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Developing controlling methodology based on HR specification factors

The Theses of the PhD Dissertation

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1. ANTECEDENTS AND OBJECTIVES OF THE WORK

1.1. Actuality and importance of the topic

In the current economic context, the globalisation of economic competition and the dynamic change of markets has a significant effect on enterprises' activities and business life. Organisations have to permanently adapt to the ever-changing environment, so that their activities remain continuous, and they can be assured in their successful operations. However, in order to achieve this, they need their decision-makers, the enterprise executives to be in possession of relevant and well-analysed information, which help them identify external effects in a timely manner, and find the best answers to said effects. Controlling, as a decision-making preparatory subsystem operates with a complex effect system that helps enterprises identify and block hazards and properly make use of opportunities, by analysing the data of past, present and future. Following trends, and keeping an eye on the enterprise's internal and external factors increases the adaptability of enterprises, which makes it possible to conduct financially and economically efficient operations.

As the human factor has a decisive role in the value creation process, more and more decision-makers consider the efficient usage of labour force in order to increase competitiveness as being a central question. By starting from this axiom, long-term survival is only open to organisations, which work out a strategy pointing towards development. The role of human resource management is to make employees contribute to the organisation's goals with their individual performances as much as possible. Integrating the perspective and functions of controlling into the human resource management may help with this goal, as they generate renewing and paradigm-changing effects that impact beyond the objective, measurable factors of human resource performance, towards less measurable factors like enterprise culture.

Generic technological development already highlighted that by improving data analyses, and by improving the organisation's digital development, production performance can be increased, which were further validated by the effects of the pandemic. Reason being, labour force became a primary priority due to COVID, and the human resource management discipline became more valued in enterprise decision-making and strategizing. By most enterprises becoming forced to introduce teleworking due to the global pandemic, HR managers could finally prove their change management and advisory capabilities, by offering the necessary guidance and education for teleworking. Furthermore, they needed to assure even more prevalence for

digital enterprise culture and development, betterment of employee experience in teleworking.

In my doctoral thesis, I research the development possibilities of controlling methodology using HR specification factors. My research is based on three main pillars. I analyse the role of human resource in the organisation, and link it to controlling, functional controlling activities. I specifically focus here on the mission and main tasks of human controlling. Furthermore, another topic of my analysis is: what kind of role do these activities have in working out a resilient enterprise management? How, and with what methods can they assist the digital transformation of enterprises? The focus of my research is redefining the human resource management, creation of data-driven HR activities, their development, and the effects they all have on the shape of enterprise culture. By keeping the economic effects of the Coronavirus pandemic in mind, yet another goal of my research is to identify the impact the Coronavirus pandemic's appearance had on enterprise culture, and activities related to human controlling.

The actuality of my topic is further strengthened by the depression caused by the Coronavirus pandemic, the process of digitalisation, and the necessity to obtain and manage technological and adaptive knowledge. The process of controlling in its traditional definition does not create value. It covers concurrent activities defined by the specific attributes of a given enterprise, which was created in order to unearth the problems within the enterprise, and find solutions with the executives of the area in question. As an end to this activity, the focus is to increase enterprise efficiency as much as possible. As such, the most notable role of controlling is to support management as much as possible, offer advice, and further develop controlling tools and methods. The importance of controlling comes from how its efficient operations guarantee that the executives of the enterprise (decision-makers) are supplier with concurrent and up-to-date, however, filtered, structured, and evaluated information related to the enterprise's weaknesses. Furthermore, even in a changing economic environment, it assists flexible reactions to changes. These functions should be analysed using their roles held in the digital transformation processes. Based on the above, a controlling system can only efficiently work in an organisation which has a behavioural culture focusing on responsibility and decision-centric thought process. During the operation of large enterprises, employing a controller, or creating a controlling division is indispensable for the efficiency to be optimal. Naturally, the size of the enterprise has a significant effect on the structural strength of controlling's fundamental conditions (management accounting, planning, validation and reporting systems).

Human controlling is one of the areas of functional controlling. Its fundamental function is to assist in establishing a cost-sensitive human resource management, and make it possible to identify the weaknesses of employment, while serving as a basis for decisions of executives. During its operations, it generates necessary changes itself. Personnel controlling's most notable tasks are to plan employment, wage, fringe benefits and education, and to collect and validate information related to the abovementioned, furthermore, to create reports and analyses. It's advantageous to integrate some assisting, helping tasks into the strategic human controlling functions, like the employer brand development, human-centric thought process, and the assurance of employee motivation. These strategic functions can assist the enterprise in keeping employees with key competences even during enterprise transformation processes.

The tasks of personnel conducting controlling activities include, in part, to define enterprise goals together with the executives, to collect and offer useful and up-to-date information for assisting decision-making, efficient participation in economic planning, evaluation of results obtained, comparison of planned and factual values, and if applicable, identification of the reasons behind deviations, and in the meantime, selection of areas to intervene in. However, there are no standard systems which could offer optimal and successful operations for any given enterprise. The controlling system always has to be shaped specifically to the image of an enterprise, in other words, there is no "blueprint" that could be applied to any enterprise due to different areas find different indicators useful and relevant, and there may be differences in values to reach as well. During the doctoral topic's research, it's my task to analyse how human controlling can shape workforce, develop the enterprise culture, and build on data-driven activities in a way that they develop the enterprise's adaptive operations.

1.2. Goals of the research

Due to the complexity of my research, I found it adequate to focus on five main areas of interest. The heart of the research is built upon the questions and specific goals coming from the interest of the researcher. Defining the research questions focuses the research work, shows the specific areas which the researcher needs to unearth more information and connections. After the selection of the topic, the research goals are specified. The main goal of my research is to highlight human resource's increased value in the enterprise decision making process and strategizing, further stressing the management of the issues caused by the Coronavirus pandemic, and the steps taken towards

digital transformation. In order to facilitate this, during my dissertation, I will analyse the connection between operating the controlling operations and the functions assisting the efficiency of human resource. I found it indispensable to analyse the changes induced in the human controlling attitude of enterprises by the Coronavirus pandemic. Accelerated markets, new technologies and data science's importance rising all affected controlling systems, causing concurrent changes. Therefore, my analysis also deals with the digital transformation processes of enterprises, and the organising of enterprise culture and its changes.

