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**Article**

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## The competitive advantages in the construction industry - a theoretical approach

Vlad LEONTIE\*

### Abstract

*Because the construction industry is widely viewed as the engine that drives economies around the world, understanding how companies achieve their competitive advantages through innovation, the use of information technologies, strategies, business models, or human resources is vital. The current paper aims to identify and categorize the types of competitive advantages that exist, ranging from pure technological advantages such as information storage, coordination, and electronic communication to organizational and management advantages. In terms of methodological approach, performing a quality analysis of the existent literature regarding competitive advantages consists the best tool due to its wide spectrum of gathering the data. The research will be structured in 3 steps, respectively problem formulation, gathering of the data and title, abstract and full-text review. A complex perspective of the competitive advantages can be therefore obtained which can be a valuable asset in helping a construction enterprise in selecting its long-time strategy for becoming more competitive, efficient and sustainable. Through the main findings, innovation, usage of the informational technologies, initial conditions, environment understanding, safety culture or management practices of the human resources can be counted.*

**Keywords:** competitive advantage, construction industry, innovations, sustainability

### Introduction

As Porter himself mentions in his book "Competitive Advantage" (Porter, 1985), the notion of competitive advantage resonates with the concept of value chain, respectively the general framework of strategic thinking in which a company's activities produce relative costs and differentiation. The path to profit is defined by Porter as being the difference between what the buyer is willing to pay for a product or service and the cost of performing that activity.

Thus, the customer of the construction sector and his needs occupy a central position in the front industry, being the one who is willing to pay the price of the product or service. At the same time, the activities within the construction value chain are the basic tools to be able to examine the

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competitive advantages or disadvantages (Porter, 1985). For the sustainable development of the companies and of the present sector, sustainability plays an important role, and the long-term goal becomes the sustainable competitive advantage. These sources and roots are directly related to the notions of cost and differentiation that can explain the key differences between firms in a competitive environment.

Competitive advantages are generated from a multitude of sources and among them, the way of connecting and coupling the different activities within a company, the types of relationship between them and the connections with suppliers and customers may be counted (Porter, 1985). By implementing the right strategies, a firm can move faster towards the reduced cost and increased products value path, which leads in a later step to profit.

Understanding and determining the sources of competitive advantage is the solution for companies in the construction industry to exceed the performance of competitors in the field. Gaining and creating competitive advantage by using information technologies is becoming increasingly important in a rapidly changing and transitioning industry, which still has a strong "traditional" character. The construction market is extremely large, with a variety of actors and a high level of competition (Bellochi and Travaglini, 2021), so the effects produced by existing technologies are a source of value.

Competitive advantages are generated by the extra value that a company can produce for its customers. It can take the form of prices, premium products or timesaving construction. The competitive strategy that any entity adopts is one of the basic pillars of success, which carefully chosen and regulated can lead to economic prosperity. The latter is the pursuit of a competitive position within the industry and aims at profitability and sustainability against the forces exerted by competitors (Porter, 1985).

## Methods

In terms of methodological approach, performing a quality analysis of the existent literature regarding competitive advantages consists the best tool due to its wide spectrum of gathering the data. The research will be structured in three steps, respectively problem formulation, gathering of the data and title, abstract and full-text review.

The research problem has been carefully formulated and it is represented by the determination of the different competitive advantages, which exist in the construction industry. The gathering of the data took place using search strings applied on two different databases: Google Scholar and Science Direct.

The search strings included the following terms: “competitive advantages” and “construction sector” or “construction industry” and the subsequent criteria were included when performing the research:

- All articles must be written in English;
- The results of bachelor and master thesis research have not been used;
- The time frame spanned between 1980-present.

After applying the search strings on the above-mentioned databases, the author firstly conducted a title and abstract analysis, followed up by a whole text analysis, depending on how appropriate the topic was. Following these steps, the main competitive advantages have been firstly gathered and afterwards categorized.

Before starting with the 3 steps analysis, a prior vision of the construction value chain is required, to observe the complicated construction industry, to understand its complexity and its relationships between the actors. Therefore, the first prerequisite is the presentation of the construction value chain.

### **Construction value chain**

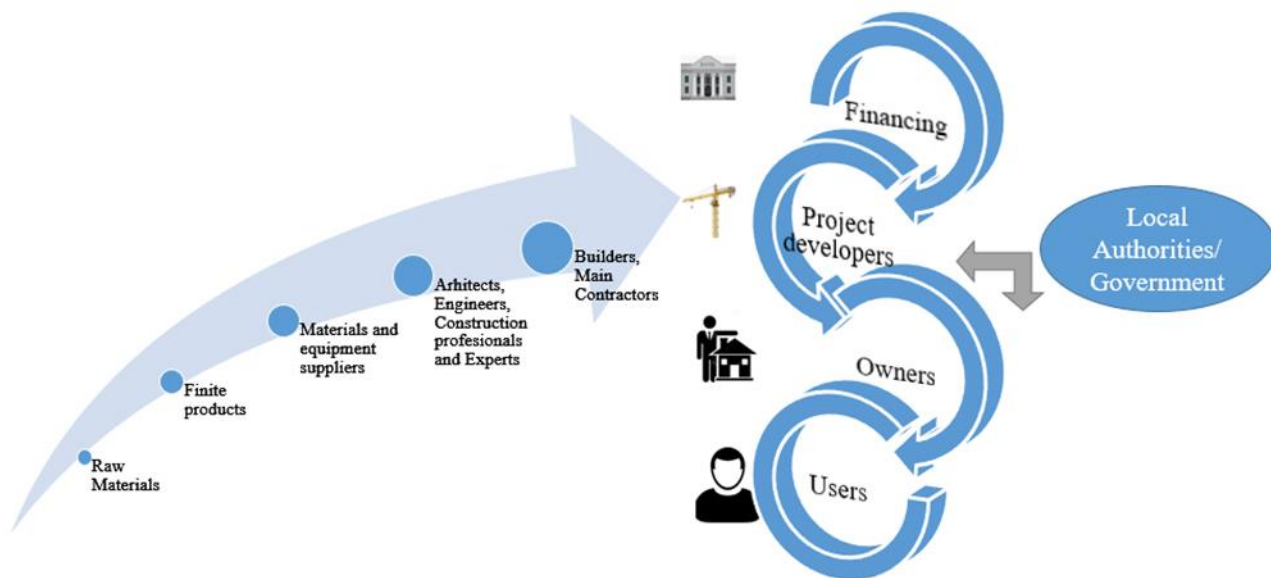
Construction projects differ considerably based on their location and category, such as residential, non-residential, civil engineering, and renovation projects. They also vary in scope, from small projects to giant structures (such as infrastructure), and are subject to national and international laws, regulations, and conditions. As such, the specific contexts of construction projects have a major impact on the requirements, composition and significance of the different stages and the different participants in the value chains (International Finance Corporation/World Bank Group, 2021).

