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Critical Success Factors of the Project Management in Relation to Industry 4.0 for Sustainability of Projects

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Abstract: Sustainability has recently become a phenomenon; small and medium-sized enterprises (SMEs) are increasingly emphasizing the principles of sustainability in their corporate governance. They implement these changes through project management. The purpose of the paper is to determine the critical success factors in project management, as seen by the managers of Czech manufacturing enterprises, related to the most to the successful completion of the projects. We aim to analyze the relation of these success factors to Industry 4.0, Human Resources, and sustainability. We determined the possible interconnectedness of the critical success factors using correlation coefficients. Then, we compared them using the Mann-Whitney test with new corporate management trends. The results show that companies consider Leadership and Experiences, and Employees and Flexibility to be key factors in project management's success. The most important critical factor for the sustainability of projects focused on Industry 4.0 is the finances that decide the implementation of projects. The benefits of Industry 4.0 concerning sustainability have been identified in projects aimed at implementing new energy sources. In addition to the results obtained, the development of a methodology for evaluating Industry 4.0 projects' success concerning sustainability may be based on critical success factors in the future.

Keywords: project; management; manufacturing enterprises; Industry 4.0; critical success factors; human resources; sustainability

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1. Introduction

The current times of dynamic changes are called turbulent times. Based on the deviations' regulation, the classic approach of managing the corporate processes is no longer sufficient. A possible way to deal with it is related to the use of modern project management practices. Project management plays an essential role in many countries worldwide as a useful and efficient tool in planning and organizing processes, crisis management, and time management. Project management does not deal with routine, repetitive activities. The project's characteristic is its uniqueness, associated with a significant degree of uncertainty and risk. It is project management that has the prerequisites for managing such risk [1]. Effective project management is important for the successful accomplishment of many projects [2]. Focusing on the critical success factors enhance project management competencies [3,4]. Therefore, our motivation is to find out the most critical factors influencing the success of projects.

In the 1980s, Peters and Waterman [5] explored management's art and science with the critical success factor model (known as the McKinsey 7S Framework). Critical success factors are the crucial attributes and variables which influence the project's successful completion and implementation of project and management activities [6]. Alias, Zawawi, Yusof, and Aris [7] categorized these factors into project management actions, project procedures, human-related and project-related factors, and external environment variables. Various studies focused on the determination of project management critical success factors

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in the literature [8]. The term 'Project Success' is defined as a construct that included budget, time, and quality [9–11]. The criteria for measuring project success vary due to its size, uniqueness, and complexity [12–15]. However, the success of projects in the longer-term is related to sustainability.

Sustainability is an integral part of project management practices that maintain the economic, environmental, and social (triple bottom line) future benefits. According to Stanitsas, Kirytopoulos, and Leopoulos [16], sustainable project management should contribute to the triple bottom line's dimensions, the project life cycle, stakeholders' demands, and organization society's sustainability. Silvius and Schipper [17] conclude that sustainable project management represents the shift of critical success factors from time, quality, and budget to the social, environmental, and economic long-term priorities. Van der Brink [18] refers to sustainable project management in a broader context as a time movement from project phases to supporting next generations; and change in scope from project elements to global society wellness. We focus our research on sustainable project management and its relation to success factors.

Project management has a fundamental influence on the implementation of projects in enterprises, including Industry 4.0 projects. There is a research gap on how critical success factors in Industry 4.0 affect the sustainability of projects. The research on integrating Industry 4.0 technologies into project management focuses mainly on human resources' qualifications and competencies [19,20]. Human resources play an essential role in project management and are, therefore, factors influencing projects' success. We investigate its role as a success factor concerning Industry 4.0 technologies' impacts to project management and sustainability.

The paper aims to determine and analyze the critical success factors in project management, which the Czech manufacturing enterprises' managers emphasize to determine their relation to Industry 4.0 and project management implication for sustainability. Based on the research objective and study of literature sources, we formulated three research questions (RQ):

- RQ1: Which are the critical success factors of project management?
- RQ2: Are project management critical success factors related to other variables (such as Industry 4.0, human resources, and sustainability)?
- RQ3: Is there a relationship between Industry 4.0 Benefits and Sustainability of Projects?

Our research brings essential benefits of day-to-day project management to achieve future sustainability of completed projects. We show the role of implementing modern Industry 4.0 technologies and qualified human resources to sustainability projects. Having greater insight into critical success factors and their relation to sustainability would yield useful information about effective project management practices.

2. Theoretical Background

The subsequent sections describe the project management's theoretical background, Industry 4.0, sustainability, and mutual relation.

2.1. Project Management

Project management can be included in the concept of change management [21]. Project management can be included in the concept of change management [22]. Together with other areas related to managerial functions, it is developing significantly, including research literature [23,24]. Bourne and Walker [21] stated that project managers are responsible for completing and efficiently implementing many companies' projects. Projects can be defined as several activities that aim to meet business goals while using their internal resources [25]. For successful project implementation, managers must address the following critical factors:

- Support of top management, effective communication channels, the correct financial budget of the project [26],

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- Project managers with the right qualifications [27],
- Elimination of project problems [28],
- The team's motivation and stimulation in the project, the joint efforts of all team members, the effort to successfully implement the project, adequate project control (regular monitoring, quick feedback, and changes in the project according to the current situation [27].

The following project performance indicators can be used to express project success [29–32]:

- Quality of construction,
- Construction costs,
- Time needed for construction,
- Prediction of construction, failures, time pressure, and customer satisfaction with services and products.