I designated my targeted areas of interest using the theoretic literature background, and the practical enterprise management actualities. By interpreting and synthesizing the abovementioned, I designated hypotheses directly connected to the goals as well. I believe that the man, as the only long-term, efficient and renewable resource of the enterprise can offer an answer to the question of increasing efficiency, to manage the hazards caused by the pandemic, and to manage the processes of digital transformation.

The goals of my research are as stated below:

Q1: How can controlling's activity and functions help efficiently assist human resource management?

In recent years, the role taken up by controllers in enterprises have increased, which makes it insufficient to operate a generic controlling division, and conducting classic reporting and cost-calculation tasks. Focus has to be put instead on answering the challenges of the changing environment, both for the areas of expertise and the global enterprise. In relation to the analyses of business efficiency areas of interest, one of the most important questions is: how was controlling and controllers' positioning changed in today's business environment, most notably the area of human resource management?
G1: During my dissertation, I wish to define controlling and human resource management, and identify their relations to functional human controlling's development, keeping their role in business and human efficiency increase in mind.

Q2: What effects did the Coronavirus pandemic have on the activities of enterprises related to human controlling?

The accelerated market world's economic and social challenges caused more and more enterprises in recent years to understand the strategic importance of caretaking-type HR activities. The pandemic caused never before seen challenger so occur, which further intensified this effect, where the

employees' mental and physical wellbeing synergises with the efficiency of enterprise operations. Uncertainty, changing work environment (f.e. teleworking), overworking, and such affect – among others – balance between work and private life, connections with colleagues and management, and the employee's dedication. Taking these effects into consideration, I considered the question of: what changes did the Coronavirus pandemic induce in the activities of the enterprise related to human controlling?

G2: My goal is to analyse how the appearance of the Coronavirus pandemic transformed the activities and tasks of the enterprise related to human controlling.

Q3: How can we define the steps taken by the enterprise towards digital transformation?

Digital transformation is accelerating at an unprecedented rate. I believe that digital transformation isn't about getting from point A to point B, but about the journey taken. A while ago, it was surely possible for enterprises to realise life cycle management – they could prepare, plan the project in question, execute it, and create development processes, before actualising. In other words, they knew exactly that f.e. in the next five years, it would work. However, this approach simply won't work today. This is why it's important for enterprises to sense, find and employ the proper velocity of digital transformation. They have to rethink again and again what information, what timeframe, and what intervention is necessary to take the first step of employees towards the new technologies, which help them develop necessary processes.

G3: My third goal is to create a model that identifies the causes behind digital transformation, and its process.

Q4: How did challenges, enterprise transformation processes change the strategy for keeping employees?

This is a very timely question, as the uncertainty caused by the quickly changing world, and the challenges caused by the Coronavirus pandemic showed that losing a good colleague can cost an enterprise a lot. As such, the secret to enterprise success is also in the perseverance of the employees, but we may question if the enterprises really do enough for them. What operative and strategic activities can motivate employees, and help the enterprise keep them? How can human controlling assisted by technological force offer quick and analysed information for employers which can offer them insight into f.e. the payoff of invested capital, and its efficiency? Even in the case of intellectual capacity, furthermore, possible potency hidden in the enterprise's knowledge capital?

G4: My goal is to analyse what operative and strategic interventions enterprises made due to the Coronavirus pandemic, in order to keep employees.

Q5: How can the transformation and resilience capabilities of enterprise culture be increased enough to liberate the enterprise from the Coronavirus pandemic's shadow?

In order to work efficiently, employees need a safe, long-term perspective, which means not only financial security, but professional development and human-centred enterprise culture, in addition, relaxing and accepting work atmosphere are all necessary. As a direct effect of this, human controlling needs to work out complex operative and strategic tasks like human-centred, welfare-focused enterprise culture's establishment, working out various levels of training, and integrating innovation and agile fundamental values into the organisation. However, in order to do this, they have to move away from administrative tasks, rethink and redesign the supportive, responsibility and guidance roles of the human systems. Along the changing demands, HR's goals, service processes and costs also have to be redefined.

G5: During my research, I wish to statistically prove what changes and organising processes appeared in enterprise culture as a reaction to the Coronavirus pandemic.

1.3. Research hypotheses

The fundamental requirement of a successful research is the properly selected research method. "We can consider research methods as rules and processes, furthermore, the tools or methods bringing us closer to solving the issue at hand". (Ghauri – Gronhaug, 2011; 42.p.) In table 1, a summary of main literature sources and source research can be seen, which were of help during the definition of my doctoral thesis hypotheses. In the Materials and Methods chapter, I will introduce the connections with statistical methods.

1. table Literature background of doctoral thesis

Thought premises		Hypotheses
Bakacsi – Bokor (2000) Körmendi – Tóth (2002) Farkas - Poór et al (2003) Zéman – Tóth (2017b)	Poór – Balogh et al (2021) Dajnoki – Boros et al (2021) Kőműves – Szabó et al (2021b) Majó-Petri – Tóth et al (2021a) Pató – Kunos et al (2021) *Horváth & Partners, XXXII. Budapesti Menedzsment és Kontrolling Fórum, 2021*	**H1:** There's a connection between HR factors' efficiency, the controlling system, the business efficiency, and the IT background support.
Körmendi – Tóth (2002) Bokor – Szőts-Kováts (2014) Gyökér – Finna et al (2017) Karoliny – Poór (2017)		**H2:** The Coronavirus pandemic had influenced the attitude and behaviour of enterprise human controlling.
Zéman – Tóth (2017b) Poór – Schottner et al (2019) Berber - Dordevic et al (2017) OLM (2021)		**H3:** A process-oriented approach describes enterprises' digital development, which can thereby assist the reworking of strategy.
Roóz (2006) Biba (2015) Karoliny – Poór (2017) Otti – Szabó et al (2021)		**H4:** During enterprise transformation processes, keeping key employees has well-defined conditions, which are influenced by the recruitment process, the general enterprise management and the HR context.
Schein (2009) Heidrich (2017) Boada-Cuerva – Trullen et al (2019)		**H5:** The role of enterprise culture became more important after the Coronavirus pandemic appeared, as digitised operation and enterprise culture became necessities.

Source: Self-made

2. MATERIAL AND METHODS

2.1. Materials

Enterprises, which have organised processes of controlling activity (generic central controlling, functional controlling, or both) are in the centre of my research interest and my analysis. Fundamentally, my research was based on both secondary and primary research phases.