The value chain of any construction project consists of a variety of different stages within a fixed framework that includes the design, production and conversion of raw construction materials into finished manufacturing products that are embedded in the actual construction. Each of these stages contains its own processes, its own actors and specific interrelationships. This, combined with all the complex relationships between the stages and the nature of the links in the construction value chain, reveals the fragmentation of the current construction industry (International Finance Corporation/World Bank Group, 2021).

From the outset, one can see the central role that information technology plays in acting as a link between customer specifications, needs and the nature of each construction project. Figure 1 depicts a complex value chain of constructions, with the main actors identified as financiers,

developers, owners and consumers; the whole process is governed by local authorities and the national and international legal framework governing the construction industry. It should be noted that Figure 1 is representative for the value chain of the new construction projects or renovations. In the demolition or decommissioning of old buildings or constructions, although they also belong to the construction industry, the value chain takes a different shape. The deconstruction process appears after 20-100 years, the participants are made up of other entities, the necessary set of activities has other links and other features compared to the new construction process. In addition, the entire line of raw materials, their processing, their supply and consultation with specialized personnel disappears (Chen *et al.*, 2020).

**Figure 1. Construction value chain**



Source: International Finance Corporation/World Bank Group, 2021

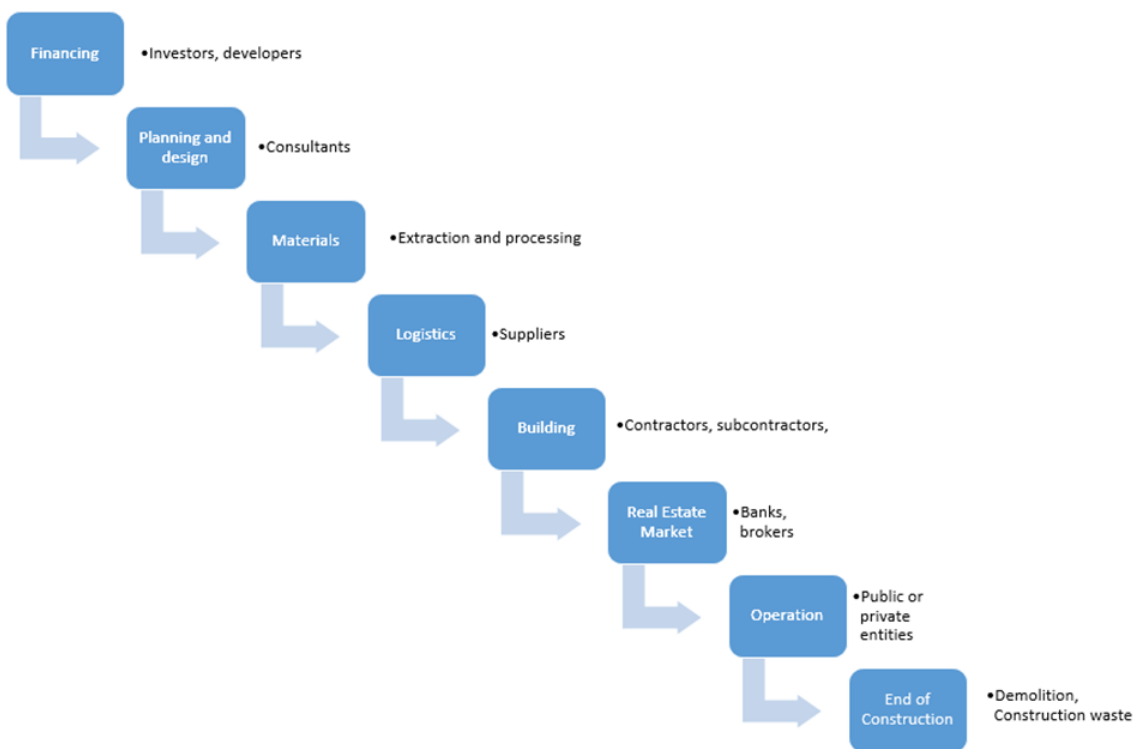
A specific need of the current sector is to use ecological materials, which are at the same time environment friendly and sustainable in order to achieve substantial Green House emissions reductions up to 2052 (European Commission-Green Deal, 2021).

The whole construction Value Chain takes place under the umbrella of the European Green Deal (European Commission-Green Deal, 2021) and under the Sustainable Development Goals of the United Nations. The Goal number 9 is focused exclusively on industries, innovation and infrastructure, the construction industry being impacted by it. Through its main targets, the development of resilient infrastructure to support economic development, and the promotion of sustainable industrialization up to 2030 may be mentioned. At the same time, the Sustainable

Development Goals target to increase the access of the small industrial enterprises to financing, to increase the scientific research, and to upgrade the technological capabilities encouraging innovation. The support for domestic technology development and research in developing countries is high, and all these may be obtained through the ensuring of a proper political environment. In order to create a sustainable infrastructure and industry by 2030, the countries will need to increase resource efficiency and adopt clean and environmentally sound technologies and industrial processes (UN, 2020).