Chan et al. [2] divided the critical factors of project success into five parts. These are human factors, project factors, project work procedures, project implementation, and factors of the organization's external environment. These factors have become relevant in many research activities in recent years [33]. Another division of these factors is as follows: environmental factors affecting the project [34,35], human resources factors [36], procedures, methods, tools [37,38], and contextual project matters [39].

Harrington and Frank [40] state that projects (up to 75%) fail before implementation. Projects fail to be mainly implemented, regardless of the type and size of the project or sector they are implemented [41]. The primary function of any project is to guarantee business activities [42]. Killen and Hunt [43] also confirm this. They further state that business activities will allow for a better redistribution of resources to help meet the goal, which is another crucial function of the project. According to Sánchez and Schneider [44], projects are a tool for achieving business strategy [45]. If a project lacks a name for its success, it is difficult to understand why it fails.

Inefficient communication between people in a project is also a common cause of project failure [46,47]. These authors [48,49] state that there is also low sponsorship in the projects. They clearly define the ownership and powers of the project leader. At the beginning of project management, project success was explored using the project's three imperatives: cost, quality, and project time. These three factors have made it possible to achieve the desired result with good project management [50]. Today, an efficiency indicator is added - whether the project goals have been met and whether stakeholders and customers are satisfied with the project's results [51,52].

In these international scientific articles [53], we will learn about the critical success factors in projects and their failure factors. Project failure is most often related to the project leader, its management, the whole company, its organization and culture, its technology, or business processes [54,55]. Nelson [56] states that about 20% of projects fail due to people (project team); technology accounts for less than 10% of failure. Companies that invest in developing their human resources better achieve the company's goals and are more successful and efficient in the market. Rop et al. [57] state that a company's development depends on satisfied employees who have the required knowledge and skills. It is also essential to manage talent, a key source of competitiveness and excellent business performance. Business managers thus face more significant challenges in reducing talent than financial constraints [58].

Project management plays an essential part in the development of Industry 4.0. It is a suitable tool for fulfilling the goals and actions that develop intelligent technologies and devices [59]. With Industry 4.0, project management uses bibliometric methods to understand this fourth revolution's implications in projects [60]. All project resources influencing its success must be integrated into companies with intelligent, self-organizing, and self-optimized processes [61]. Project people and their managers must use new digital technologies and physical systems to communicate [62]. In classic projects, managers manage and make decisions centrally; in Industry 4.0 projects, decentralized management predominates [63].

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2.2. Industry 4.0

"Industry 4.0" is a term for the ongoing fourth industrial revolution [64] and was first introduced in 2011 by the German Government. Industry 4.0 means the integration of cyber-physical systems (CPSs) into manufacturing for value creation [65] and the use of digitization, automation, and artificial intelligence [66].

One of Wolfgang Wahlster's [67] main goals in defining the concept of Industry 4.0 was sustainability, which over time came into the background when introducing and evaluating Industry 4.0 [68,69], thus losing one of the main ideas for returning manufacturing companies to cities [70–72]. Sustainability is now coupled with human-touch key concepts in conjunction with Industry 5.0 [73]. Although many companies incorporate eco-economic dimensions of sustainability into their business models [72], in particular reducing production emissions [74], optimizing energy consumption through process simulations [75,76], waste management [77] or recyclable materials, gaining one of the key competitive advantages in CSRs (Corporate Social Responsibility) [78,79].

The authors of the article perceive the concept of Industry 4.0 in accordance with the definition of Vrchoty et al. [80] "Industry 4.0 as a revolutionary industrial concept of the production process in manufacturing, focused on new technologies that interconnect machines and equipment with digital data into automatic, intelligent systems". From this point of view, the focus of linking project management with increasing sustainability in companies is crucial [81–83]. Or there is currently a mass introduction of new production technologies in internal projects within companies [84]. At the same time, one of the main advantages of Industry 4.0 is its high degree of flexibility and customization of production [11,85,86], which is much more in line with a project than a process management system [87,88]. However, behind every vision, project, technology, it is always necessary to see managers and employees who have the main idea and direction of the company [89].

2.3. Sustainability

Scholars and practitioners are worried about the role of business in society [90]. Sustainability thinking in some firms goes back to the 1930s when some articles about business's social responsibility were published [91]. The growing amount of information concerning this problem increases wider awareness of social and environmental needs. [92,93]. That is why we have results like this in a trend towards business operations that are socially responsible and also sustain development [94]. Currently, one of the important research areas in corporate social responsibility (CSR) field is to examine the effect of CSR on corporate economic performance [95–97]. An important factor influencing the management of production factors is the challenge of sustainability, including, for example, global warming and the finiteness of important resources [98]. A growing number of organizations and companies are now adopting corporate responsibility strategies to contribute to sustainable development goals [99].

Sustainability is currently more received as a fundamental goal of development and environmental management. This term has been used in many disciplines and many other contexts, ranging from the principles of maximum sustainable yield in forestry and fisheries management to the vision of a sustainable society with a steady-state economy [80,100]. The companies see sustainability as meeting the needs of a firm's direct and indirect stakeholders without compromising its ability to meet future stakeholders' needs [101]. Corporate responsibility represents how a company can engage the process of sustainable development where the self-interest of the company is in balance with the greater public good [102,103]. Many sustainability definitions turn direct attention to humans' relationships and the resources they use [104] and the environment [105].