The primary research can be divided into two separate big groups, qualitative and quantitative research. "The results of the quantitative research – as opposed to the qualitative research – can be defined in numbers, and generalised for the sample in question. It answers questions like "How much?" "How many?" and data can be analysed using statistical methods." (Sajtos-Mitev, 2007; 20-21. p.) Based on this, I chose to apply questionnaire data collection to the primary analysis of my doctoral dissertation. "Questionnaire is the most widely used primary research, information procurement technique, which is usable for descriptive, explanatory and identification goals." (Boncz, 2015; 32 p) The research questionnaire consisted of 34 closed and 1 open questions, which were compiled using the Google Forms online spreadsheet. The free web-based software of Google helped greatly in my research.

Apart from the results of my secondary research, defining my questions was aided by two large enterprise professionals, who have HR management and controller positions, as they could enlighten me on the practical actualities and challenges of enterprise management. After synthesizing this information, I sorted the questions in the questionnaire into four separate categories, which were generic demographic questions, existence of controlling questions, digital transformation processes' questions, and necessary key competences and performance evaluation questions. The measurements were conducted using the answers to these questions, by usage of ordinal (6-level Likert attitude scale), and ratio scales, which declares what mathematical and statistical processes are allowed during the analyses.

I applied a self-completed questionnaire form, meaning the participant reads and interprets the questions by themselves, which assured that the enterprises could fill the questionnaires out with the most possible anonymity factor. The questionnaire was sent as a pilot to 15 enterprises before finalising. These enterprises were in direct contact with me, making it possible to obtain feedback in order to conduct corrections and specifying unclear points, and to

obtain information about the time required to complete the questionnaire. I offered examples in order to make answering the questions simpler.

The questionnaire was open from 02.02., 2021 to 05.31., 2021, for four months' time. Completing the questionnaire required about 20 minutes. The sampling process of assembling the dissertation's database was aided by the Hungarian Chamber Commerce and Industry, and recruitment agencies. Furthermore, my questionnaire was shared on my own social media site several times, outside my enterprise circle, and posted to several HR professional (f.e. HR Club) sites. Through the national channels which helped share the questionnaire, 342 completed questionnaires were amassed. However, during data processing, data had to be cleaned, as answers logically incompatible with my analysis had to be filtered. This, and the filtering process will be explained further below.

First, Google's answers were compiled into the Microsoft Excel database, which was then migrated into the IBM SPSS (Statistical Package for Social Science) datasheet. The analyses were conducted using the .25 version of SPSS. The calling card of the sampling process is that even with the most meticulous preparation, we can't obtain a sample that perfectly represent the original target of the analysis. In spite of controlling and HR being responsible for internal, confidential information, I considered the number of answers I obtained from my questionnaire to be a success, which were sufficient for validating my hypotheses. Below, I will introduce the main attributes of my sample.

The 28. question of my questionnaire was one of the demographic questions, which asked about the enterprise's size. Act XXXIV of 2004 (the SME Act) lists the value intervals, personnel requirements and other factors, by which an enterprise can be categorised as either an SME or not. If it's a micro-enterprise or not (micro-enterprises have less than ten employees, less than, or equal to 2.000.000 euros of annual net income, or less than, or equal to 2.000.000 euros of balance sheet). If it's a small enterprise or not (small enterprises have less than fifty employees, less than, or equal to 10.000.000 euros of annual net income, or less than, or equal to 10.000.000 euros of balance sheet). If it's a medium-enterprise or not (medium enterprises have less than two hundred and fifty employees, less than, or equal to 50.000.000 euros of annual net income, or less than, or equal to 50.000.000 euros of balance sheet). (MÁK, 2017) 58% of participants were large enterprises, 21% were medium enterprises, 16% were small enterprises, and 5% were micro-enterprises. These were analysed by the operational form of controlling within the enterprise.

2. table Operational form of controlling based on the sample

Operational form of controlling	Questionnaires completed (pcs)	Percentage completed (%)
Generic central	122	35,7
Functional	91	26,6
Generic and functional	75	21,9
None within organisational framework	54	15,8
Total	*342*	*100,0*

Source: self-made

If we look at the data of table 2, we can see that 35.7% of the enterprises have generic controlling, whereas 26.6% said that they also have functional controlling operating within organisational framework. The generic and functional controlling exists in 21.9% of the sample. Therefore, this is the circle that has a developed controlling system among the sample participants. 15.8% of the sample is made up of enterprises that didn't conduct organised controlling processes, but this does not mean that controlling isn't present in these enterprises. The difference between controlling tools, and the method of their application is not only influenced heavily by capital, but the differences in the enterprise's organisational and management systems. (Gonda – Farkas-Fekete, 2018; 11.p)

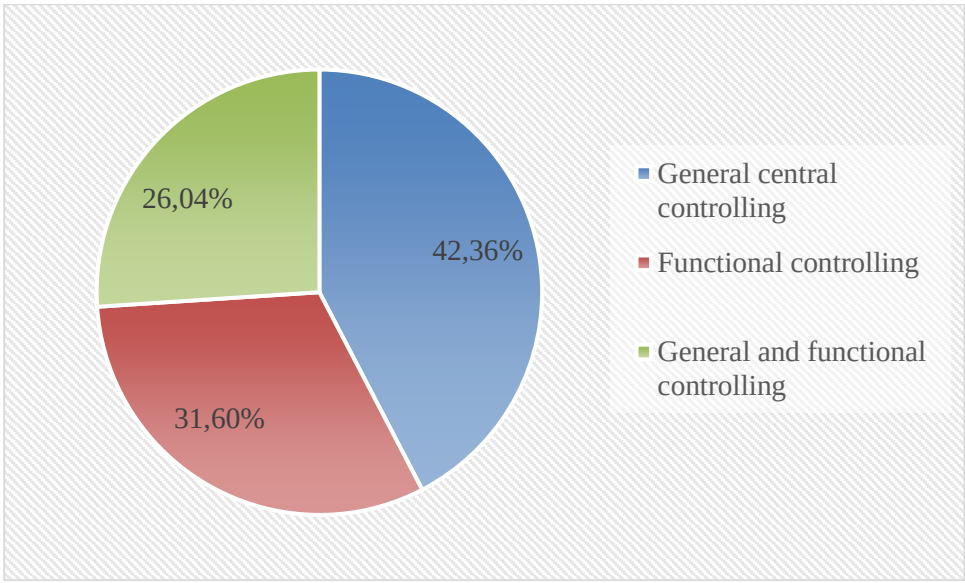
Below is table 3, which shows that the most notable reason for the lack of controlling is enterprise size, as the establishment of a controlling system is directly related to the large enterprise categorical size. This was supported by the research of Szóka (2007), who derived the lack of controlling experts, low information-saturation, incorrect assumptions about controlling, enterprise size, and lack of funds as causes, from the sector's relevant issues. Possible reasons were applicable to test on the questionnaire as well, as participants who answered that they don't operate controlling within the enterprise framework only had to proceed to telling the reason. The data of my sample also support that those that don't know the controlling activity, and have incorrect assumptions due to incorrect information on potential advantages, which I interpreted as incorrect knowledge, made up a total of 21% within the sample.