Also, an interesting and complex representation, in the form of a linear sequence of the value chain of constructions is provided by the experts of One Planet Organization (Network Task Group, 2020) as can be seen in Figure 2.

**Figure 2. Construction value chain and its steps**



Source: Network Task Group, 2020

It should be noted that some stages may vary, may occur simultaneously or may be slightly delayed, as is the case with the construction and real estate market stages. The number and complexity of the processes together with the participants in the whole construction process reach high values and they can be spread in different parts of the world (marble extraction takes place in India, processing in China, supply in the Netherlands, use in the construction process in Bulgaria).

A special role along the value chain of constructions is the consumption of natural resources necessary for the realization of any construction of any kind. A strong connection between building materials, natural resources and environmental impact can be seen from the outset.

The building materials used in construction are obtained using combined natural resources such as iron which is produced from the combination of iron ore, carbon and energy (Network Task Group, 2020). The building materials of particular relevance to the construction industry are concrete, cement, asphalt / bitumen, metals, glass, chemicals and wood. It should be noted that in the European construction industry, the slope and direction of the industry towards low CO<sub>2</sub> consumption (European Commission - Co<sub>2</sub>, 2011), reduced emissions and greenhouse gases (European Commission, 2012) lead to a major switch in the use of construction materials.

Natural resources are used to a large extent in the value chain of constructions, throughout several stages and processes. However, their most frequent uses are found in the processes of production of building materials, construction and during the period of operation of the building. Among the most common resources in the value chain of construction land, water, minerals and fossil fuels may be counted (Network Task Group, 2020). The land is needed for the manufacturing and extraction of materials, while in the same time can serve as a site for the new building. Water is an indispensable element of the construction industry, with 25% of drinking water being absorbed by the construction industry (Network Task Group, 2020). From the metals, about 10% of the global extraction is used for the construction industry (IRP, 2016).

The impact on the environment is major and the way natural resources are exploited must be as minimally invasive as possible for the environment and their use to reach the sustainable side. Greenhouse gas pollution and emissions are among the most documented effects on the environment. Also, deforestation and huge water consumption lead to major deficits over time of these resources if not properly exploited (IRP, 2016).

The value chain of constructions is shaped by a series of factors (drivers) that influence the behavior of participants and actors involved in the construction industry. These drivers can intervene at any stage and can make a strong positive contribution. Among the main drivers that influence the value chain, we can list:

- Demography - population growth, urbanization or depopulation (Network Task Group, 2020);
- Real estate market forces - property price, level of lending and indebtedness, opportunities (UNEP, 2019);
- Environment - natural resources, ecosystem of services, biodiversity (IRP, 2016);

- Fiscal policy - the regulatory system and incentives from governments (Network Task Group, 2020);
- Infrastructure - roads, ports and communication and energy systems (OECD, 2018);
- Policies and standards - Taxes, their level, construction, safety and financial rules (UNEP, 2019);
- Socio-cultural character of the region - the social values that determine a certain time of consumer behavior (OECD, 2018);
- Technologies - research and developments in the sector, innovations, information flow (Network Task Group, 2020).

Since there are countless activities involved in construction throughout the construction process, as well as a variety of actors involved, it is important to comprehend the value chain of construction so that those “optimizations” which can be synonymous with competitive advantages can be observed.

### **Types of competitive advantages in the construction industry**

After introducing the search strings: “competitive advantages” and “construction industry” to be included in the title of the papers from Google Scholar Database, 82 articles were found. After restraining the searched period, from 1980 up to present, only 71 papers remained and after removing the citations, only 45 works have been selected. These remained works were analysed using, title, abstract and full text review.

After introducing “competitive advantages” and “construction sector” to be searched for in the titles of Google scholar database, starting from 1980 to present, 24 papers remained. After removing the citations, only 9 papers remained.

When using the Science Direct database, after introducing “competitive advantages” and “construction industry” as research strings to be included in the title, abstract or keywords, a number of 72 research papers in the time frame from 1980 up to present, were found. After including “competitive advantages” and “construction sector”, a totally of 47 research papers came out. All these findings were analysed and finally, a number of 23 papers offered consistent results.

The main purpose of any strategy of a company is to create a competitive advantage over the competitors in the guild and to maintain it. To understand this, the competitive advantage can usually be obtained from two basic sources:

- Lower cost than competitors;
- The ability to order a premium price.



The firm must find a different position from its rivals, insofar as imitation or copying ensures the disappearance of competitive advantage and leads to mediocrity (Ngowi and Rwelamila, 1999). The strategy of the companies defines the inter-relationship of the activities and how they are configured, the competitive advantage having its source from the capacity to perform certain activities at a lower collective cost than that of the competitors. Another source also arises from the mastery of creating superior value for a product or service through the unique performance of an activity. (Porter, 1985).

Among the reasons that lead to a competitive advantage, the initial conditions and managerial decisions can be listed. The initial conditions may include pre-existing reputation, well-regulated activities within the own value chain and existing links formed (suppliers, customers). These conditions have their origin either in the company or in the environment in which it operates (Ngowi and Rwelamila, 1999).

Managerial decisions define the concept of competitiveness within the company and configure its spectrum of activities. They are of great importance in that the skill of the company and the skills that have been “passed on / inherited” and may or may not be valuable in the competitive context. A multitude of skills, knowledge and resources are nothing if they are not necessary for the existing competitive environment. Therefore, first, understanding the environment in which a company operates is an essential element for a company to obtain a favourable position compared to competitors (Porter, 1996).