Sustainability is a critical perspective in managing companies via a holistic approach by thinking about companies' economic, environmental, and social dimensions [106]. Management's position towards sustainable development and business responsibility is one of the crucial elements in applying sustainability development strategies [107]. Multiple researchers have studied the social orientation and perceptions of corporate

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social sustainability and similar concepts from the management position. Leaders of those companies with a clear and understandable set of guiding principles such as relevant policies and a strong sense of shared values are more motivated and more eager to make changes [108–111]. The role of stakeholders in shaping sustainability practices [112] and the concept of corporate social responsibility and corporate sustainability [113] has been addressed by researchers working in organization and management.

Silvius and Schipper [17], for example, justify the connection between the concept of sustainability and project management. If we accept that the use of natural resources is not sustainable at the moment, we must also take remedial action through project management, which implements these desirable changes into corporate governance. Of course, this is also reflected in the strategic management of the companies themselves, and thus it affects the strategy itself.

Projects have become more globalized, significantly helping with the economic growth in the countries in which they are executed, especially for the local industry in developing countries [114,115]. Warhurst [116] has also pointed out that there is a need to develop indicators that can be used to make decisions to ensure that projects are managed according to practices that will help with sustainable development. Sustainability is a relatively new topic in project management literature. A vast number of publications date back to the last ten years [17]. The impact of sustainability on project management in 'impact areas' is specified by Maltzman [117]. Trying to use the principles of sustainability will have an impact on the specifications and requirements of the project's deliverable output and the criteria for the quality of the project [118]. Some authors conclude that integrating sustainability requires a scope shift in the management of projects, from managing time, budget, and quality, to managing social, environmental, and economic impact [119].

Companies want to stay competitive by looking into sustainable practices in other markets or innovations that already exist [120]. Thus is helping with resource management and creating the conditions to get a competitive advantage [121]. Sustainable methods differ depending on the firm's size, level of business maturity, and strategic management dimensions, such as planning and organizational structure. Implementation and analysis of possible improvements for sustainable practices are challenging [122].

3. Materials and Methods

The aim of the paper is to determine and analyze the critical success factors in project management, which are emphasized by the managers of the Czech manufacturing enterprises to find out their relation to Industry 4.0 and the implication of project management for sustainability. At the same time, three significant current trends in business management are assessed in addition to these critical success factors—industry 4.0, human resources (in terms of quality and quantity of employees), and sustainability.

The research was carried out in 2019, using a sample of 114 manufacturing enterprises. The manufacturing enterprises were chosen due to their higher technological complexity and closer relation to Industry 4.0. The sample was selected based on their size to best correspond to the enterprises' real distribution in the Czech Republic. We used the method of non-probability purposive sampling by expert assumption about the total population. The group of respondents consisted entirely of managers, mostly from the field of project management.

The results were processed from a total sample of 114 enterprises. Seventy-four enterprises use elements of project management and implement projects (i.e., almost two thirds). The largest share in the sample is the enterprises from engineering (43%), followed by the production of non-metallic products (14%), the production of household products (12%), and the others (31%). There are enterprises with five to 680 employees in terms of size and an average value of 199 employees. The sample includes 64 enterprises that do not have a foreign owner and are local, compared to 52 enterprises with a foreign owner. Also, 38% of the enterprises regularly cooperate with a university or a research institute. Out of the total sample, 68 enterprises have a written corporate strategy, where Industry 4.0

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is mentioned in 72% of cases. This number is relatively high, and it is expected that such enterprises focus on future development, and innovation is a matter of course for them.

Data collection took place as electronic surveys, contacting the directors of the enterprises. Out of the total number of 114 enterprises, 74 of them use some project management parts and implement projects. Such enterprises were asked what factors are the most important for the success of their projects. The questions about critical success factors were open, and therefore, the enterprises were not forced to choose from any pre-prepared answers. Subsequently, the answers were categorized by a group of five experts (the project managers and the authors of the paper) into seven groups (Plans and Deadlines, Finance, Employees and Flexibility, Quality, Leadership and Experiences, Communication and Cooperation, and Other factors). Then the questionnaire includes questions related to the number of implemented projects, human resources (number of employees, number of information technologies specialists, and number of university-educated employees), Industry 4.0 (priority of industry 4.0 in strategy, Industry 4.0 readiness; evaluation on a five-point Likert scale), and sustainability benefits of Industry 4.0 projects (evaluation on a five-point Likert scale). The last group of questions (responses yes/no) was related to sustainability and project management (using of project management), and implementation of projects (projects implementing own source of electricity, projects related to reduce waste heat, projects focused on collecting data about the release of emissions, projects creating the infrastructure of sensors for monitoring).

As each enterprise could belong to more than one group, the correlation tests were performed between the groups, using the Pearson correlation coefficient, assuming normality of the data. Within the correlations, there is always a null hypothesis, H0, which states that the critical success factors do not correspond to each other. However, the alternative hypothesis states that the first-named factor affects the second named factor.

$$\text{H0: } \rho\,(X, Y) = 0; \text{ HA: } \rho\,(X, Y) \neq 0 \tag{1}$$

So that it is possible to use Pearson's correlation, it is necessary to test the normality of both variables [123,124]. To test, the (one-dimensional) normality of $R = \frac{r}{\sqrt{1-r^2}}\sqrt{n-2}$ [123], the histograms of Shapiro-Wilks test (p-value) were used, followed by Q-Q plots. After that, the data were analyzed, using the Pearson correlation coefficient [123,125,126]:

$$r = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}} = \frac{S_{xy}}{S_x S_y} \tag{2}$$

To improve clarity, we statistically compared results interdependencies compare in Statistica software, version 12. Subsequently, the hypotheses dealing with the enterprises' differences by the categorized groups were tested using the Mann-Whitney test. It was possible to determine how groups the enterprises emphasizing a particular factor differ with a statistical significance of 0.05. The calculation always uses a null hypothesis that the enterprises that see and do not see the factor as significant agree based on the analyzed data and an alternative hypothesis that the enterprises that see the factor significantly reach higher levels in the factor. We analyzed data using a non-parametric two-sample Wilcoxon test [123,126] and its asymptotic variant. Deviations in the samples larger than 30 did not significantly impact test results [126,127].