3. table Why controlling isn't present within organisational framework (n=342)

	Number of answers (pcs)	Percentage of answers (%)
Doesn't know controlling activity	3	0,9
Not necessary by size of enterprise	43	12,6
Doesn't know about the advantages of introducing controlling activity	4	1,2
Total	54	15,8
Missing	288	84,2
Sample	342	100

Source: self-made

Sharing the opinion of Bogáth (2017), in many cases for SMEs, there's not enough financial background to introduce controlling, or they have no need for the financial data reporting, the accountant employed has no fundamental controlling knowledge for planning and analysis, or accounting is outsourced to an accounting firm. Within the sample, there are only four enterprises that don't employ a controlling system, in spite of being a medium enterprise by definition. An even more surprising fact is that there are three large enterprises that don't have a controlling system. Therefore, the prior statement is valid, as most of the enterprises that don't employ a controlling system are micro- and small enterprises, namely, 87%. We can assume that the cluster, where enterprise size is denoted as the cause for difficulty in introducing a controlling system, they should be aware of the advantages offered by one. I derived this conclusion from analysing the background variables, however, I don't believe that explaining it is necessary in the current research. These enterprises were excluded from the statistical analyses, meaning my sample, the database of the quantitative research was made up of 288 enterprises, which are shown on figure 1, categorised by the form of controlling employed. This primary data sample was the source of the statistical statements, relevant for the 288 enterprises.



1. figure Sample by the operational form of controlling (n=288)
Source: self-made

2.2. Methodology

By running and interpreting the hypotheses I developed in the 2.1. sub-chapter, I've selected the following analysis methods to validate the results obtained:

- Simple descriptive statistical methods: mean, median, mode, deviation
- Crosstabs
- *Pearson's Chi-square (χ2) test*
- *Cramer's association coefficient*
- *Correlation, regression analysis*
- *Factor Analysis*
- *Hierarchical Cluster Analysis*
- *ANalasys Of VAriance = ANOVA*
- *Classification chart*

Materials and methodology of Hypothesis 1

My first hypothesis, which states "**There's a connection between HR factors' efficiency, the controlling system, the business efficiency, and the IT background support.**", tries to find out the connection between two variables, and shows their combined frequency, according to Sajtos-Mitev (2007). We can understand how two nominal or ordinal variables are in connection with each other. (Sajtos-Mitev, 2007; 137. p.) Based on this information, the analysis will focus on

identifying the connections between the questionnaire's 1. and 5. question groups. In other words, I will analyse if there's a connection between the controlling department's nature and the factors contributing to business efficiency. During the analysis, it's advised to make several crosstabs, as by unearthing some of the conditionally unrelated attributes, storing the data may become more practical as well. We call the table obtained as such "contingency-table". (Hunyadi – Mundruczó - Vita, 2000) In order to identify the connection between the variables, I conducted the ***Pearson's Chi-square*** ***(χ^2).*** "Based on the Chi-square, we can state if two factors are related, or unrelated, usually at a significance rating of 95%". (Tóthné, 2009; 20. p.) In case we wish to analyse the relation between two factors, and both factors are categorical (nominal and/or ordinal scales), the existence and strength of correlation can be analysed using crosstabs and associative coefficients respectively.

After validating the statistical correlation between two categorical variables, we need to calculate an associative coefficient in order to determine the strength of said correlation. One of the more notable measurement units of association is ***Cramer's association coefficient***. (Cramer, 1962) The coefficient basically deviates between 0 and 1, and the closer it is to the value of 1, the stronger the relation between two factors is. Furthermore, the ***figure of averages, albeit not being a statistical tool, but a visualisation tool***, is of great help in illustrating correlation.

In order to unearth deeper correlations, I grouped the answers given to the 5th question group, the factors contributing to business success, using ***Factor analysis***. Factor analysis, in essence, isn't a single process, as it's a method of multi-variable statistical processes, which can be used to analyse the mutually dependent connections. The method is used as a data dimension compression process, as starting attributes are reduced, and organised into factors. Structure identification is a notable goal for the method, in other words, we wish to identify how the variables are related to each other. The main component analysis has to be preceded by analysis of data, if factor analysis is possible. In order to conduct this, I used the **KMO (Kaiser-Meyer-Olkin) test**. KMO is used when we wish to determine if our variables are usable for analysis. (Ketskeméthy – Izsó – Könyves-Tóth, 2011) The indicator is generally between an interval of 0 and 1. If the KMO is greater, or equal to 0.5, our data is usable for factor analysis. Furthermore, it's necessary for the variables to correlate. (Sajtos – Mitev, 2007)

Materials and methodology of Hypothesis 2

My second hypothesis states: "***The Coronavirus pandemic had influenced the attitude and behaviour of enterprise human controlling.***" I used the 3rd and 4th question groups of my questionnaire, which aimed to obtain data about eleven human controlling tasks, for the timeframes before and after the Coronavirus pandemic. In case the KMO result is greater, or equal to 0,5, I decided to use the method of Factor analysis to group the human controlling tasks.