In the case of the construction industry, the value chain is extremely complicated and the development time of a typical construction project is particularly long. Whether it is in the field of extraction and processing of materials or in the field of actual construction, any company that gains a competitive advantage must continually improve it in order to be able to constantly take advantage of it.

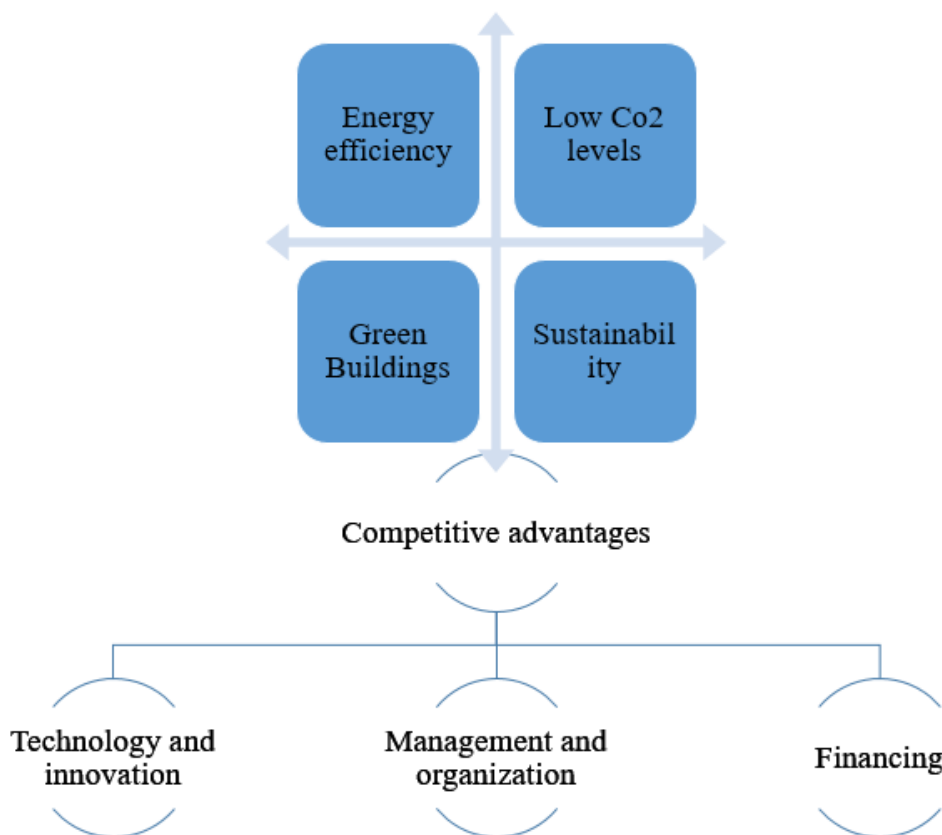
A prerequisite for sustaining a competitive advantage is the global approach of any firm (offering services anywhere in the world under its own brand) (Porter, 1990). Approaching a global strategy can lead to long-term profitability and growth. Companies that have an integrated global view and approach the whole globe as a single market perceive national borders as just an artificial demarcation (Abdul-Aziz and Abdul-Rashid, 1994).

As it can be seen on figure 3, the competitive advantages in the construction industry have their sources in the following elements (Ngowi and Rwelamila, 1999): technology and innovation (owning one or more special technologies that can make a difference (Strassmann, 1988; Afraz *et al.*, 2021), management and organization (the way the activities are coordinated and coagulated - an example of this would be a contractor who has a computer program to control time, materials and subcontractors, (Afraz *et al.*, 2021) and financing (obtaining financing can be a competitive advantage, especially in

developing countries, companies that prepare the most attractive financing proposals may obtain a favourable position (Soubra, 1989).

These benefits, on the other hand, do not independently develop the sustainable side that is needed to achieve that long-term plus. They are based on resources that are scarce and difficult to reproduce, but at some point in time, a similar technology may be developed or a company may obtain funding. Often, companies that want to make a profit group together in strategic alliances and access financing programs to obtain the necessary resources (Ngowi and Rwelamila, 1999).

**Figure 3. Sources of competitive advantages in the construction industry**



Source: Ngowi and Rwelamila, 1999

Thus, in order to sustain the long-term competitive advantage, companies need to develop organizational structures capable of producing rapid innovations. Several authors have argued over time that organizational routines can create sustainable competitive advantages, such as Barney (1992) or Peteraf (1993).

The European construction sector is currently changing, being subjected to the legal framework and European policies pushing for energy efficiency, green buildings (European Commission-Zero

pollution plan, 2021), low CO<sub>2</sub> levels (European Commission - Co<sub>2</sub>, 2011), security, digitization (European Commission, 19/02/2020) and sustainability (European Commission-Green Deal, 2021). Given this context, the question of how one entity might outperform another in terms of performance arises. Choosing a strategy is often insufficient and directing companies to new technologies is imperative in order to develop a sustainable competitive advantage (Marichova, 2013).

Large companies (with over 250 employees) in the construction industry account for about 20% of European turnover, while small and medium-sized companies account for about 80% (Allianz and Euler Hermes, 2020). The European construction market in terms of construction companies is divided into 4 areas of activity: civil engineering (18.6% of total investment), non-residential construction (31.6%), residential (21.6%) and rehabilitation and maintenance (28.6%) (FIEC - European Construction Industry Federation, 2020). Along these spheres, the percentage of firms varies according to the number of employees, reaching that in large civil engineering projects, about 45% of companies are large entities (Allianz and Euler Hermes, 2020). Representing a high percentage, companies with specialized goods, high-performance finished products and high fixed costs impose very high barriers to entry, gaining competitive advantages from high uses of information and digital technologies, good management qualities, high human and capital resources, and through economies of scale.