4. Results

The results are divided into three sub-sections: determination of project management critical success factors, relation of these factors to other variables (Industry 4.0, Human resources, and Sustainability), and relation of Industry 4.0 benefits for project management and sustainability of Projects.

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4.1. Determination of Project Management Critical Success Factors

The enterprises were asked to list the factors that contribute the most to the success of their projects. The results are summarized in Figure 1 below. It reveals that the enterprises attach the most significant importance to experienced project managers, in 36 cases (almost 50%), followed by employee flexibility with 25 cases (around one third). On the contrary, the financial resources (14) and Communication and Cooperation (16) (both around one fifth) were of relatively low importance.

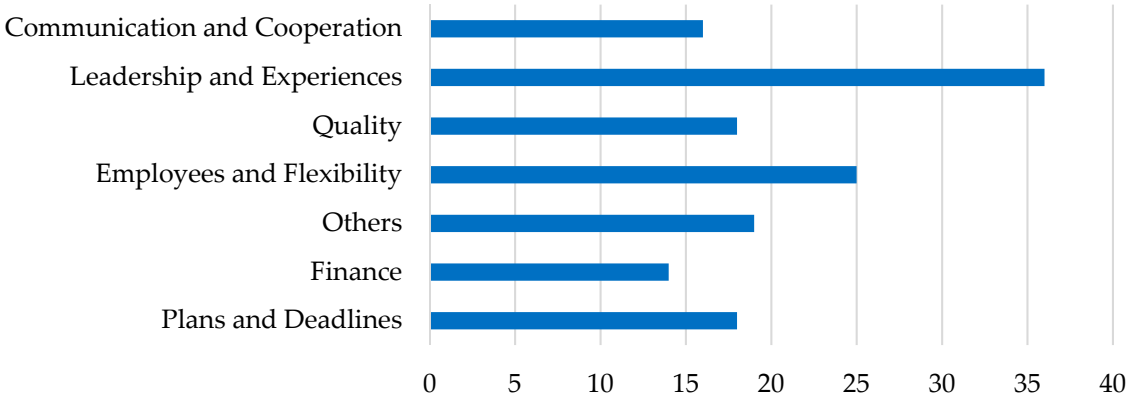

Figure 1. Critical success factors in the projects in the manufacturing enterprises.

Subsequently, the critical success factors are compared, using the Pearson correlation coefficient to determine the possible dependence factors. It was possible to expect that enterprises focused on one factor will also resort to another factor. The null hypothesis of independence of both factors was tested at a significance level of 0.05, compared to the alternative hypothesis of interdependence. In all cases, the null hypothesis could not be rejected, as reported by the correlation matrix below (Table 1). The highest correlation of −0.207 was reported between Leadership and Quality. However, the *p*-value was not below the significance level of 0.05 in this case either. For this reason, several factors were retained for further testing.

Table 1. Correlation coefficients of the factors.

	Plans and Deadlines	Finance	Others	Employees and Flexibility	Quality	Leadership and Experiences	Communication and Cooperation
Plans and Deadlines	1	−0.053	0.0253	−0.068	0.1228	0.0213	−0.002
Finance	−0.053	1	0.0212	−0.079	−0.142	0.0478	0.0683
Others	0.0253	0.0212	1	−0.085	0.0253	−0.038	−0.018
Employees and Flexibility	−0.068	−0.079	−0.085	1	0.0083	0.0617	−0.033
Quality	0.1228	−0.142	0.0253	0.0083	1	−0.207	0.0815
Leadership and Experiences	0.0213	0.0478	−0.038	0.0617	−0.207	1	0.0525
Communication and Cooperation	−0.002	0.0683	−0.018	−0.033	0.0815	0.0525	1
How many projects did you implement last year?	0.207	0.965	0.492	0.890	0.047	0.028	0.404

We found no correlation between the number of employees and the number of implemented projects in the enterprise, as tested using Pearson correlation coefficient (r (X, Y) = −0.0310), although it should be obvious. It was concluded, as follows from the graph on the right, below (Figure 2), that the enterprises that implement more than one project considered quality to be one of the main factors of project success. The graph shows that the upper quartile started at a limit of 250 projects for such enterprises. Otherwise, companies in the upper quartile at the limit of 15 projects do not consider quality necessary.