Hierarchic cluster analysis exists to group different cases into groups. The method is applied in cases where the various cases (in the questionnaire, participants) have mutually dependent relations with each other within the sample in question. The goal of the process is to use determined variables to create relatively homogeneous groups that can be differentiated between using statistical logic. If the cases being in the same groups have similar values to those of their group members, however, the attributes of those within a group are different to the attributes of those within other groups, the analysis is considered a success. Unlike the previously discussed analysis, we have no prior information about which group the participants are in. Therefore, the grouping happens on the basis of statistics, which has several guiding principles. When grouping my data, I applied the weighted method, also called distance of centres, or centroid method. The centroid method refers to the distance between the mean of the objects. Using a ***dendogram***, we can determine the number of separate groups. (Székelyi – Barna, 2008) As such, I wish to use this method to identify how the enterprises that participated in the questionnaire (or their groups, to be specific) operated before the Coronavirus pandemic, and if there's any difference due to the pandemic, in relation to the human activities ***ordered into factors***.

Materials and methodology of Hypothesis 3

My third hypothesis states: "**A process-oriented approach describes enterprises' digital development, which can thereby assist the reworking of strategy**." I wish to construct the interpretation of digital transformation on several statistical methods. First of all, using the 1st and 6th questions from the questionnaire, I wish to identify the connection between the controlling division's operational form and the digital strategy's existence using ***crosstabs, Pearson's Chi square*** and ***Cramer's V***. Following this, I analyse the 6th, 7th, 8th, 9th and 10th questions of the questionnaire using crosstabs. In other words, I analyse the relation between the existence of a digital transformation strategy and the enterprise's reasons for realising digital

transformation processes, the enterprise's intervention towards reaching digital transformation, observing their effects, and the issues that appear during the transformation process. I wish to support the conclusion that the enterprises' digital transformation is organised into a process using a ***Classification tree generated via CHAID process***, from the crosstabs' data. Classification, or decision trees are a method built on statistical algorythms that help create decision rules, and make separation and classification possible. The decision tree is fundamentally the research result's graphical illustration. The background of the trees is supported by complex statistical algorithms, one of the most clear examples of which is the CHAID (Chi-squared Automatic Interaction Detector) method. „CHAID is a multi-variable, recursive classification process developed by G. Kass in 1980. The main goal of the explorative algorithm is to classify the observations from the perspective of the dependent variable (Y) in a way that the ***variance*** within the groups becomes the least possible, and the variance between the groups becomes the greatest possible. During the process, the hierarchy between the descriptive variables (Xi) is shown according to how much they describe the target variable's variance." (Hámori, 2001; 1.p.)

Materials and methodology of Hypothesis 4

My fourth hypothesis states: "***During enterprise transformation processes, keeping key employees has well-defined conditions, which are influenced by the recruitment process, the general enterprise management and the HR context.***" The analysis evaluates the questions for human controlling tasks and importance of digital transformation, from the perspective of the process of recruiting new colleagues.

The 19th question of the questionnaire, dealing with the importance of human controlling for the year 2021 will be subjected to grouping via **Factor analysis**. This can assist with understanding the technological and management tasks directly related to controlling. The 11th and 12th questions of the questionnaire deal with the technological development's level on the field of human controlling, before and after the Coronavirus pandemic. I wish to introduce the changes using ***descriptive statistics***. "Mean is the mathematical average of elements, its usage is best for intervals and ratio scales, however, it can't be used for grading and nominal scales. Mode is the most frequent element." (Sajtos-Mitev, 2007; 93 p.) Following this, the same variables will be grouped using factor analysis. The factor weights' being reorganised during the process offers the conclusion on the usage and development of operative and strategic human resource management functions.

The 17th and 18th questions of the questionnaire, which analysed the competencies before and after the Coronavirus pandemic, will also be introduced using descriptive statistics (mean, mode) and factor analysis. As the Coronavirus pandemic caused quarantine limitations, and a general shift towards teleworking, the digital transformation of enterprises demands a different attitude and different competencies from employees, which makes HR's role in developing colleagues pivotal.

I conducted another factor analysis for the questionnaire's 15th and 16th questions, which are aimed at measuring the performance of colleagues, and its efficiency. Furthermore, yet another factor analysis is conducted for the 21st question, dealing with the enterprise interventions for integrating new employees as soon as possible. Naturally, before conducting the factor analysis, the ***KMO results*** were checked, in order to validate data for the analysis.

Correlation analysis helps unearth factors which aids with keeping employees, if the factors themselves exist, and are operated correctly. Therefore, the variable groups created using factor analysis were subjected to a correlation analysis to identify relations. "Correlation calculation helps with determining the linear connection between variables, the connections' strength and nature. The linear correlation (also named Pearson's, r) may be anywhere between -1 and +1. The stronger the relation is between the two variables, the closer the absolute value of r is to 1." (Sajtos-Mitev, 2007; 204-205. p.) I wished to conduct a ***regression analysis*** in order to analyse the connections stronger than average, which may offer insight as to the contribution of various areas (f.e. HR, management) to keeping employees. "Regression analysis also aims to find the existence, nature and strength of connection between two variables." (Sajtos-Mitev, 2007; 214. p.)

Materials and methodology of Hypothesis 5

My fifth hypothesis states: "***The role of enterprise culture became more important after the Coronavirus pandemic appeared, as digitised operation and enterprise culture became necessities.***" The pandemic showed that digital transformation isn't only about technology – it also relates to the thought processes of managers, leaders and employees, and the whole enterprise has to be transformed and operated while keeping this in mind. Therefore, I wished to use ***descriptive statistics*** (mean, mode) to unearth how the Coronavirus pandemic changed the supportive human activities, like enterprise culture's innovative factors.

I considered it important to analyse the relation between the employee integration analysed in hypothesis 4, and the introduction of digital enterprise culture. The connection was analysed using ***crosstabs, Pearson's Chi-square and Cramer's V***. Furthermore, I wished to analyse how the attributes of enterprise culture in the questionnaire's 22nd question affect the performance of employees. The analysis was done using ***variance analysis*** method. "Variance analysis (ANOVA) is one of the explanatory models, which means it's used to compare expected values of two or more samples, and fundamentally aims to evaluate if there's a connection between the averages of two or more groups. The question, therefore, is how an independent variable influences a dependent variable's value." (Sajtos – Mitev, 2007; 164-165. p.) The applicability of variance analysis is related to two conditions: first, the dependent variables have to have normal frequency, and the variance homogeneity has to be valid. This states that the dependent variable has to have the same deviation at different levels of the independent variable. The variance analysis process defines four main steps: defining the problem, reach squared analysis, the test of statistical independence, and the analysis of the effect's potency. (Sajtos – Mitev, 2007) Deviation squared for variance analysis can be evaluated using F-test, which offers an insight as to the significance of effects. Therefore, the F-test is a method analysing the equality of deviation squared values, where the null hypothesis is that two samples with normal frequency have the same variance. The post hoc analysis (f.e. Scheffe-test) shows what sample pairs' averages have significant difference between means. Kruskal-Wallis test is the nonparametric version of a specific variance analysis. This process is applicable if the sample's frequency is different to normal, and data isn't subjectable to parametric tests.

