustainable project/object.

The theoretical analysis allows to derive a conceptual model - "Role of the digital strategy for sustainable development of the construction company and creation of a sustainable project/object" (fig. 1).

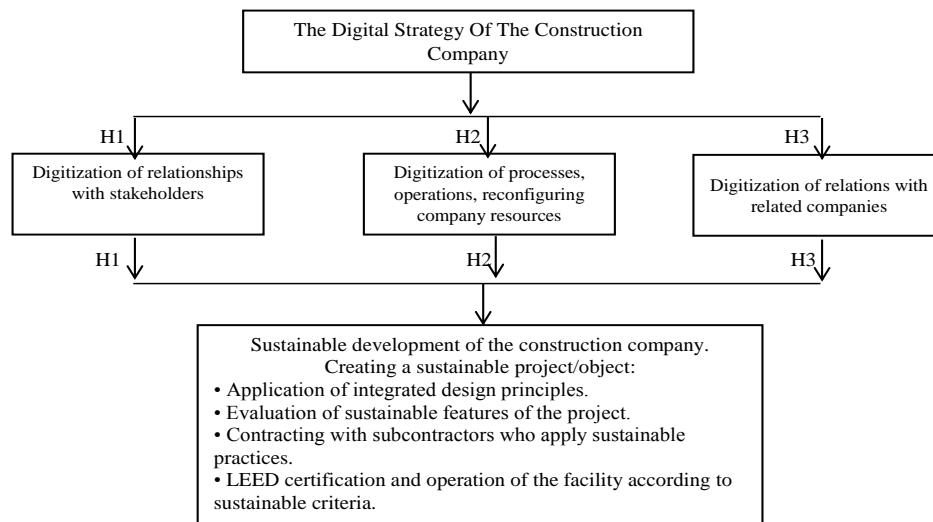


Figure 1. Conceptual model "Role of digital strategy for sustainable development of the construction company and creation of a sustainable project/object" and research hypotheses

III. EMPIRICAL ANALYSIS

3.1. Method and object of the research

The empirical study was conducted through a developed and applied methodology for evaluating the defined hypotheses and is part of a larger study of the strategic management of the construction company. The study includes 26 companies selected at random, which have been working for more than 5 years in different segments of the construction market and have different specialization, different history, different territorial localization, different business model, which allows to make generalizations with the necessary objectivity. An equal number of small, medium, and large companies were studied, which have different resources and competences related to production, organization, and management, have different market positioning and different opportunities for digitization of processes and operations.

3.2. Research procedure

The information was collected through an online survey based on the principle - one respondent (senior manager) - one company, assuming that he has complete information and knowledge about the company he leads. Due to the expressed desire of most of them for confidentiality and anonymity (referring to company secrecy), respondents are given the opportunity to submit the survey without indicating their name or the name of their company. Of the survey cards sent to 55 firms, 42 were returned, of which 16 were rejected due to lack of complete responses, resulting in a final sample of 26 firms and 26 managers.

The questionnaire included a total of 24 questions constructed as statements to which respondents referred by marking their responses from 1 to 5 on a Likert scale (where 1 means "strongly disagree" and 5 means "strongly agree"). Since the aim is to determine the correlation and to evaluate the influence of the digital business strategy (the independent variable) on the sustainable development of the construction company and the creation of a sustainable project/object (the dependent variable) the questions are divided into three parts that follow the formulated hypotheses. Cronbach's alpha coefficient was also used, whose high value (significantly

higher than the accepted base of 0.7) proves the internal relationship and consistency of the questionnaire, representativeness of the final results.

To determine the role and impact of digital business strategy on the sustainable development of the construction company and the creation of a sustainable project, by improving communication with stakeholders (H1), the survey paid special attention to the following issues:

1) The digital business strategy allows the development of an effective system for monitoring, processing, and exchange of significant information, facilitates the creation of formal and informal channels for communication with external stakeholders.

2) The digital business strategy stimulates active dialogue through meetings, conferences, and newsletters with external stakeholders on sustainable development issues.

3) On the basis of the established digital relationships with key stakeholders, the company can predict events that create threats for it and eliminate them in a timely manner.

4) The digital business strategy allows for the presentation of strategic plans for sustainable development of the company and the requirement for objective feedback from external stakeholders.

5) The digital business strategy stimulates the development of new strategies for sustainable development through a process of public consultation and exchange of knowledge and experience.

6) The digital business strategy through joint activity with stakeholders is a factor for popularizing the environmental, social aspects of the offered products, services, brand, which is a factor for attracting customers.

The role and influence of the digital business strategy, on the sustainable development of the construction company and the creation of a sustainable project, through the process of developing company processes and operations, reconfiguring and adapting resources and competencies (H2) has been evaluated based on the following main problems:

1) Digital business strategy reduces time to develop and bring new products to market.

2) Digital business strategy reduces time and improves strategic and operational decision making.

3) The digital business strategy reveals new opportunities and distinctive competencies of the company.

4) The digital business strategy provides integrated access to resources, improvement of overall company activity, creation of new, specific internal processes and procedures supported by information technology.