In addition, another source of competitive advantage is the reputation of the company, the tradition and the image of the companies. Enterprises such as Bilfinger und Berger – founded in 1880, Strabag in 1835 or Hochtief in 1875 all from Germany, have their roots deeply rooted in the building industry (Marichova, 2013).

Where a relatively high number of large companies are found, the oligopoly appears. In the sub-market of civil engineering works, this character of the market appears, and the company's strategy becomes a determining factor in obtaining profit. The two possibilities that most large companies adopt are either coming in groups to get more profit or developing an aggressive competitive character. That is why every company must carefully weigh its position regarding the two competitive forces: competition with rivals or cooperation. Partial agreements for profit maximization are quite common in these types of markets (Marichova, 2013). The public sector is one of the main customers of this construction sub-sector and it can boost competitiveness by achieving the optimal combination of resource use, technology and social benefits.

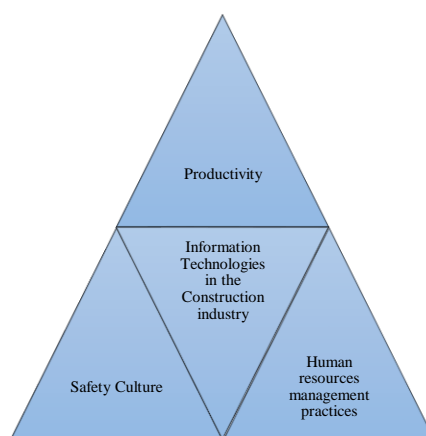
Another type of competitive advantage that can be obtained in the construction industry is that which comes from human resource management practices that support the development of skills and motivation of employees (Widyanty and Mahfudz, 2020). The results of these types of practices lead to high productivity and creativity and improved performance can be recorded. Human resource

management practices can be defined as the set of practices of a well-defined strategy, designed to attract, develop, motivate and retain employees for them to perform services to achieve the company's objectives (Widyanty and Mahfudz, 2020). Over time, researchers have shown that human resource management practices within a company can positively influence turnover (Gutherie and Datta, 2004), labor and business productivity, and financial performance (Huselid, 1995). The results of these studies indicate that these practices are sources of competitive advantage and that human resources can add value to the organization. They cannot be copied or reproduced and are therefore one of the main contributors to success. Investing in this resource increases the skills, awareness and commitment to the firm, which reduces the chances of them being replicated (Huselid, 1995).

Safety culture is a concept that describes the atmosphere inside a company where safety is understood and assimilated, being the primary property in obtaining the competitive advantage (Widyanty and Mahfudz, 2020). The construction sector is at high risk from the point of view of safety at work and for this reason, the culture of safety at work is an important aspect that helps to prevent risks and dangers. The implementation of various information technologies such as sensors (Smart cap or Blackberry Radar) connected to the Internet of Things leads to a safe climate that can create value for construction companies. This creates a secure environment that influences job satisfaction and commitment to the company and thus a transition to high efficiency and productivity is ensured (Randhawa and Kaur, 2014).

Productivity is defined as the relationship between input and output, respectively the ratio between results and sacrifice (Kale, 2016). High productivity aims for improved efficiency, which is reflected in the production of goods and services. It is thus a way to maximize the use of existing resources, including human capital, and can produce long-term competitive advantages (Widyanty and Mahfudz, 2020). One of the most common ways to increase productivity, efficiency and quality is to use digital technologies such as BIM, the Internet of Things, sensors or drones. They have a huge potential to increase the performance of any construction project and by using them, an increased work efficiency can be observed (European Construction Sector Observatory, 2021). The implementation and adoption of these digital media and the transition to digitalization of a rigid, traditional, strong sector locked in old patterns of work organization and processes can be the path to high productivity in the sector. A firm can also increase its competitiveness by increasing productivity and thus adding value to its products and services (Widyanty and Mahfudz, 2020). In the triangle of productivity, safety culture and human resource management practices, information technologies play a decisive role, as it can be seen in figure 4.

**Figure 4. The role of the different information technologies in the different competitive advantages sources**



Source: author's representation

In terms of resource management practices, the use of information technology has a positive effect on attracting labour as far as any employee wants to work in a more efficient environment, where he has the chance to develop his skills. Employee motivation also occurs when the individual uses high-performance software and hardware based on digital tools to carry out their work. Thus, an eloquent example is the site manager who has to prepare the necessary materials for different stages in a construction project: he does not have to travel in the field to keep track of materials and equipment, but with the help of drones, his work it is visibly facilitated.

Technological innovation is one of the main forces in the competition acting as a catalyst in those companies that implement it and over time can change the laws of competition (Răilean, 2011). Innovation is achieved by transforming knowledge into economic and social benefits because of complex interactions between a multitude of participants in the construction value chain, such as companies, research institutes, governments and local authorities.

A study of Nicolescu *et al.* (2010) in the White Paper on SMEs in Romania shows that in the domestic construction sector, the main competitive advantages of small and medium enterprises identified inside the industry are: quality of services (over 50% of participants), price/quality ratio (43%), low price of products or services (26.37%) and reputation.

Technological innovation and technology implementation are one of the main sources of competitive advantage, which is also confirmed by Răilean (2011) and Gumba *et al.* (2021). This is the pillar of the differentiation strategy, which is one of the two basic methods of obtaining competitive advantage (differentiation or cost (Porter, 1985)). Construction projects are becoming more and more voluminous and detailed in terms of information and their management can be made

easier by using information and computer technologies. Thus, steps such as design, planning and construction can be easily monitored and streamlined. The speed and accuracy of work is increasing and digital tools such as BIM or the Internet of Things (IoT) provide clear answers to current industry problems. The general European context also pushes for digitization and automation, the common goal being the development of energy-efficient, self-regulating buildings capable of self-regulation in terms of energy and resource consumption (Center for Digital Technology and Management München, 2018). Investing in innovation is risky, especially for small and medium-sized companies, because of the financial requirements, but the profitability over time is far superior to current investments. Also, a more competitive position of the company can be obtained and both the costs and the quality have to be gained.