3. RESULTS AND DISCUSSION

3.1. Correlation between operation of the controlling system and HR efficiency

In this chapter, the main focus of analysis is if the controlling system exists, and how they relate to the info-technological background's support. This greatly influences the increase in business efficiency. Sharing the opinion of Fabricius-Ferke – Zéman (2016), tendencies following the development of controlling are defined by duality – on the one hand, integration within the existing enterprise information systems is developing and going forward; and on the other hand, services for the new management permanently appear, which could not yet integrate into the info-technological (IT) system. Changing external conditions, and the demand of markets, f.e. faster, more efficient and deeper information supply, necessitate the integration of as-of-yet unused intelligence elements into the IT systems.

Therefore, I realised this analysis by finding the relations between the questionnaire's 1st and 5th question groups. The first question group dealt with the operational form of controlling, whereas the fifth one dealt with the level of contribution enterprise and HR factors have on increasing business efficiency. My analyses showed a connection between the controlling system profile, and the IT support expansion variable of increase in business efficiency, as the Chi square significance (0,009) didn't reach 1% value. The two variables showed a weaker than average (0,302) connection according to Cramer's V.

IT support contributes the most to the business success of enterprises where generic and functional controlling are both existing, as these enterprises gave a value above 4 in over 80% prevalence. In the case of functional controlling, I obtained the lowest rate of points above 4 at 59,4%. This is followed by generic central controlling at 66,4%. We can thus conclude that the IT efficiency, as a tool of digital transformation can assist the controlling system, that it serves a proper quantity and quality of data, and that it assists the expansion of controlling functions and operations. It's reasonable to ask which of the two variables is the dependent, and which is the independent, as the crosstabs don't explicitly determine this. According to my belief and professional stance, IT support effects business efficiency by creating the complex and supportive controlling system, which is clearly shown in the data of the crosstab analysis. Therefore, the connection is that IT support's expansion contributes to establishing complex, generic and functional controlling. Furthermore, the quick digital adaptation of tasks assisted

enterprises with adapting to new conditions, and in the long-term, increasing efficiency. For enterprises that already had developed IT solutions even before the Coronavirus pandemic, adapting new challenges wasn't as difficult. Therefore, the so-called winners of the pandemic were f.e. info-tech and online trading companies. Strong IT background can assure the more efficient planning and usage of resources, optimal cost economising, increasing performance, and the observation of enterprise processes.

During my next analysis, I once again used the 5th question group, and aimed to use factor analysis to derive the grouping of HR factors contributing to business efficiency using their answers. One of the conditions of conducting a factor analysis is to conduct a KMO test, which produced a value of 0,905 in this case, whereas the Bartlett test showed that results are significant statistically. This means that variables are very applicable to factor analysis, which was conducted using the Varimax method. The variance reached and explained by factors reached 77%, meaning the process concluded without significant data reduction. The rotated component matrix suggested the creation of a 2-factor model, which is shown in table 4. As we can see, increasing employee efficiency, increasing employee contentedness, optimal employee numbers, planning, and related performance-based evaluation variables were describable the most with the word "work management".

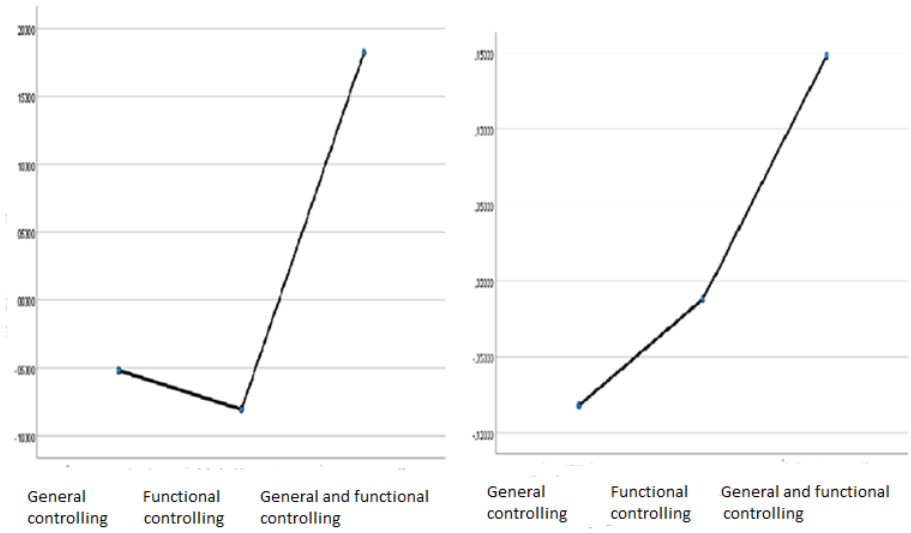
The controller may offer suggestions to employees and executives on how work can efficiently organised and managed, what and how employees should do, f.e. how they can organise personalised, or even hybrid tasks. The result of the task management is strongly related to the appearance of enterprise culture, which includes the sorting of work description, technological guidance, organising the workplace, the movement of people and information. The other variable group is education, the efficiency of employee recruitment systems, IT support, partner-centric HR, and the professional HR colleagues are all members of the HR functions. The IT support has a small difference, which is also shown in the factor weight. However, thinking about it, digital transformation, proper professional background, HR processes' proper usage are also necessitating IT support, much like other areas of the enterprise.