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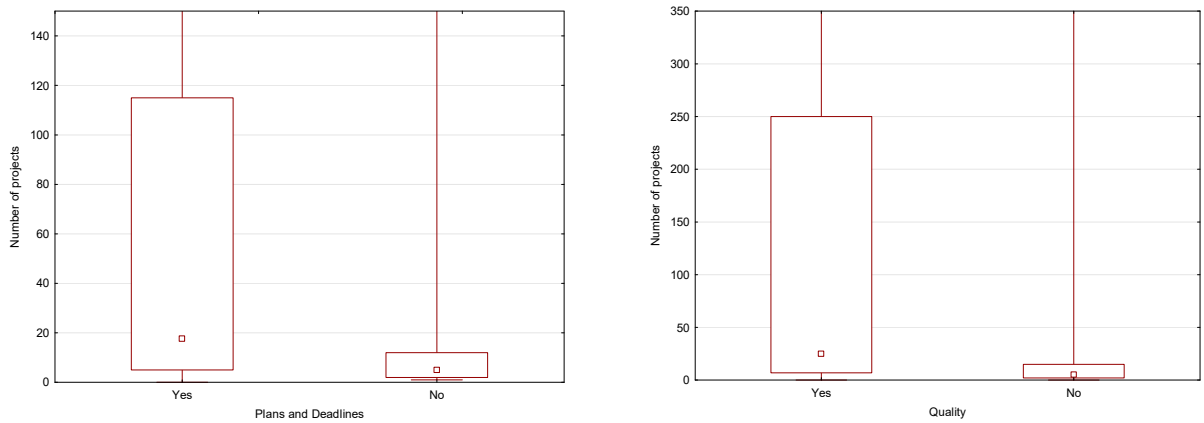

Figure 2. Relation of the number of implemented projects to the Plans and Deadlines (**a**) Quality (**b**).

4.2. Relation of Project Management Success Factors to Human Resources, Industry 4.0 and Sustainability

The research also analyses the implementation of Industry 4.0, human resources, and sustainability concerning the factors influencing the project's success in manufacturing enterprises. The three areas were chosen due to the growing impact of innovation and technology in the manufacturing enterprises and the constant shortage of skilled workers in the field. Therefore, the enterprises were divided by the degree of significance of the factors into two groups. Those that consider them significant and do not consider them significant.

The diversity (agreement) of the groups in terms of their approach to tested variables. The table below shows the resulting *p*-value for the Mann-Whitney test, testing the null hypothesis of agreement of both groups in the factor compared to the alternative hypothesis, stating that the enterprises attributing the importance to the factor achieve higher values in the factor, at the level of significance 0.05 (Table 2).

Table 2. Test statistics of the critical success factors and the groups of indicators.

	Plans and Deadlines	Finance	Employees and Flexibility	Quality	Leadership and Experiences	Communication and Cooperation	Other Factors
No. of employees	0.044	0.231	0.942	0.009	0.654	0.573	0.994
No. of IT specialists	0.922	0.687	0.090	0.546	0.249	0.858	0.621
No. of university educated employees	0.312	0.572	0.619	0.823	0.841	0.183	0.912
What is the priority of Industry 4.0 in your organization?	0.602	0.939	0.488	0.540	0.028	0.326	0.265
To what extent do you rank among companies with Industry 4.0?	0.444	0.968	0.718	0.208	0.007	0.243	0.216
Do you see the benefits of industry 4.0 in sustainability and environmental protection?	0.849	0.032	0.872	0.891	0.065	0.990	0.215

The first tested factor influencing the success of the project is known as planning and deadlines. The factor was seen as significant by 24% of the enterprises. It was proved that the enterprises that focus on the factor have a larger number of employees (*p*-value = 0.044), so its planning was more of an activity of the medium-sized and large enterprises. Therefore, more emphasis was placed on deadlines. From statistics results,

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the median for the enterprises with an emphasis on planning was 19. It is more than for enterprises that do not plan so much. The shift of the upper quartile was also significant. The enterprises opting for Yes had 115 employees, and the enterprises opting for No had 12 employees. For the other factors, it was impossible to reject the null hypothesis in favor of the alternative.

Regarding finance, considered necessary by 19% of the enterprises, the null hypothesis could not be rejected for any of the indicators except sustainability (0.032). Finance was a critical success factor for evaluating benefits sustainability and environmental protection—this exciting finding show why some projects with environmental impact are not realized. The lack of finance is usually the main factor in decision-making about supported projects.

Many managers place a great influence on employees and their flexibility, where none of the monitored factors has succeeded in proving a relationship. This may be due to the fact that for many projects, this factor is one of the key ones, as can be seen in Figure 1, where after Leadership, it was the second most important from the point of view of managers, and therefore it was emphasized in all projects and companies, regardless other factors.

Another tested critical success factor was related to the adherence to quality in the project. The factor is assessed as necessary for the completion of the project by 24% of the enterprises. The hypothesis H0 was rejected at a significance level of 0.05 in two cases. We found differences in the number of employees. The enterprises that care about quality have more employees, and at the same time, they implement more projects.

Leadership and experience are the most critical factors influencing enterprises in terms of Industry 4.0 (Figure 1). It was possible to reject the null hypothesis of the groups' agreement in the perception of the degree of the introduction of Industry 4.0 (p-value = 0.007). Simultaneously, the introduction of Industry 4.0 is a higher priority (p-value = 0.028) for the enterprises. This fact is probably caused by the response of managers, when they perceive themselves as important and at the same time perceive themselves as a significant direction of the company towards Industry 4.0, which further fulfills their vision.

Regarding the communication and cooperation, and factor employees and flexibility, no differences were proved. Employees and flexibility were essential factors in 34% of enterprises. For these indicators, the p-value was below the significance limit. It is assumed that the enterprises for which employees are the key to the project's success do not differ in their size, the number of employees, and education, access to Industry 4.0, and sustainability.

