# External Partnerships in Employee Education and Development as the Key to Facing Industry 4.0 Challenges

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**Abstract:** The new challenges that will currently affect the existence and sustainability of businesses stem from the dramatic changes that come from the fourth industrial revolution. Based on the concept of intellectual capital management as a resource-based strategic management approach, which leads to the management of structural, human, and relational capital, sustainable human resource management underlines the involvement of partnerships and external relations in learning and personal development processes. Industry 4.0 expects major changes in human resource management and processes such as education. Organizations will benefit from the new knowledge in the near future that will need to be brought into the internal environment of the organization constantly. However, this will require cooperation with the external environment, and the resulting new education opportunities built on cooperation with external partners, organizations, and educational institutions. Innovations as essential factors in adapting to major changes in the environment will be key in all organizational processes, including educational. This paper focuses on comparing highly innovative countries and less innovative countries in Central Europe, analyzing 1482 businesses by looking at differences in attitude towards employee education and individual forms of employee education. The main statistically significant difference is in the strategic approach to employee education and development and the set-up between innovative countries and moderate innovators.

**Keywords:** employee education; external partnership; innovation

## 1. Introduction

Industry 4.0 is a great opportunity for realizing the real step forward towards better performance and strategic value creation. Therefore, Industry 4.0 is a topic that attracts the attention of many people, mainly industrial and IT specialists and business managers [1,2]. These changes create tremendous opportunities for innovative businesses but can seriously jeopardize those businesses that will not react quickly and effectively to the ongoing changes [3,4]. The increasing organizational complexity leads to better and proper management, in the term of managerial functions. From the human resources perspective, the main focus is oriented on job automation and job computerization [3,5,6].

However, the impact of advanced digital technologies escalates some new positions and specializations with new set of knowledge and expertise.

The value of external sources and collaboration relationships are the main contributions of open innovation theory. This paper follows this theory in the context of knowledge sharing, learning, and human development. Companies need to recognize the value of external partnerships in learning

and human development and apply new procedures to obtain the flexibility and interoperability in the implementation for the new Industry 4.0 paradigm [3,7].

Open innovation research pointed out that a company's ability to retrieve new knowledge through its interaction with external partners requires investments in internal HRM (Human resource management) capabilities [4,5,8].

To ensure that the organization is competitive and advancing not only in a stable but predominantly unstable environment, employees must be educated and engaged [9–12]. It is the dynamically changing environment and the forthcoming fourth industrial revolution that represent a great challenge for businesses—not just in Slovakia—and the opportunity to shift the borders, while the most effective and ethical possibility to grasp this opportunity can be the focus of enterprises to increase innovation performance—not individually but synergistically—and in cooperation with external partners, through open innovation.

While the transformation processes towards Industry 4.0 are long term, companies have to take into consideration a strategic approach [13] to human resources and human development. From this point of view, intellectual capital and intellectual capital management has been a subject of interest of many researchers in the field of business management [14,15]. Intellectual capital management is also presented as a concept that ensures sustainable competitiveness [16–18] and avoids ad-hoc solutions with higher levels of risks and costs. Intellectual capital is defined as knowledge and knowledge initiatives convertible into value [19,20] and brings a schema for presenting qualities and potentials for sustainable development. There are several views at the breakdown structure of the intellectual capital model presented in literature [14,20], usually consisting of three main components: human capital, structural (internal, process, or organizational) capital, and relationship (external or partners) capital. As human and organizational capital both contain knowledge and knowledge initiatives oriented towards inside the organization, the relational capital contains knowledge and knowledge initiatives oriented outside the company or towards partners and customers. Sustainable development according to this concept needs to incorporate all of these three components [21,22]. Sustainable learning and sustainable human resource development therefore also need to contain not only human and structural (process) but also relationship knowledge initiatives.

Only the opening of enterprise boundaries in an enterprise's innovation process will allow "the use of intentional inflows and outflows of knowledge to accelerate internal innovations, as well as their expansion into markets for the external use of innovation" [23]. The willingness of enterprises to collaborate and share information is primarily conditioned by the belief that their collaboration with the external environment will be beneficial for them [24]. It is clear from the above that external cooperation is primarily based on the internal environment of individual enterprises. It is the company's internal potential that affects its ability to become a valuable partner in open innovation.

The company's internal potential is most strongly influenced by the potential and commitment of its own employees that can be directly influenced by the individual activities of human resources management. Business support in this area can be directly linked to increased employee performance [25–30], as well as the positive perception of the enterprise by employees [28], and also with their satisfaction [31–33], engagement [9,10], and willingness to cooperate internally within the boundaries of the organization [34–36]. However, in the case of providing space, support, and security from parent companies, such employees are strongly committed [37], even beyond the boundaries of their organization. Educated employees trust in a professional environment in external cooperation, communicate openly and share information because they see space, and feel satisfied that they are able to push the boundaries of the product's usefulness to the consumer. As mentioned above, the level of employee education [11,38–41] and the integration of employee knowledge [42–47], not only internal, can be marked as key to maintaining the competitiveness of an organization. The quality and the level of education and development systems in the organization, as well as the degree of use of external partners for this purpose, are substantial for the quality and the increase of the intellectual capital potential.