Sustainability is a complex concept that manages to combine different spheres of human life and activities, in order to achieve a well-proportioned relationship between economic, social and environmental. This is a crucial element in the construction sector as it can provide a concrete solution between the above-mentioned issues. A high degree of fragmentation in this sector due to the variety of subcontractors existing in the projects, the fact that construction is responsible for more than 1/3 of the world's waste and produces more than 35% of spherical gases are just some of the peculiarities that the construction industry needs to take into account in order to be sustainable (Liu, 2020). Sustainable construction is a real source of competitive advantage and in the construction industry, the following elements of sustainable development can be observed (Liu, 2020):

- Economic (life cycle costs, low operating costs, nature and greening of spaces);
- Environment (limited use of raw materials and natural resources, protection of the ecosystem);
- Society (improved quality of life, safe work environment).

Sustainable construction can be defined as the process that is carried out using the basic objectives of sustainable development presented above. Project management faces various obstacles in its implementation process and the application of green building standards becomes part of the company's marketing strategy. Green Buildings is a new stage in the development of construction technologies and for these, a number of European standards have been developed: BREEAM (Building Research Establishment's Environmental Assessment Method), LEED (Leadership in Energy and Environmental Design) or DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen) (Liu, 2020). All these standards regulate a multitude of aspects related to construction and various environmental aspects such as energy, transport, water, material and resources, air quality and innovation.

The COVID-19 disease challenged several sectors and areas of the industry. Because of the pandemic, nations, regions, and localities have implemented lockdowns and restrictions regarding human movement in order to slow the spread of the disease. It is not surprising that the authorities imposed restrictive measures on such an important industry as construction, resulting in the postponement, delaying, or cancellation of current projects. In addition to the negative aspects brought by pandemics, there have also been a number of positive ones. Several competitive advantages in overcoming the pandemic challenges have been spotted in the studies of Leontie *et al.*, (2022) through them digitalization or increased technology usage being counted. Turning on to digital is one of the main competitive advantages, which exists nowadays, and along with technology usage, could change the whole face of the industry (Foracel *et al.*, 2020).

The main findings of the current section may be seen in Table 1, which summarises the main findings in an easy accessible and understandable manner.

**Table 1. Main competitive advantages in the construction industry**

Categories of competitive advantages	Source
<b>Technology and Innovation</b>	(Strassmann, 1988)
Producer of rapid innovations	(Ngowi and Rwelamila, 1999)
Safety culture through usage of digital technologies as smart cap or Blackberry Radar	(Widyanty and Mahfudz, 2020)
Productivity through usage of the latest technologies	(European Construction Sector Observatory, 2021)
Technological innovation and technology implementation	(Răilean, 2011)
<b>Management and Organization</b>	(Ngowi and Rwelamila, 1999)
Development of organizational structures capable of producing innovation	(Ngowi and Rwelamila, 1999), (Afraz <i>et. al</i> , 2021)
Activities control and management- organizational routines	(Barney, 1992)
Forming strategic alliances between companies	(Marichova, 2013)
Human resources management practices as: investment in the skills, trainings, improving the commitment of the employees to the firm	(Widyanty and Mahfudz, 2020) and (Huselid, 1995)
Safety culture	(Widyanty and Mahfudz, 2020)
Sustainable construction	(Liu, 2020)
<b>Financing</b>	(Soubra, 1989)
Finding funding for specific projects	(Soubra, 1989)
Big companies have resources and invest in the use of digital technologies	(Widyanty and Mahfudz, 2020)
<b>Size of the entity</b>	(Allianz and Euler Hermes, 2020)
Large companies impose high entry conditions	(Allianz and Euler Hermes, 2020)
Large companies create oligopoly in specific market segments	(Marichova, 2013)
Reputation	(Nicolescu <i>et al.</i> , 2010)

## Discussion

Determination and identification of the competitive advantages, which exist in the construction sector, is the main goal of the current research. Choosing the proper practices to obtain competitive advantages helps in setting the long-term strategy for the companies, which can lead to profitability and efficiency.

The construction process is extremely complicated and the number of actors and processes, which are required to build a structure, reach high levels. Porter himself states in his book "Competitive Advantage" that the notion of competitive advantage resonates with that of the value chain: the framework of strategic thinking under which a company's activities produce relative costs and differentiation (Porter, 1985). In order to understand and observe better the competitive advantages, respectively the points along the value chain where they might arise, an analysis of the construction value chain has been performed.

Depending on their location and category, construction projects can be divided into residential, non-residential, civil engineering, or renovation projects. As well as varying in scope, they can be small projects or giant structures (like infrastructure), and are subject to national and international laws, regulations, and conditions. Thus, the specific contexts of construction projects have a major impact on the requirements, composition and significance of the various stages and participants in the value chains. The location plays an essential role in the case of the construction industry and depending on it, several competitive advantages can emerge as finding financing (especially in the developing countries) or human resources existence. At the same time, depending on location, activity sector and type of construction project, the structure of the construction market triggers several competitive advantages, which apply only to the big entities, such as creating alliances or the creation of oligopoly. For a small company trying to penetrate a new construction subsector, competitive disadvantages appear, as finding high entry conditions or the lack of reputation.

Located in an environment regulated by local authorities, governments and national and international legislation frameworks, the construction value chain includes four types of actors: financiers, developers, users, and owners. The construction process consists of several steps and involves the conversion of raw materials into finite products, which are then assembled into complex structures by builders under the supervision of field professionals.

A number of factors (drivers) shape the value chain of the construction industry, which influences the behaviour of participants and actors. Demography, real estate market forces,



environment, policies, infrastructure or technologies are among these drivers. Regardless of the stage, they can make a significant positive contribution.