4. table Grouping the factors contributing to business efficiency using rotated component matric

Efficiency variable	Task management	HR tasks
increasing employee efficiency	**0,777**	0,257
increasing employee contentedness	**0,75**	0,35
optimal employee number	**0,752**	0,228
professional, competent colleagues	**0,641**	0,392
expanding education opportunities	0,255	**0,669**
increasing efficiency of recruiting	0,316	**0,749**
performance-based wage system	**0,667**	0,172
increasing planning precision	**0,72**	0,366
expanding IT support	0,37	**0,578**
making HR partner-focused	0,27	**0,835**
professional HR colleagues	0,224	**0,824**

Source: self-made

I used variance analysis to find significant differences between the controlling organisation's form and the factors created (task management and HR tasks). The F-test's value for the task management factor was 1.715, at p=0.182 significance, and an independence level of 2. Meanwhile the F-test for the HR tasks resulted in a 1.247 value at p=0.289 significance, and an independence level of 2. This shows that there's no detectable significant difference between the controlling background and the variables. However, if we look at the means plot on figure 2, we can clearly see that both factors resulted in high variables in case generic and functional controlling worked together. Therefore, with a sufficiently modern IT support, and redesigning the the digital transformation processes of the business models, the strategic and functional presence of controlling within the organisation is reached, which helps the efficiency of HR factors, contributing to business success.



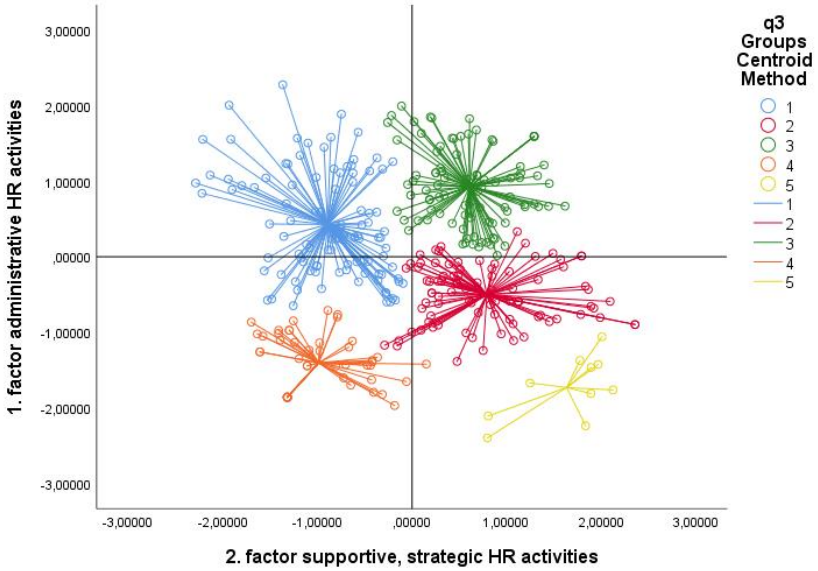
2. figure Business efficiency factor means plot by form of controlling organisation (n=288)
Source: self-made

The crosstab found a correlation with IT support's role, furthermore, variables obtained by factor analysis were subjected to variance analysis, but I wasn't successful in finding significant difference in terms of controlling organisation. However, the means plot, albeit not being a statistical but a visualisation tool, and the crosstab showed that in the case of generic and functional controlling, the usage of efficiency increasing tools is the highest.

3.2. Analysis of enterprise attitude towards human controlling

Hierarchic cluster analysis was used as a means to identify different enterprise groups in my dissertation. Human controlling activities were categorised into 11 different categories, which were separately evaluated for both before and after the Coronavirus pandemic. Before the factor analysis, once again, I conducted a KMO test, which resulted in a value of 0.875, making the variables acceptable for factoring. Both before and after the Coronavirus pandemic, variables can be organised into two categories. The first category included the so-called classic, administrative HR tasks (taking numbers, analysis of employment costs, analysis of fringe benefit efficiency, analysis of labour structure, analysis of worktime-efficiency, analysis of away data, analysis of labour movement/fluctuation, and analysis of educational costs). Meanwhile, the second group consisted of the so-called assist-support,

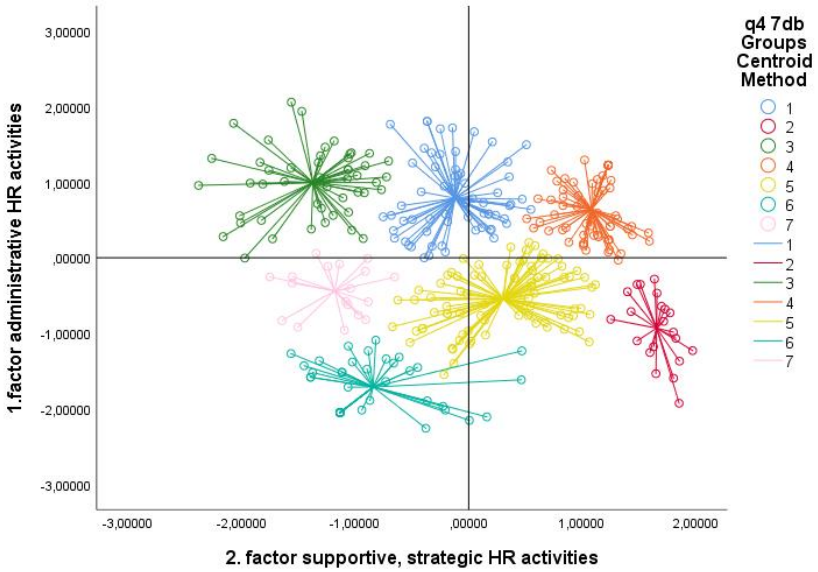
strategic HR activities (keeping/motivating key members, human-centric thought process, employer branding).



3. figure Enterprise attitude towards human controlling before the Coronavirus pandemic (n=288)

Source: self-made

Using the dendogram tree, five groups of enterprises were differentiated between for the timeframe before the Coronavirus pandemic. I illustrated these for the perspectives of two separate factors, shown on figure 3. As the fifth group (yellow, 2.9%) doesn't make up 5% of the sample, it's not relevant for the current analysis, although I wish to mention that they are the ones that are flexible in using the assist-support strategic HR tasks as the true innovator enterprises, the ones exiting the classic administrative role. Group 1 (blue, 30.4%) aren't open to moving towards the assist-support, strategic activities, they prefer to operate classic HR controlling activities, so we can call them conservatives. Group 2 (red, 25.4%) reduce the classic HR controlling tasks, and are moving towards the assist-support strategic HR activities, they're innovators. In the third group (green, 26.9%), enterprises are dedicated to operating both traditional and novel HR controlling activities, they can be called the moderates. Group 4 (orange, 14.4%) members don't have established HR controlling activities, which makes them the group of passives.