*1.1. Internal System of Employee Education and Development in Organizations*

Education of people is among the key objectives and consequences of the modern society at the same time [46,48]. It is conditioned by the present demanding and turbulent environment, requiring constant enhancement, deepening, adaptation, and development of the educational attainment of people. It means that education needs to be permanent and should reflect all current needs brought about by the reality of changes [48,49]. Employee education can be characterized as a permanent process in which the adaptation and change of working behavior, the level of knowledge, skills, and motivation of employees take place on the grounds of learning based on using different methods. It results in a decrease of the difference between the present competences of employees and requirements posed on them [41].

Employee training in each organization is a necessity, but its nature, level, and intensity may vary according to the specific needs of the organization. It is important that education is effective, that is, it must be well organized and systematic and must be conducted continuously within the recurring cycle [50,51]. The learning cycle is characterized as a continuous sequence of four steps, the content of which is to gradually identify the real needs of education, its planning, implementation, and monitoring and evaluation of the effectiveness of education [52]. The effectiveness of education is largely conditioned by the choice of appropriate employee training methods (such as: lectures, seminars, handbooks, self-education, Internet, work on projects, e-learning, coaching, outdoor learning, mentoring, video conferences, assessment centers, etc.) that represent the means and methods used to transfer and acquire knowledge, skills, attitudes, and experience. The use, suitability, and cost of individual learning methods is to be seen from a number of perspectives, namely the purpose of employee training (adaptation/retraining/retraining/development of employees (career management)) [53], in terms of the number of participants in education, from the point of view of the place of education (in the performance of work/outside the workplace), from the point of view of the working position of the trained [35], and last but not least, from the point of view of the education provider (internal/external lecturer, agency). The level of focus of organizations on education and development in Europe, as well as in the world, is a topic on which research networks are focused, such as the Cranfield Network (worldwide), HPDCEEUS (Human Potential Development in Central and Eastern European States) (Central and Eastern Europe), and PAS (Business Alliance of Slovakia) (in the Slovak Republic). What confirms the topicality of the issue and also promotes the whole community awareness of the need for change from random, unplanned access to education (i.e., education where necessary courses and training are carried out only on the basis of the need to acquire the given knowledge or experience) to a holistic approach to education, to the so-called concept of a learning organization of P.M. Senge [11,54], who characterizes the learning organization as a place where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together [55].

The learning organization is learning at the level of individuals, teams, organizations, and even at the community level with which the organization is in contact—it develops the capacity of an organization to innovate and grow [56–58]. Key factors within the learning organization are trust, open communication, a high level of engagement, and the environment of challenges, competitions, and a creative atmosphere [41] that promote learning and enable it to be shared. An effective sharing of knowledge can represent a significant potential for organizations. Sharing knowledge consists of capturing, processing and organizing, re-using, and transferring knowledge within the organization, ensuring that this knowledge is available to all staff in the industry/organization. A number of studies have shown that knowledge sharing is crucial to the development of human resources and organizations as a whole, as it enables organizations to improve their innovative performance and reduce over-effort in learning [53,59,60].

However, the sharing of knowledge itself should not only remain within the boundaries of the organization but should overcome them. Sharing knowledge across external environments

through so-called knowledge networks is discussed in a number of studies [61–63]. It is through the involvement of external partners (business partners, educational and research institutions) in the sharing of knowledge that the process of training and development of human resources in the enterprise is significantly improved.

*1.2. Employing External Partnerships for Employee Education and Development*

From a broad perspective, Fayol described networking relationships, but later, Drucker, Savage, or Nolan et al. at the end of the 20th century, emphasized the importance of teamwork and network structures [64]. Collaboration with external partners may, however, take different forms. We can distinguish these based on the number of members, the geographical position of the members, the type, or the purpose of the collaboration. Transaction-based partnership cooperation is the most common type of partnership driven by economic factors. This kind of cooperation, however, rarely creates an environment of trust and the form of relationship that stimulates the exchange of knowledge. On the contrary, there are forms of partnerships as knowledge networks that are designed to promote knowledge creation and sharing. Du Preez has defined knowledge networks as a set of people and resources, and relationships between them that enable them to capture, transfer, and build knowledge to create value. An integrated knowledge network covers all domains, communities, and relationships to promote innovation sustainability, which will continue to support the sustainability of business competitiveness/their users [65].