Through the general competitive advantages, which can be obtained, cost advantage or differentiation can be counted. They must be implemented in the firm strategy on the long term and represents the capacity of either building with lower cost or building premium assets which other competitors are not able to produce.

In the complicated value chain of constructions, the initial conditions and the managerial decisions play a specific role. Through initial conditions items like pre-existing reputation, existing links between suppliers or pre-defined processes can be mentioned.

As shown in Table 1, construction companies can obtain specific competitive advantages by acting in the construction industry that fall into four categories. Technology and Innovation, Management and Organization, Financing and Aspects depending on the size of the entity represent the four main categories, which had been found inside the construction industry.

In the current paradigm switch of the construction industry (Foracel *et al.*, 2020) technology and innovation through implementation and usage of the different digital technologies and assets plays a central role in terms of competitive advantage. Digitalization, along with its technologies and benefits can improve in a decisive manner the performances of the companies, especially in very difficult circumstances as pandemics or supply chain short comes (Leontie *et al.*, 2022). The management and organization of the companies, respectively their strategies are of essential importance and through human resources practices, safety culture or sustainable constructions several competitive advantages can be obtain. The financing item becomes essential in the developing countries and the one who is able to find resources for building a project definitely gains an advantage.

## Conclusions

Based on quality analysis of the specialized existing literature, the identification of the main types of competitive advantages that exist within the construction sector was realized. A presentation of the construction value chain has been drawn up as far as its knowledge constitutes a genuine source of competitive advantage. Understanding it is also essential because from the multitude of activities, processes and actors, the interrelationship between them can generate additional value and potential optimizations can take place.

The sources that generate competitive advantages in the construction industry are multiple, starting from initial conditions such as reputation or existing ties formed, to financing or management and organization. The identified competitive advantages are also numerous, starting from the

company's strategy, high utilization of information technologies or human resources management practices, to productivity, technological innovation and sustainable constructions.

A classification of the competitive advantages was conducted and four different categories have been identified: Technology and Innovation, Management and Organization, Financing and Size of the Entity.

Choosing the construction enterprise's long-term strategy for becoming more efficient, sustainable, and competitive represents indeed a difficult task, for which the current study tries to offer solutions. In the first step, the size of the entity is important along with its region where it is active. Depending on these two variables, the proper strategy should be carefully chosen. General findings, which apply to all companies of all construction industry's subsectors, are represented by the several competitive advantages, which emerge, from digitalization and the usage of the existing technologies in the sector. At the same time, competitive advantages as safety culture, development of organizational structures, which are able to produce innovations and technological improvements, offer various benefits and attract at the same time the human resources from the field.

Several of the competitive advantages identified in the specialized literature highlighted the central and extremely valuable role that information technologies occupy in the construction industry, especially in the context of the current European construction industry that offers green, energy efficient buildings built with low CO2 emissions.

## References

- Abdul-Aziz, A.R. (1994), Global strategies: a comparison between Japanese and American construction firms, *Construction Management and Economics*, 12, pp, 473-484.
- Afraz, M., Bhatti, S.H., Ferraris, A., Couturier, J. (2021), The impact of supply chain innovation on competitive advantage in the construction industry: Evidence from a moderated multi-mediation model, *Technological Forecasting and Social Change*, 162, 120370. <https://doi.org/10.1016/j.techfore.2020.120370>
- Allianz and Euler Hermes (2020), *Construction companies in Europe: Size does matter*, Germany: Allianz and Euler Hermes.
- Aripin, I.D.M., Zawawi, E.M.A., Zulhabri I. (2019), Factors influencing the implementation of technologies behind industry 4.0 in the Malaysian construction industry, *MATEC Web of Conferences*, 266, 01006. DOI: <https://doi.org/10.1051/matecconf/201926601006>.

- Barney, J.B. (1992), Integrating organizational behaviour and strategy formulation research: A resource based Analysis, *Advances in Strategic Management*, 8, pp. 39-61.
- Bellochi, A. and Travaglini, G. (2021), *A quantitative analysis of the European Construction sector: Productivity, Investment and competitiveness*, Working paper, Fondazione Giuseppe Di Vittorio, Urbino Carlo Bo. University.
- Center for Digital Technology and Management München (2018), *The digital future of the construction industry*, Technische Universität München: Ludwig-Maximilian-Universität.
- Chen, T., Kim, H., Pan, S-Y., Tseng, P-C., Lin, Y., Chaiang, P., (2020), Implementation of green chemistry principles in circular economy system towards sustainable development goals: Challenges and perspectives, *Science of The Total Environment*, 716, 136998.
- EU BIM Taskgroup (2017), *Handbook for the introduction of Building Information Modelling by the European Public Sector - Strategic action for construction sector performance* (retrieved from [http://www.eubim.eu/downloads/EU\\_BIM\\_Task\\_Group\\_Handbook\\_FINAL.PDF](http://www.eubim.eu/downloads/EU_BIM_Task_Group_Handbook_FINAL.PDF)).
- European Commission (2011), *Roadmap for moving to a competitive low-carbon economy*, Brussels.
- European Commission, (2012), *Communication from the Commission to the European Parliament and the Council - Strategy for sustainable competitiveness of the construction sector and its enterprises*, Brussels.
- European Commission (2020), Official publication from 19/02/2020, *Shaping Europe's digital future*, Brussels.
- European Commission (2020), Official publication from 21/02/2020, *Circular Economy Principles for Buildings Design*, Brussels.
- European Commission-Green Deal (2021), *Energy performance of buildings directive* [Online] (retrieved from [https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive\\_en](https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en)).
- European Commission (2021), *Pathway to a Healthy Planet for All. EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'* (retrieved from <https://faolex.fao.org/docs/pdf/eur204204.pdf>).
- European Construction Sector Observatory (2021), *Digitalisation in the construction sector - Analytical Report*.
- European Parliament and the Council (2014), *Directive 2014/24/EU of the European Parliament and of the Council on public procurement and repealing directive 2004/18/EC*.