Likewise, these indicators were not affected by the Other factors group, which included nineteen enterprises, the most frequent of which is the influence of customers (8) on the successful completion of the project, followed by the influence of technology (6) and suppliers (3). Other frequencies did not exceed the limit of three occurrences. For both of the factors, the null hypothesis of agreement between the two groups applies.

Another interesting hypothesis is the fact that none of the monitored critical factors of project success was affected by the number of university-educated employees or the number of IT specialists, which is contrary to the literature, where education and use of IT generally affect monitoring indicators and project success.

4.3. Relation of Industry 4.0 Benefits for Project Management and Sustainability of Projects

This section expands the analysis of the relationship between Industry 4.0 benefits and sustainability of implemented projects. Sustainable development is an essential horizontal theme that permeates all projects. This finding is an area that will be continually gaining in importance in future projects. The surveyed enterprises provided feedback from the successful implementation of projects concerning their sustainability. Sustainability is seen in terms of the benefits of Industry 4.0 technologies and environmental protection.

As part of the research, we found out whether projects related to economic, social, or environmental sustainability were implemented in selected companies (Figure 3). The overall results suggest that companies implement projects that have the potential to ensure future sustainability to a relatively high degree. Their number will increase in the future.

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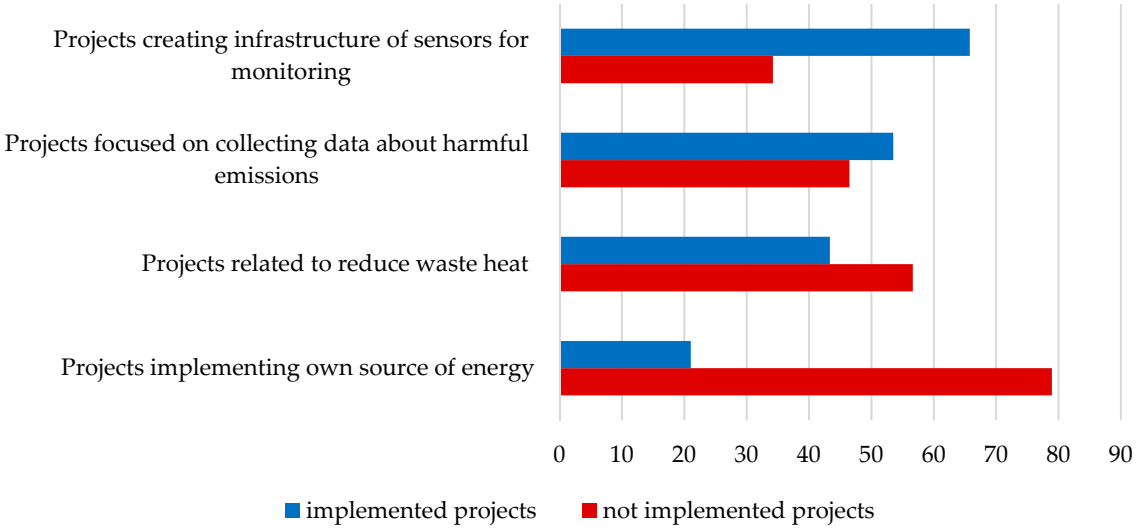

Figure 3. Characteristics of projects implemented in enterprises.

These are mainly projects focused on using alternative energy sources, such as photovoltaic, gas, water, air energy sources, smart grids, etc. The results show that these projects were implemented by only 21.1% of companies. These projects aimed mainly to save energy, the possibility of future use of electricity to power vehicles, etc. Smart grid projects here represent a particular area based on industry technology 4.0. From the perspective of sustainability, these projects number the economic (if these technologies allow) and environmental areas.

Another group of projects consists of projects aimed at reducing and using waste heat. These projects were implemented by 43.4% of the surveyed companies. Heat leakage and heat loss can cause additional costs for the operation of technical equipment and machines. These projects aim to reduce waste caused by outdated technologies in production and better use of thermal energy, for example, for heating. These projects also fall mainly into the economic and environmental dimensions of sustainability.

Furthermore, these are projects focused on collecting data about releasing harmful emissions into the air or other resources. The results show that more than 53.5% of companies had implemented these projects. Their goal was to minimize the impact of damage on the environment. Here we can see the connection with the concept of industry 4.0. In this area, projects can also analyze the large volume of data (big data) for effective management and monitoring. Sustainability was associated with a focus on predominantly environmental impacts.

The last areas are projects introducing sensors, which are the basis of smart factories, and another practical example of implementing the industry 4.0 concept. Companies implemented this group of projects to the greatest extent of 65.8%. The introduction of sensors allows the implementation of the industrial internet of things into production and other company areas. The task of sensors in the monitored projects is to monitor temperature, noise, and light intensity. From the point of view of a man's temperature, it is most often a matter of preventing unexpected events with disasters, which reduces the risk of their occurrence. Noise and light affect companies' working environment, so monitoring them is essential due to ergonomics. In sustainability, these projects have a potential impact on the social dimension (employee productivity, quality of the environment, etc.).

A statistical test of the relationship of Industry 4.0 benefits to project management and sustainability projects was performed. Enterprises were asked on a scale of one to five how they perceive the importance of Industry 4.0 benefits for sustainability concerning project management and project implementation. Most enterprises adhered to an average mean response of three. Table 3 below shows the values of the statistics tested using the Mann-Whitney test, where the relationship between Industry 4.0 benefits for project management

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and sustainability of projects was tested. The relationship between sustainability and project management (p-value 0.039) seems to be statistically significant, where enterprises using project management emphasize linking Industry 4.0 with sustainability. The same relationship was demonstrated using their electricity sources, where it is used by 21% of SMEs. Moreover, as can be seen from the tested value of Z (−3,192) and p-value (0.001), enterprises using these own resources see a significant influence of using Industry 4.0 to sustainability, as also shown in Table 3.