The concept of knowledge networks is often understood also as information networks, expert networks, practice-oriented communities, or strategic alliances, depending on the interest of the members, their quantity, or the openness of such a network [66]. The authors of this paper understand knowledge networks as any internally coordinated network—a community of organizations which has their main interests in the promotion and exchange of knowledge. Such networks can also work in the form of online communication between partners, for example, through their own e-learning platform or online learning. An optimal form of such a partnership is, for example, business cooperation with universities. The success of the knowledge network, however, depends closely on the relationships and trust of individual members. According to Morone and Taylor, social relationships between network participants can directly excite the process of learning [67].

In general, we can distinguish between two types of knowledge networks depending on the formality. Formal knowledge networks are structured networks that are governed by internal guidelines, rules, and agreements that direct their activities. Their primary focus is on knowledge generation, cumulation, and sharing [66]. They can exist within the internal environment of the organization as internal knowledge networks, as well as beyond the organization. Such networks may include other organizations, sectors, and countries.

Informal networks are a frequent form of networks that can occur at random or are even targeted. However, such networks are not too stable, and their service life is short. Such networks are mostly passive, and members have to come directly to the network to benefit from it.

According to knowledge management needs, two network models can be distinguished: explicit knowledge transfer and intellectual property networks that use existing knowledge and networks to develop new knowledge to innovate [44]. There may be cooperation with partners, educational and research institutions, or public-sector entities in both types of networks.

In much research, an intensive debate on the most profitable models of cooperation has taken place and, on the basis of research [68], networks with many strong links are more manageable and beneficial for intensive cooperation that is crucial to building trust [69], exchange of quality information [45], and implicit knowledge [47]. On the other hand, more "open", freely bound networks with many weak links [70,71] have different advantages. In this open network configuration, subjects can build relationships with several unrelated actors and explore external knowledge resources [23,72]. Nevertheless, such open networks are associated with greater uncertainty and are less manageable [68].

Support for human resource education and development through cooperation with external entities can take various forms, whether it will be the aforementioned collaboration of organizations with universities taking place in the form of online communication using its own e-learning platform or online learning, or through the participation of individual actors in educational workshops.

Employee training can be supported by different forms of partnerships. For example, a lot of clusters, which were defined by Michael Porter in 1990 in his book "Competitive Advantage of Nations" as "a geographically close group of interconnected enterprises, specialized suppliers, service providers and related institutions in a particular field, and companies in related fields that compete together but also have common features and cooperate together" [73], includes governmental or other institutions—universities, law-making agencies, research teams, or business associations—providing specialized training, education, information, or research [74]. The benefits of clusters in the area of education for its members are mostly in educational services for members of the cluster being based on their specific needs. A cluster attracts the attention of the bearers of new knowledge, because it organizes the whole range of dynamic enterprises (being in clusters declares willingness to improve, educate, and grow) and allows a flexible dissemination of this knowledge [75]. Therefore, participation in such clusters can significantly improve the training and development of employees.

The fact that a customer can, in addition to feedback and reviews, provide the enterprise with ideas for innovation and be part of the innovation process is confirmed by several studies [76–80]. The identification and use of key customers have a positive effect on enterprise innovation performance [81]. However, feedback from customers can also be a good source of incentives for human resource development, as in many companies, employee evaluation is a key source of incentives for employee education and development, which often includes customer feedback. However, large customers can and often also participate in, the training of subcontractors, mainly in order to ensure the continuous fulfillment of their own strategic goals. Subsidiaries are able to respond more effectively to changes in demands coming from wholesalers thanks to such support.

The relationship of organizations with research institutions and universities has been relatively intensified in the past due to mutual need. Organizations are aware of their limited access to knowledge, equipment, and capital, and it is also important for universities and research institutions to commercialize their research and thus to source resources for further research activities. Their formal cooperation, in particular, results in tangible results, such as patents, research publications, and licenses. Informal cooperation is used for organizing and participating in conferences, workshops, making contacts and relationships, consultations, and searching for qualified staff with intangible results that mainly support education, development, and sharing of human resource knowledge in participating organizations [82].

## 2. Materials and Methods

The aim of the research was to analyze the approach of the organizations surveyed to internal and external types of employee training and educations. In the survey, groups of organizations were compared based on the country in which they operate. Within the countries surveyed, a sample of high and less innovative countries was selected, consisting of companies from Austria, Germany, and Switzerland, compared with a group of organizations from Slovakia and a group of organizations from the Czech Republic. Research groups were selected based on the European Innovation Scoreboard 2017, where Austria and Germany were strong innovators to innovation leaders, while Slovakia and Czech Republic were moderate innovators. The European Innovation Scoreboard 2017 was conducted working with results from 2015/2016. In 2017, Slovakia and Czech Republic remained in the same group of moderate innovators, being less innovative compared to Austria and Germany. Each selected group consisted of similar number of respondents in order to provide selected statistical analysis.