5) Digital business strategy creates a new internal company infrastructure that supports long-term connections and relationships with key partners and enables the codification, sharing and use of knowledge about markets, supply chains and customers.

6) The digital business strategy stimulates investments aimed at improving organizational processes and creating additional value through the exchange of data, information, and knowledge not only within the company, but also within the vertical supply chain.

The role and influence of the digital business strategy on the sustainable development of the construction company and the creation of a sustainable project/object, by expanding the scope and managing networks of interconnected companies (H3), is evaluated as follows:

1) A digital business strategy creates opportunities to expand digitization up and down the chain.

2) A digital business strategy enables the creation of network effects and multi-faceted platforms.

3) Digital business strategy allows obtaining additional value by using digital resources and creating multifaceted business models that encompass the complex and dynamic coordination between multiple companies.

4) The digital business strategy facilitates the process of analysis, absorption, and assimilation of new information and its transformation into knowledge.

5) Digital business strategy is an important factor for building strategic alliances, stimulates the development of formal and informal partnerships.

6) The digital business strategy stimulates the process of coordination and integration of knowledge, skills, competencies of all participants in the vertical chain of created value by creating a digital network model.

Based on the following statements, managers are asked to evaluate the sustainable development of the construction company and the creation of a sustainable project/object as a function of:

1) Increasing degree of convergence and integration between digital and corporate strategy.

2) Growing scope and effectiveness of the digital business strategy in company activity.

3) High degree of digitization of products and services.

4) Timely collection, analysis, and evaluation of information from the external environment and the digitization of relations with all directly and indirectly stakeholders.

5) Broad and comprehensive digitization of all company processes and operations at all levels.

6) Creation of intercompany platforms and digital networks and application of integrated design principles in the activity.

3.3. Results

When processing the data obtained from the conducted online survey, the Pearson coefficient (R) was calculated for the entire sample (the average values of the studied independents were previously calculated). This allows to determine the influence and role of the digital business strategy on the sustainable development of the construction company and the creation of a sustainable project/object (Table 1). The correlation between the sustainable development of the construction company and the creation of a sustainable project/object as a function of the digital business strategy was also determined (Table 2). The coefficient of determination/certainty (in %) - R^2 was also calculated, which gives a more accurate estimate and shows what percentage of changes in the independent variable will lead to changes in the dependent (the remaining percentages up to 100 define the coefficient of uncertainty).

Table 1. Correlation analysis between the digital business strategy, the sustainable development of the construction company and the creation of a sustainable project/object

Role and influence of digital business strategy for:		The sustainable development of the construction company and the creation of a sustainable project/object
Improving communication with stakeholders	Pearson Correlation – R Coefficient of Determination (%) - R^2 N=12326	0.748 55.95
Accelerating of developing company processes and operations, reconfiguring and adapting resources and competencies	Pearson Correlation – R Coefficient of Determination (%) - R^2 N=26	0.812 65.93
Extending the scope and management of networks of interconnected businesses	Pearson Correlation – R Coefficient of Determination (%) - R^2 N=26	0.796 63.36

Correlation is significant at the 0.01 level (1-tailed). Source: Own calculations

The calculated Pearson's correlation coefficient in Table 1 and 2 is statistically significant, indicating that there is a relationship between the studied variables. Since the correlation coefficient is significantly greater than zero, this by definition allows rejection of the null hypothesis of independence.

Table 2. The sustainable development of the construction company and the creation of a sustainable project/object as a function of the digital business strategy (Correlation)

		Digital business strategy
Sustainable development of the construction company and the creation of a sustainable project/object	Pearson Correlation – R Coefficient of Determination (%) - R^2 N=26	0.695 48.30

Correlation is significant at the 0.01 level (1-tailed). Source: Own calculations

The obtained results prove the existence of a significant positive correlation between the development and implementation of a digital business strategy and the sustainable development of the construction company and the creation of a sustainable project/object and allow the following conclusions to be drawn:

According to the respondents, digitization enables and facilitates the development of an effective system for monitoring, processing and exchange of significant information, active communication with directly and indirectly interested parties, analysis, evaluation and strategic decision-making ($H1=0.748$). Particularly valuable is their participation in the entire process of creating the new project, offering ideas, constructive proposals, conducting tests, providing material or non-material resources for development and creation of offers. In the conditions of digitization of processes, when information is easily accessible, the joint activity of the company with the interested parties is a factor for popularizing the environmental, social aspects of the proposed projects/objects, image, reputation, history of the company, which is a factor for attracting customers. Criticisms, suggestions, comments or expressed wishes from interested parties can be easily received and quickly used to implement changes.

The company with its activity (project/idea, design, production - used resources, technologies, consumption, waste management and re-treatment of secondary materials) affects society as a whole and the natural environment. That is why a central place in the company's digital strategy is occupied by the problem of analysis and strategic management of the product life cycle (cradle to cradle), which allows a comprehensive study of opportunities to improve technologies, products, and processes with the help of information resources and by consider their interoperability with other complementary platforms ($H2=0.812$).