Table 3. The relationship of sustainability to project management and implementation of projects.

	Tested Statistics U	Tested Statistics Z	p-Value
Using project management in the enterprise	1133	−2.063	0.039
Projects implementing own source of energy	621	−3.192	0.001
Projects related to reducing waste heat	1580	−0.020	0.984
Projects focused on collecting data about harmful emissions	1452	0.926	0.354
Projects creating the infrastructure of sensors for monitoring	1277	1.199	0.230

Subsequently, the assumption that large enterprises (over 250 employees) will place more emphasis on sustainability concerning Industry 4.0 technologies benefits and environmental protection was tested. Large and SME enterprises' similarity was not confirmed, as the null hypothesis was not rejected (p-value 0.585). Therefore, it can not be assumed that large enterprises would focus more on sustainability.

5. Discussion

This section presents a discussion of significant findings and results, including the research's contributions.

Project management success factors lead either directly or indirectly to completing the project in a predetermined time, budget, and the required quality or functionality. In contrast, the correct identification of such factors minimizes the risks associated with project management. Due to experts' relative fragmentation on this topic, the most essential identified factors related to the projects' success are discussed in the paper. The influence of the determinants that take a project to success is tested by some researchers, such as [2,128,129]. In evaluating the factors that affect project success, the Czech managers most (almost half) emphasize the project manager's leadership. Christenson [130] also found a significant positive effect on project management leadership on a project's success. The competence of the project manager has been identified as the most important factor or project success—over 80% of Bulgarian respondents [131]. Critical success factors of project management: empirical evidence from projects supported by EU programs. Systematic Economic Crisis: Current issues and perspective [132].

Project managers are vital players in achieving project success [133]. Kerzner [134] recommended using management techniques and practices for successful project management. The process of project implementation similar in all projects, although each project is different and unique [135]. According to Dissanayake and Kumaraswamy [135], a good relationship between the construction company and a representative of the client accelerates traffic and helps achieve success. The first research question authors focused on determining the critical success factors of projects. In evaluating the projects' critical success factors with three current directions in business management (Industry 4.0, human resources, and sustainability), the authors demonstrated the relation of project planning and the number of employees in the enterprises. The obtained factors were relatively consistent without significant mutual correlations. Enterprises that implement multiple projects are considered to be the essential success factors Quality, Leadership, and Experiences. The literature mentions various critical success factors in project management:

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communication, control mechanisms, feedback skills, problem-solving, coordination, decision making, monitoring, project organization, planning and scheduling, and management experience [8].

Thi and Swierczek [136] stated that environmental factors and managers' competencies have a positive and important impact on the success of the project. Radujković and Sjekavic [137] divide success factors into three areas: managers' competencies, methods, management tools, and project management. Serrador [138] confirms the effects of planning on achieving project success in the industry. Further research also confirms the importance of the project manager and their team to the success of the project [39,139]. Other studies also confirm the importance of the project manager and their team for the success of projects [34,35].

Heaton, Skok, and Kovel [140] emphasized the need to develop the skills of the project manager; their competencies have a positive effect on the success of the project. Sousa et al. [141] also pointed out that critical factors for project managers' success are increased communication across the organization and related knowledge of the organization's team roles. The effectiveness of teamwork is considered in much research to be part of success in project management [12,13]. Large enterprises attach more importance to planning (they plan more compared to small enterprises), as proved by the research by Piszczur and Pawliczwk [142,143]. They noticed that large enterprises attaching more importance to strategic planning also perform better. Similar results are shown in an Australian study, which said that only 58% of the SMEs planned. Another study examined 3000 SMEs, and only 16% of them planed regularly. Furthermore, the dependence on the number of employees and projects in enterprises focusing on quality projects was proved by Turner et al. [144], where they showed that up to 60% of the micro and small enterprises' turnover was realized through the first two years and up to 40% in the following years. However, in such enterprises the project manager addresses other issues, so there is no full focus on the project, which is subsequently related to the quality of their activities, corresponding to the paper's presented outputs. Therefore, it is necessary to perceive project management in the micro and small enterprises differently because there are not experts for all issues [11]. Kerzner [134] also described several differences in project management in small enterprises, including the fact that the project manager is in charge of multiple projects at once. Hence, the project's focus is not the same as in large enterprises, where there is always a project manager as a full-time job.

Furthermore, the relationship of these critical success factors to Industry 4.0, human resources, and sustainability was investigated in the second research question. All these variables were selected based on a survey of literary sources, as they can influence project management and projects' success. The results show that human resources (in terms of quantity) are significant concerning plans, deadlines, and quality. For Industry 4.0, the most critical factors in terms of project management are Leadership and Experiences. This result was confirmed both for companies for which Industry 4.0 is a strategic priority and for companies that are assessed as companies with Industry 4.0 technologies. This sentence was also stated in Zheng et al. [145], where it was noticed that Industry 4.0 is an opportunity and a challenge for enterprises with strong leaders. In sustainability, a critical finance factor has been identified for companies that consider it necessary. These are assessed mainly concerning the success of projects focused on Industry 4.0.