The research was conducted as part of a research project in 2015 and 2016. The data collection was conducted by an electronic questionnaire distributed directly to the respondent, mostly to managers and the directors of organizations. The survey included a total of 1482 organizations, of which 489 respondents

were from Slovakia, 419 respondents from the Czech Republic, and 574 respondents from Austria, Germany, and Switzerland. For the purposes of this research, we will further refer to the group of respondents from Slovakia abbreviated as "SK", the group of respondents from the Czech Republic as "CZ", and the group of respondents from Austria, Germany, and Switzerland as "AT, DE, CH".

*2.1. Research Structure*

In order to fulfill the aim of this research, the structure of the research analysis can be split into two sections. The first section of the research was focused on analyzing the differences among selected countries (SK; CZ; AT, DE, CH). Groups of companies from each country were at first compared on the basis of country of operation, to see and identify statistically significant differences. Further, the differences where compared based on size of companies and maturity of companies for deeper analysis. This deeper analysis allows the reader to understand more deeply in which types of organizations these differences occur, which may have an effect on general results of our study. In the case of analyzing companies it is important to keep in mind that behavior of an organization may differ when they are small sized, large, starting, or mature.

The second section of the research was to analyze current stages of internal education systems from the point of view of subjective assessment of researched companies, as well as their attitude towards investment in human resources. The aim of this section was to provide supporting data on the behavior of companies in the question of education systems, which also serve as support for interpretation of key differences found in first section of this study.

*2.2. Research Questions*

In the survey, the respondents answered three questions describing the current status of partnerships in employee education, the quality and maturity of enterprise education systems, and perceptions of the importance of investing in human resources in terms of long-term business prosperity. Respondents responded to the question "Is your business engaged in some of these forms of partnership and collaboration?", where respondents answered on scale 1–5 (1—representing never, 2—almost never, 3—sometimes, 4—often, 5—all the time) to these alternatives of partnerships and collaboration: employee training in external organizations; training courses, coaching, and development programs provided by external specialists; staff travel to partner organizations; cooperation with research institutions; cooperation with secondary schools and universities; joint business activities with other entities (e.g., development, advertising, logistics); cooperation with competitors (e.g., partnerships in specific projects); a close link in supply and demand chain; engagement in knowledge networks, alliances, joint ventures. For the purpose of this research, we divided respondents based on their answer to those who regularly engage in the partnership (answers on scale 4 and 5) and those who do not engage in the partnership regularly (answers 1, 2, and 3).

The aim of this question was to find out the level of utilization of the analyzed types of partnerships in the individual groups studied, especially in comparison with internal and external types of education. Supported by statistical analysis of the chi square test, it was thus possible to ascertain through this question whether there are significant differences between the surveyed countries.

The question "Assess your organization's environment in terms of quality, maturity, and activity in the following areas" was to find out how the company assesses the current state of education in the firm, with companies reflecting on the options: level of external partnerships in education and knowledge acquisitions; internal system of education; knowledge management and development. Respondents were able to express perceptions of the level of the given type of education on a scale of 1–5, 1 representing very low maturity, quality, and activity of the given education; and 5 representing a very high degree of maturity, quality, and activity of the given education. On this issue, we have more closely analyzed the significance of the differences between the countries surveyed.

On the question "Which of the following areas do you consider to be key to the long-term management of the company's financial performance (long-term ability, ROA, etc.)?", respondents answered the option: investing in human resources, responding on a scale 1–5, 1 representing not at all key to the long-term prosperity of the business, 5 is absolutely crucial to the long-term prosperity of an enterprise. The aim of this question was to find out how individual organizations in the countries surveyed perceive investment in human resources and whether there are significant differences between the surveyed countries, between individual sizes of the companies, and between different levels of the maturity of the surveyed companies.

We used advanced statistical methods in the research to analyze the significance of the differences between the studied groups using the non-parametric chi square test method. Within the research groups, we aimed to achieve a statistical sample of more than 400 respondents in each of the countries surveyed, thus generalizing the conclusions from the statistical analyses to the total population of the surveyed countries.