An important starting point in this activity is the eco-design of production processes, products, and services, in which the social and environmental requirements and norms for the product created at each stage of

the general production are determined, which must be observed by the other participants (suppliers, contractors of individual nodes, details). A sustainable construction project/object is the result of information modelling that integrates data related to cost estimation, time and creation of a product that lasts longer, is easier to reuse, repair and recycle and includes as many recycled materials as possible.

The creation of individual offers, the development of new forms of consumption based on information causes a transformation and major changes in market communication and relationships that disrupt the traditional sources of company advantages (the material resources valued by the profit received) and at the same time create fundamentally new sources of value. The success of a company today is primarily a function, not simply of the investments made, but of investments aimed at improving organizational processes and the creation of additional value through the exchange of data, information and knowledge, especially within the vertical supply chain.

The digital business strategy stimulates the construction of specific, unique connections, relations between companies participating in strategic alliances, allows development of their own resources, access to different, new markets, including territorial ones, creation of new business models for management, which is factor for higher reputation and stabilization and/or expansion of market positions ($H3=0.796$). The creation of different pooling models expands production and, by definition, allows firms to realize economies of scale. The rich database, cloud services provided facilitate access to other digital resources (software, infrastructure, and platform resources), increase the network effect (more and more users and companies use e-mail, social media, which increases the value of the product), support the activity of the chains for supply, marketing and service operations as well as other functional areas. All these technological innovations facilitate and reduce costs and time for reconfiguration and adaptation of resources and competences, which is a strategic factor for the company.

One of the key features of a digital business strategy is the creation of a new organizational capability to design, structure and manage networks of interconnected firms based on long-term cooperation that are wider than traditional supply chains (or the so-called extended firm). These networks include scientific research units, laboratories, universities, recycling companies, direct and indirect stakeholders that provide useful information for the development of additional capabilities, beyond the internal, own capabilities of the company. The end results are improvement in customer service, reduction of material stocks, optimization of technologies, closing the cycle, offering a better eco-product, reducing harmful environmental impacts, improving social relations, and ultimately building competitive advantages for companies- participants and performance.

Problems and their successful solution are the result of joint work based on used digital resources, exchange of information, training, transfer, integration of knowledge, search for better new configurations of resources, which strengthens trust and the tendency to undertake new joint commitments. This gives incentives to expand the scope, speed, efficiency of the digital company process.

IV. CONCLUSION

Creation of a sustainable project and sustainable development of the construction company can be facilitated by the development and application of information and communication technologies that change the world of business and lead to global connectivity (the Internet and the mobile network), which determines the purpose of the study - an assessment of the role and influence of the digital strategy in realizing these goals. In the new conditions, the strategy related to the digitalization of the company recognizes the role and importance of the dissemination of digital resources and technologies, of training and the transfer of knowledge to develop a sustainable strategy that allows creating, offering, and obtaining additional value for customers, the company and society.

Digital business strategy is not only a matter of internal optimization of company operations, but also of strategic behaviour, the result of monitoring the dynamics of the external environment, analysing information, and making decisions about change and adaptation. According to the author, the digital business strategy develops in three main directions - digitization of relationships with stakeholders, digitization of company processes, operations and reconfiguration of resources, and digitization of relations with related companies, which is a strong factor in creating a successful sustainable construction project/object.

Digitization facilitates the participation of all stakeholders in the process of creating the new project, offering ideas, constructive proposals, providing offers, intangible resources (knowledge, experience), which is a factor for popularizing the environmental, social aspects of the proposed projects/objects and attract customers.

Digitization of company operations provides a complete picture and complex analysis of the product life cycle (from cradle to cradle), which stimulates innovation, shortens development and implementation time, and increases productivity. The system is an effective way to integrate and collaborate with the entire team, as each participant receives the necessary data from the very beginning, which reduces errors, unnecessary changes, transaction costs, asymmetry and loss of information that traditionally occur in the vertical chain. The

accelerated process of digitization in all aspects of business activities requires the creation of digital networks that provide flexible restructuring of relations between partners and suppliers, coordination with the actions of companies creating complementary products and services. Digital inter-firm platforms reveal new organizational capabilities for co-design, structuring, management, and additional opportunities to build inter-firm competitive advantages.

The advantages of the digital business strategy make it possible to develop and creation in practice a sustainable construction project/object that implicitly includes, combines in itself all the stated main characteristics. The development of information and communication technologies, the digitization of processes and company operations are equally accessible and lead to global connectivity, both large and small companies, established and start-up companies, and regardless of the specifics of the market, where they work.

In recent years, there has been an exponential increase in the volume of generation, collection, analysis, and exchange of and information as a result of technological innovations (Internet of Things, smartphones, computing areas, large databases, freely available data, etc.), which is a factor for increasing the competitiveness of the company. If until now, the company was often defined as irrational because it had a limited amount of information, and/or made decisions based on incomplete and often low-quality, misleading data, with an expired deadline, now there is an abundance of information and data provided ready for analysis. This is an opportunity to develop and implement a digital business strategy and make rational management decisions aimed at working together with stakeholders (from start to finish), creating multifunctional teams, applying integrated design principles, sustainable consumption of resources, eco- innovations in sustainable products, circular production, and consumption, decarbonization of construction, which ultimately means creating a sustainable project/object.

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