- European Parliament and the Council (2018), Directive (EU) 2018/844 of the European Parliament and of the Council amending Directive on the energy performance of buildings, *Official Journal of the European Union*, 05.
- European Union (2020), *Views on Construction 2020 and Beyond*, Analytical report.
- FIEC- European Construction Industry federation, Annual report (2020), *Construction activity in Europe*, edition 2020 (retrieved from <http://www.fiec.eu/en/library-619/annual-report-english.aspx> Accessed on 26.10.2022).
- Foracel E., Ferrari E., Opazo-Vega A., Puido-Arcas J., (2020), Construction 4.0: A Literature Review, *Sustainability*, 12(22), 9755. <https://doi.org/10.3390/su12229755>
- Gumba K., Belyantseva O. and Kochetova L., (2016), Justification of the sources of forming competitive advantages of underground construction companies under the production concentration conditions, *Procedia Engineering*, 165, pp. 1323-1327. <https://doi.org/10.1016/j.proeng.2016.11.858>.
- Gutherie, J. and Datta, D. (2004), *HRM and firm performance: peeling back the onion*, Academy of Management Meeting in New Orleans, USA.
- Huselid., M. (1995), The impact of human resource management practices on turnover, productivity, and corporate financial, *Academy of Management Journal*, 38(3), pp. 635-672.
- International Finance Corporation/World Bank Group (2021), *Construction industry value chain - how companies are using carbon pricing to address climate risk and find new opportunities*, Pennsylvania Avenue N.W.: IFC.
- IRP-UNEP International Resource Panel (2016), *Global Material Flows and Resource Productivity. An Assessment Study of the UNEP International Resource Panel*. H. Schandl, M. Fischer-Kowalski, J. West, S. Giljum, M. Dittrich, N. Eisenmenger, A. Geschke, M. Lieber, H. P. Wieland, A. Schaffartzik, F. Krausmann, S. Gierlinger, K. Hosking, M. Lenzen, H. Tanikawa, A. Miatto, and T. Fishman. Paris, United Nations Environment Programme.
- Kale, A. P. and Gawade. S. N. (2016), Studies on nanoparticle induced nutrient use efficiency of fertilizer and crop productivity, *Green Chemistry Technical Letter*, 2(2), 88-92.
- Leontie, V., Maha, L.-G. and Stoian, I.C. (2022), COVID-19 pandemic and its effects on the usage of information technologies in the construction industry: the case of Romania, *Buildings*, 12(2), 166. <https://doi.org/10.3390/buildings12020166>.
- Liu, Z.J., Pyplacz, P., Ermakova, M. and Konev, P. (2020), Sustainable Construction as competitive advantage, *Sustainability*, 12(15), 5946. <https://doi.org/10.3390/su12155946>

- Marichova, A. (2013), Competitive strategy and competitive advantage, *Ovidius University Annals Series: Civil Engineering*, 15, pp. 71-78.
- Network Task Group, I.-O. P. (2020), *Analysis of the construction value chain*, s.l.: International Resource Panel.
- Ngowi, A. B. and Rwelamila, P. D. (1999), What is a competitive advantage in the construction industry?, *Cost Engineering*, 41(2), 30–6.
- Nicolescu, O., Haiduc, I.C, Nancu, D., Maniu, A., Dragan, I.M., Nicolescu, C., Bara, O.B, Borcos, L.M. and Anghel, F. (2010), *The white book of SMEs in Romania*, Bucharest, Romania: Olimp Publishing House.
- OECD (2018), *Global Material Resources Outlook to 2060: Economic drivers and environmental Consequences*, Paris: OECD publishing.
- Peteraf, M. (1993), The Cornerstones of competitive advantage: a resource based view, *Strategic Management Journal*, 14, pp. 179-191.
- Porter, M. (1985), *Competitive Advantage creating and sustaining superior performance*, 2-nd Edition, with new introduction Hrsg. SUA, New York: The Free Press.
- Porter, M. (1990), *Competitive Advantage of Nations*, 1-st Hrsg. New York: Free Press.
- Porter, M. (1996), What is strategy?, *Harvard Business Review*, 11/12, pp. 61-78.
- Răilean, L. (2011), Ensuring competitive advantage in SMEs in the construction industry in Romania through technological innovation, *The Young Economists Journal*, 1(17), pp. 110-117.
- Randhawa, G. and Kaur, K. (2014), Organizational climate and its correlates: Review of Literature and a Proposed Model, *Journal of Management Research*, 14(1), pp. 25-40.
- Soubra, Y. (1989), The Construction and Engineering Design Services Sector: Some Trade and Development Aspects, *Journal of World Trade*, 23(1), pp. 97-124.
- Strassmann, W. (1988), *The United States. The Global Construction Industry*, London: Unwin Hyman.
- United Nations, (2020), *Sustainable Development Goals, Goal 9-Build resilient infrastructure, promote sustainable industrialization and foster innovation* (retrieved from <https://www.un.org/sustainabledevelopment/infrastructure-industrialization/>, accessed on 28.12.2022).
- UNEP (2019), *Sand and sustainability: Finding new solutions for environmental governance of global sand, resources*. GRID-Geneva, United Nations Environment Programme, Geneva, Switzerland

(retrieved from <https://www.unep.org/resources/emissions-gap-report-2019>, accessed on 28.12.2022).

Widyanty S., and Daito Mahfudz M. (2020), The effect of entrepreneurial orientation, use of information technology, and innovation capability on SMEs' competitive advantage and performance: evidence from Indonesia, *Diponegoro International Journal of Business*, 3(2), pp. 115-122.