## 3. Results

Figure 1 shows the percentage comparison of the SK, CZ and AT, DE, CH group of organizations in the question of engagement in selected forms of partnership and collaboration.
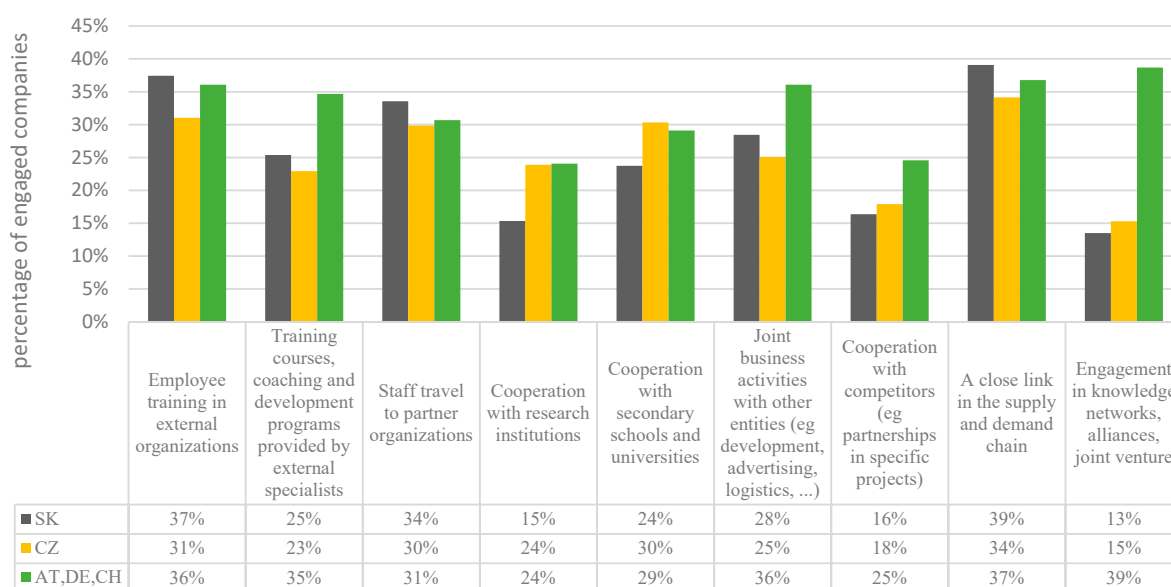
**Figure 1.** Percentage comparison of the Slovakia (SK), Czech Republic (CZ), and Austria (AT), Germany (DE), and Switzerland (CH) group of organizations in the question of engagement in selected forms of partnership and collaboration.

The result of statistical comparison of significance in differences among the group of SK, CZ and AT, DE, CH organizations in the question of engagement in selected forms of partnership and collaboration is presented in Table 1. Statistical significance of the data was tested at the *p* = 0.05 level.

**Table 1.** Statistical comparison of significance in differences among the group of SK, CZ and AT, DE, CH organizations in the question of engagement in selected forms of partnership and collaboration (significant difference—yes, nonsignificant difference—no).

| | Employee Training in External Organizations | Training Courses, Coaching and Development Programs Provided by External Specialists | Staff Travel to Partner Organizations | Cooperation with Research Institutions | Cooperation with Secondary Schools and Universities | Engagement in Knowledge Networks, Alliances, Joint Venture |
|---|---|---|---|---|---|---|
| *Chi SK-CZ* | yes | no | No | yes | yes | no |
| *Chi SK-AT, DE, CH* | No | yes | No | yes | yes | yes |
| *Chi CZ-AT, DE, CH* | No | yes | No | no | no | yes |

In the comparison of selected groups of organizations, there were several differences identified concerning the engagement in analyzed partnerships. Thirty-seven per cent of the SK companies engaged regularly in employee training in external organizations, followed by 34 per cent of the SK companies engaging in staff travel to partner organizations. In the case of staff travel to partner organizations, a significant statistical difference among selected countries was not found. In the question of employee training in external organizations, significant statistical difference was found between the SK and CZ companies, where the CZ companies engaged in this type of partnership for education by 6 per cent less than the SK companies.

From the point of view of other external types of education, we further looked at cooperation with research institutions, secondary schools, and universities. In both partnerships, there was a significant statistical difference found between the SK and CZ companies, as well as between the SK and AT, DE, CH companies. SK companies engaged less than the CZ and AT, DE, CH companies in both cooperation with research institutions and secondary schools and universities.

As internal types of education, we analyzed the question of training courses, and coaching and development programs provided by external specialists and the question of engagement in knowledge networks, alliances, and joint ventures. In both internal types of education, we found a significant statistical difference between more innovative and less innovative countries. The AT, DE, CH companies engaged in both partnerships for internal types of education more than the SK and CZ companies. This difference was by more than 10 per cent in training courses, and by more than 20 per cent in knowledge networks.

In the general comparison of countries, we can see that more innovative countries, which are represented by the AT, DE, CH companies, engage more in internal types of education than less innovative countries, represented by the SK and CZ companies.

Based on differences found among the countries surveyed, we further focused on analyzing differences between countries from the point of view of company size and company maturity, in order to identify where the main differences that have an effect on general differences found in Figure 1 and Table 1 occur.

Figure 2 compares the differences between the countries surveyed on the basis of company size.

From the analysis we can observe that micro companies from all countries surveyed have the most similar behavior in the case of engagement in partnerships for education, except in the case of engagement in knowledge networks. The AT, DE, CH companies engage more in knowledge networks in all sizes of companies compared to the SK or CZ companies. In the case of another internal type of education—training courses—differences also do not occur in small sized companies but do occur in medium and large. In both cases, the AT, DE, CH companies have the highest assessment, followed by the SK companies. The CZ medium and large companies engage in training courses by external specialists the least. Looking at behavior of more innovative countries represented by the AT, DE, CH countries, we can see that engagement in internal type of education—training courses etc.—increases with the size of a company.