Finally, we focused on the perception of the importance of Industry 4.0 benefits for project management and sustainability of realized projects. The results show that enterprises use project management and Industry 4.0 for the achievement of sustainability objectives. For example, Braccini and Margherita [146] confirmed that Industry 4.0 applications support triple bottom line sustainability dimensions in the case of manufacturing enterprises. The importance of linking sustainability and project management was also underlined by Silvius and Schipper [17]. Similarly, Tsai et al. [147] showed how effective planning and control with carbon tax through 3D printing, robotics may enhance sustainability in the tire industry. However, we found that only in projects aimed at implementing

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its electricity source see benefits of using Industry 4.0 technologies for sustainability. There are many descriptions of projects implementing new sources of energy [148–150] etc. Interestingly, this did not depend on the size of the companies.

We found that the critical factor for success in projects was the human factor (whether it is management and leadership or the quality of human resources). Project management was necessary for the realization of more sustainable business practices. It was confirmed that a critical factor of finance conditions the success of Industry 4.0 technology projects due to sustainability. They are also often responsible for not implementing many potentially useful projects that improve the environment or society. It also has practical use in preparing projects that can be better processed about their financial benefits. Another benefit can be developing a methodology for evaluating the success of Industry 4.0 projects concerning sustainability based on critical success factors.

6. Conclusions

Project management spreads to all areas of human life, and the project approach to problem-solving is in demand. Today, it is not possible to apply standard procedures automatically to every change to be made. Whether the result is success or loss depends on how the goal of the change is defined, the path to the goal is found, and how we are able to motivate and lead people. We recommend focus teamwork in the right direction and motivate everyone to perform at their best. The effective deployment of project management helps to deal with the issues mentioned above.

In short, the results show that soft factors are essential for the success of projects. Businesses consider human resource management and management to be a key area, and they are the best rated critical success factor Leadership and Experiences, and Employees and Flexibility. Human resources in project management, plans and deadlines, and quality are essential success factors. According to the management grid [142], these factors are essential for teamwork, requiring both a focus on people and tasks. All the sample enterprises focused on project leadership are statistically more focused on Industry 4.0, as it is a high priority for them and process more projects. Project management concerning the sustainability of projects focused on Industry 4.0 emphasizes finance, which often decides to implement or support projects. The third research question then addressed the relationship between the benefits of Industry 4.0 and the sustainability of projects. We found that in companies that use project management, project managers believe more in Industry 4.0 to achieve sustainability. This finding cannot be generalized only for large enterprises and includes SMEs too. The analysis also showed that companies see the benefits of Industry 4.0, especially in projects aimed at introducing new energy sources.

6.1. Managerial Implication and Future Research

Project management needs to look for the most effective and direct way to complete a project in any complicated situation. The aim of project management is the design and implementation of successful projects. Moreover, every successful external and internal project means competitive advantage, simply because a failed project is a burden for every organization, negatively impacting either the organization's competitiveness or efficiency. There are often many obstacles, and it is up to the project manager to find the right and most effective way to move forward. Mastering project management knowledge and its use in practice should be at the center of the SME managers' attention in particular [151].

Project management drives small and medium organizations. There is, therefore, a need to create a more sustainable way of utilizing project management tools [152]. Project management must be applied correctly in all phases of the project. Further education of the project managers is also vital, together with the news from project management, acquired both by studying new professional literature and at workshops and conferences.

The practical benefit of the paper is to determine the commonly used critical success factors of projects, according to the size of the company, where larger companies focus more on planning and quality, while companies with fewer employees target more employees,

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communication, and leadership. Another useful finding for project managers is that there is no correlation between the monitored key factories of successful projects; therefore, the implementation of each of the above does not duplicate others and are all important from this point of view, although most managers perceive their management in the form of strong leadership.

Further research should focus on risk factors and project barriers, including their impact on sustainability. It may be interesting to see if some of the success factors will also be risk factors. Another possible extension is the categorization of sustainability into different groups (economic, technological, environmental, social, organizational, etc.) concerning management design. In the end, it is beneficial to conduct more profound research dealing with different types of projects that use Industry 4.0 technologies and their relationship to sustainability.

6.2. Limitations of the Research

The limitations are discussed alongside strengths. The most obvious shortcoming of the work described here is related to the research sample, research method, unclear definition of sustainability, and more profound classification of projects.

Among the limiting factors of the contribution can undoubtedly be included, a sample of enterprises only for the Czech Republic. Communication with partner universities in neighboring countries is currently underway to be expanded internationally. At the same time, we also expected a higher return on questionnaires when contacting enterprises.

Another limitation of the research is the sampling method. The disadvantages of the expert purposive sampling method are that the sample's judgment is influenced by selection bias and possible error. There can be some doubt about the representative of the sample. Another limitation may be the method used to identify critical success factors. In our research, we used companies' practical experience with the implementation of projects, and therefore, we addressed project managers. The research was, therefore, focused on business experts. However, some studies [153] use academics or other people involved in the project (client, contractor, consultants, suppliers, project team members, etc.).

Furthermore, it is possible to include in the limits, also often unclear understanding of sustainability, which occurs in enterprises, where it would be appropriate to define individual terms more when asked. Simultaneously, expand the areas that are more common in enterprises, such as emissions or sensors, and go into more in-depth research here.

Other limits include not examining the type of projects, or although these are industrial enterprises, the types of projects may differ fundamentally. Concerning sustainability, we would like to reveal how many investment projects were related to sustainability. In research, we focus more on the environment than on the economic and social dimensions of sustainability.

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