**Figure 2.** Comparison of average assessments of the SK, CZ, AT, DE, CH companies in the question of engagement in selected forms of partnership and collaboration with deeper comparison based on company size.

Comparing external types of partnerships, we observed that employee training in external organizations and staff travel to partner organizations was most similar in micro companies. Differences increase with the size of a company, while the SK companies have the highest assessment in all types of company sizes. An interesting observation was when looking at cooperation with secondary schools and universities. While the micro and small SK companies have a lower assessment than the AT, DE, CH companies, the medium and large SK companies have a higher assessment than the AT, DE, CH companies, thus engaging in this type of cooperation more when medium sized or large.

Figure 3 shows a comparison of average assessments of the SK, CZ, AT, DE, CH companies in the question of engagement in selected forms of partnership and collaboration with a deeper comparison based on company maturity.

The comparison of company sizes has shown specific differences that have an effect on general behavior of countries in this research. It is also important to look at company maturity to analyze the differences. Company maturity defines the stage of life cycle of a company regardless of its size. In the case of engagement in knowledge networks, large differences between the AT, DE, CH companies and the CZ and SK companies was seen in all stages of maturity. Training courses have more similar assessments, except in the case of starting companies, where the highest assessment is seen in the CZ companies, due to the most often average assessment on scale. An interesting observation in external types of education is in the case of cooperation with research institutions and secondary schools and universities. In both options, the largest difference is observed in the case of the SK and AT, DE, CH

starting companies. Behavior of the SK and AT, DE, CH growing and mature companies is, however, much more similar.

**Figure 3.** Comparison of average assessments of the SK, CZ, AT, DE, CH companies in the question of engagement in selected forms of partnership and collaboration with a deeper comparison based on company maturity.

The average assessment of the SK starting companies in cooperation with secondary schools and universities of 1.84 is very low, even when comparing with the CZ companies (2.74), as well as the AT, DE, CH companies (2.85).

For interpretation of differences found among countries surveyed, it is important to look at the company's education systems in terms of its level of maturity and quality, and its importance for the company. We further analyzed the behavior of the SK, CZ and AT, DE, CH group of companies in two questions.

The next figure depicts a comparison of average assessments of the SK, CZ and AT, DE, CH group of organizations in the question of evaluation of the organization's environment in terms of quality, maturity, and activity in the selected areas.

The result of a statistical comparison of significance in differences among the group of the SK, CZ and AT, DE, CH organizations in the question of evaluation of the organization's environment in terms of quality, maturity, and activity in the selected areas is presented in Table 2. Statistical significance of the data was tested at the $p = 0.05$ level.

**Table 2.** Statistical comparison of significance in differences among the group of SK, CZ and AT, DE, CH organizations in the question of evaluation of the organization's environment in terms of quality, maturity, and activity in the selected areas (significant difference—yes, nonsignificant difference—no).

|  | **Internal System of Education, Knowledge Management and Development** | **Level of External Partnerships in Education and Knowledge Acquisition** |
| --- | --- | --- |
| SK | 3.28 | 2.95 |
| CZ | 3.18 | 2.89 |
| AT, DE, CH | 3.46 | 3.16 |
| Chi SK-CZ | no | no |
| Chi SK-AT, DE, CH | yes | yes |
| Chi CZ-AT, DE, CH | yes | yes |

AT, DE, CH evaluated their organization in the field of external partnerships in education and knowledge acquisition higher than the SK and CZ companies, this difference being found to be significant between the SK and AT, DE, CH companies, as well as the CZ and AT, DE, CH companies. The internal system of education, knowledge management and development was also rated higher by the AT, DE, CH companies, with a significant difference to both SK and CZ compared with the AT, DE, CH companies, as shown in Figure 4 and Table 2.
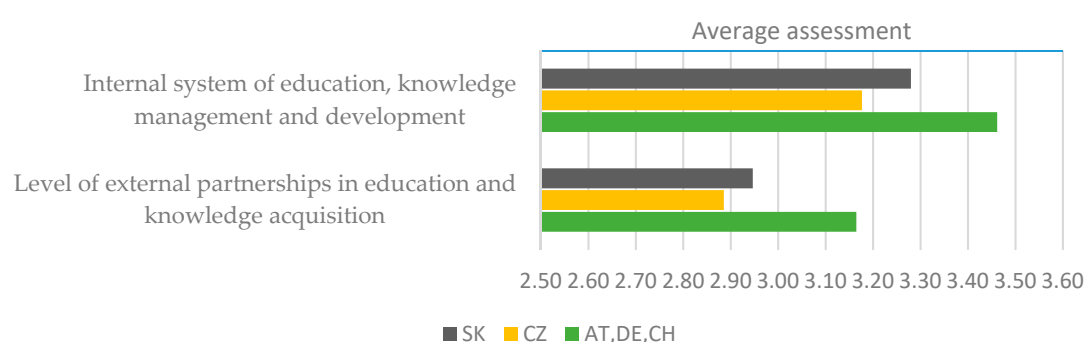
**Figure 4.** Comparison of average assessments of the SK, CZ and AT, DE, CH group of organizations in the question of evaluation of the organization's environment in terms of quality, maturity, and activity in the selected areas.

Figure 5 depicts a percentage comparison of the SK, CZ and AT, DE, CH organizations that consider investment in human resources as key to the long-term management of the firm's financial performance.
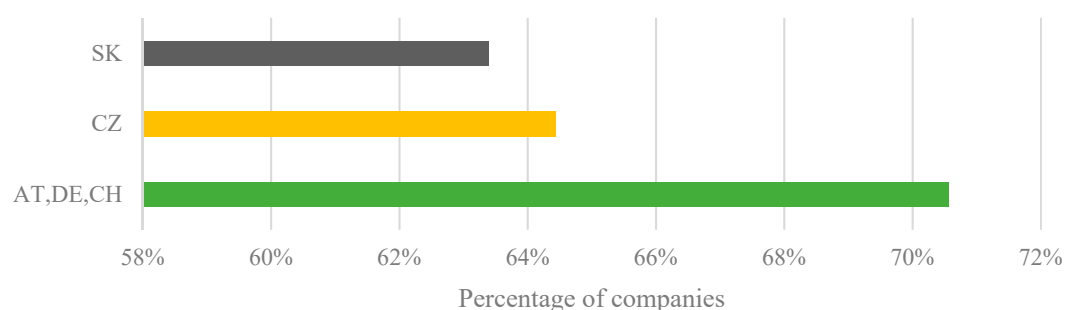
**Figure 5.** Percentage comparison of the SK, CZ and AT, DE, CH organizations that consider investment in human resources as key to the long-term management of the firm's financial performance.

Table 3 presents a statistical comparison of significance in differences among the group of SK, CZ and AT, DE, CH organizations in the question of seeing investment in human resources as key to

the long-term management of the firm's financial performance (long-term ability = sustainability of goals such as profit, ROA, etc.). Statistical significance of the data was tested at the $p$ = 0.05 level.

**Table 3.** Statistical comparison of significance in differences among the group of SK, CZ and AT, DE, CH organizations in the question of seeing investment in human resources as key to the long-term management of the firm's financial performance (significant difference—yes, nonsignificant difference—no).

|  | Investment in Human Resources |
| --- | --- |
| **SK** | 63% |
| **CZ** | 64% |
| **AT, DE, CH** | 71% |
| **Chi SK-CZ** | no |
| **Chi SK-AT, DE, CH** | yes |
| **Chi CZ-AT, DE, CH** | yes |

Investing in human resources was most considered to be the key to the long-term management of the firm's financial performance with the AT, DE, CH group of organizations (71 per cent). Significant differences were found between the SK and AT, DE, CH organizations, as well as the CZ and AT, DE, CH organizations, with fewer SK and CZ organizations considering investing in human resources to be highly important, as shown in Figure 6 and Table 3.

**Figure 6.** Unemployment development in countries surveyed (OECD Data).

As we can see from the subjective assessment of researched companies, the AT, DE, CH companies perceive their internal system of education to be more evolved than the SK and CZ companies. The AT, DE, CH companies also invest in human resources more than the SK and CZ companies. The level of maturity of a company's education system is, however, interrelated with their attitude towards human resources and their development and education.

In the whole sample of 1482 companies, we found a significant moderate correlation of 0.28, tested at the $p$ = 0.05 level, between the level of the internal system of education and investment in human resources.

## 4. Discussion

Sustainable human resources development and knowledge sharing as part of relationship capital [83] enables companies to manage their adaptation to Industry 4.0 [84–86] and grant them

the "how to do" expertise in this process. Openness towards external knowledge sources [87] and partnerships [88] in training enables firms to access the knowledge in developing appropriate procedures and solutions required for Industry 4.0 transition. Also, according to the research by Götz and Jankowska [89], these challenges will drive companies to assure network embeddedness and to collaborate, share risks, and jointly learn. They expect the transformation of clusters for better and wider cooperation.

Our comparative study verified these assumptions that the openness in retrieving new knowledge through interactions with external partners depends on R&D and HRM capabilities. More mature and more innovative economies (AT, DE, CH) show significantly higher levels in cooperation with external partners and engagement in knowledge networks. On the other hand, the lower levels of external partnerships in training and human resources development can be interpreted as the outcome of lower maturity levels of R&D and HRM processes. The group of companies from more innovative countries (AT, DE, CH) obtained better assessments in both internal systems and external partnerships in training, personal development, and knowledge acquisition.

The findings of our survey identified also a large difference in maturity among the groups surveyed. Organizations that are reliant on higher activity in education and development are more open in the cooperation with other businesses, as well as cooperation with universities.

Traditionally, organizations have secured the necessary staffing structure based on their qualifications and skills primarily from the labor market. In particular, the Eastern Bloc countries have long been in a situation of higher unemployment and low competition in the labor market, which has enabled businesses to acquire skilled workers without the need for a developed system of education and development.

The situation is visible when comparing the development of unemployment and the level of maturity of human resource development systems between the AT-DE-CH and CZ-SK countries.

Given the changing situation, it is advisable to draw inspiration from examples of countries (AT-DE-CH), which have long-term low unemployment rates and hence a higher need for training and development of their own employees (OECD unemployment rate).

Organizations in the Czech Republic and Slovak Republic will have to find inspiration in a short period of time and look for specific examples if they want to ensure the requirements for the structure and quality of human resources. According to the analyses of Kazancoglu and Ozkan-Ozen [90], the transformation of traditional production systems to smart factories, and the increase in the need of intelligence level from employees will foster the importance of the ability of dealing with complexity, problem solving, and thinking in overlapping processes and flexibility.

The second topic supporting the necessity to shift the education system in the CZ-SK organizations is a need for professions that are not in the labor market.

Industry 4.0, and in particular automation that interferes with multiple processes and professions, gradually changes employee education and skills requirements [91–94]. It is not just about adding up the quality of newly recruited employees to the existing qualifications structure but gaining employees with different and new skills. It seems that professional vocational and academic training will be a success factor for the implementation of digitalization [3].

The need for cooperation with universities will be indispensable for communicating the need for graduate education, but also for identifying the right competencies in relation to the goals the organization is trying to fulfill.

Partnerships and networking activities will help to develop a common approach to education, development, and sharing of approaches to developing specific skill requirements or employee knowledge.

Several managerial implications follow from this discussion and should be of interest to managers.

First, this study contributes to a better understanding of interconnection between HRM maturity and the level of external partnerships and knowledge network activity. Managers mainly in Slovak companies must enhance activity in the field of training and personal development, not

only in the context of a lower unemployment rate, but also in the context of changes directed toward Industry 4.0. The higher activity and higher perceived need for improvement should then lead to higher levels of openness in training and human development. HR (Human resource) have to take proactive steps to engage external knowledge and unitize it internally [6]. These activities should also lead to transformation of clusters operating in the Slovak Republic and Czech Republic to be more active in knowledge sharing and offering training development programs. Differences between countries with a higher degree of maturity among innovative leaders and the need for cluster transformation is also the result of a comparative study [95]. Clusters, science parks, technology incubators, innovation centers, and accelerators are still developing areas where they operate, and we can expect progress also in the future [96]. We identified a significant difference between the SK and CZ companies compared to the group of AT, DE, CH companies, which is more than 24% in the question of engagement in knowledge networks. For future development in the Slovak and Czech economy, it is essential to improve the operation of clusters and widen the focus also on knowledge sharing, training, and collaboration support.

According to Ryan, Geoghegan, and Hilliard, it is important to start to measure the knowledge sharing activities and the impact of university–industry collaboration on innovation [97].

Measurement is the main aspect of intellectual capital management and other strategic performance management approaches [21,22]. Better and proper monitoring and measurement of external learning processes and knowledge activities could assure that the visions of sustainable human resource development will be fulfilled.

Second, the rise of new positions following automatization and computerization of work fosters the need for the cooperation with universities and research institutions. This study shows that growing companies understand this need, and the behavior of the SK and AT, DE, CH growing companies is almost similar. Cultural specifics, that limited for a long time the innovation activity in the Slovak Republic and Czech Republic and complicated the implementation of open innovation principles, should be overcome also in the field of human resources development. Openness towards external knowledge sources enables companies to obtain new specific, e.g., technological knowledge, needed to foster their innovation processes and discover their role in the new Industry 4.0 environment. Daudt and Willcox indicate that the main driver for new technologies is the opportunity for creation of new markets and then effective incorporation of these emerging new technologies [98]. It is clear that new technologies may enable new economic activities or revitalize traditional industries. This means a big opportunity for both Slovak and Czech companies and the Slovak and Czech economy.

Overall, this study contributes to a better understanding of the value of external partnerships in training and personal development and reveals a partial view on sustainable human resource development.

## 5. Limitations and Future Research

We acknowledge several limitations in our research paper and suggest related opportunities for future research. First, we examined only limited types of internal and external forms of training and development to identify whether was there any difference between highly innovative countries and less innovative countries in Central Europe.

Second, we focused on selected groups, so we cannot compare our results with the developments in all European countries. Moreover, we did not evaluate the differences between companies in the group of AT, DE, CH countries. There can be some differences based on industrial structures and their readiness for Industry 4.0.

Limited research, however, has focused on the actual topic and pointed out some significant interconnections, that should be taken into consideration.

Further studies are needed to test the level of partnership in other contexts; also, in R&D and open innovation. Future research should include more detailed forms of training, supplemented by perceptions of new digital competencies and the new role of human resources in organizations.

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