4. figure Enterprise attitude towards human controlling before the Coronavirus pandemic (n=288)

Source: self-made

However, answers took up a different shape after the Coronavirus pandemic. Using the dendogram tree, we can differentiate between 7 enterprise groups, which will be shown for the two factors on figure 4. The difference for the post-Coronavirus timeframe is very noticeable. Group 1 (blue, 19%) are passive towards modern HR controlling activities, but they operate classic HR controlling. Group 2 (red, 6.1%) enterprises are real innovators, they move forward with novelties, and push classic HR controlling to the back. Group 3 (green, 14.3%) took a step back towards classic HR controlling activities. Group 4 (orange, 19.3%) enterprises fully operate classic and novel HR controlling activities at the same time, and their weight centre is further from the centre than the moderates' before the Coronavirus pandemic. Group 5 (yellow, 24%) enterprises are almost entirely passive towards both factor groups. Group 6 (turquoise, 12%) and 6 (pink, 5.3%) enterprises are also passive towards both factors' HR controlling activities. Regarding the traditional and assist-support strategic activities, enterprise groups' placing compared to the centre were also noted. Groups 1 and 3 (33.30%) should be considered conservative, groups 2 and 5 (30.10%) innovators, group 4 (19.30) moderate, and groups 6 and 7 (17.30%) passives.

5. table Behaviour and attitude towards human controlling, prior to and post Coronavirus pandemic

Enterprise behaviour	Pre-Coronavirus	Post-Coronavirus
Conservative	30,40%	33,30%
Innovator	28,30%	30,10%
Moderate	26,90%	19,30%
Passive	14,40%	17,30%

Source: self-made

Therefore, for the timeframe before the Coronavirus pandemic, we can clearly identify four different routes, according to which the enterprises considered either possibility, both possibilities, or neither possibility. Whereas after the Coronavirus pandemic, the groups further differentiated, as there are those that are true innovators. Data of the relations are summarised in table 5.

3.3. Relations between controlling and digital transformation

3.3.1. Analysing the process of digital transformation

In the next part, I'll analyse the effects of digital transformation. One factor of this specific topic is the existence of a digital transformation strategy, and if there's a connection to controlling organisation's form. From the perspective of this relation, I theorised that in case the controlling background exists in the organisation, we can assume there's a sufficient level of strategic management as well. This suggests that enterprises know the main megatrends, which include the process of digital transformation as an important element. Furthering the thought process, the presence of a digital transformation strategy assumes the presence of strategic management. Based on the crosstab, we can state that the conditions of conducting the analysis were met, as the necessary frequency is over the minimal value of five. Based on the data, we can observe a connection between two variables, which means we can invalidate the null hypothesis, the significance level of the test being below 5%. We can state that the strength of the connection is weak, as the Cramer's V result was below a value of 0.2, however, I also ran the test including the enterprises with no controlling system, where the Cramer's V showed a value of 0.468, "improving" the indicator to weaker than average.

The results of the crosstab's data content validates the assumption that for enterprises that have both functional and generic controlling, 9% of the enterprises in the group have no digital transformation strategy. The same reaches 24% for the enterprises only employing functional controlling, and 21% for enterprises only employing generic controlling. Another noteworthy

result, though not represented in the current table, is that the same percentage for enterprises that operate a controlling system by control groups reaches up to 69%! This, therefore, suggests that the sophistication level of the controlling system has a correlation with the existence of the digital transformation strategy. In case we look at the order by timeline, though the questionnaire had no separate question for this, we can state that the development of controlling tools has a longer history than those of digital transformation. This results in enterprises, which have a more sophisticated controlling mechanism being more advanced in the process of digital transformation as well, as the two factors are also conditions of each other.

Therefore, the logical framework model is as follows:

Technological development → Controlling → Controlling system's sophistication level → Digital transformation → Controlling system's development through the regulations.

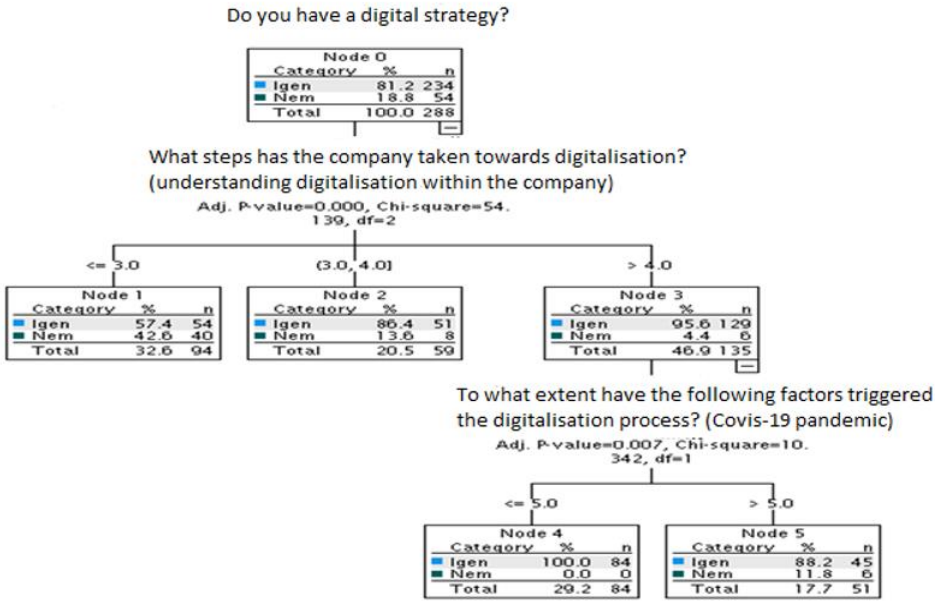
Technological development created the decision-preparation subsystem for the executive level, controlling, which relates to planning, plan-fact data analysis and information coordination. Enterprises continuously analyse the effects of environmental challenges, by learning the five philosophies of controlling (goal-, future-, bottleneck-, decision-orientation). This, in addition to separately analysing the functional areas, and using methods that assist strategic planning, make the tools of the system development and correction possible, which aids with the digital transformation of the enterprise's processes and business models. Therefore, the continuous development of the controlling system is realised through the regulation circle.

In the following part, I analysed the blocks of the questionnaire related to digital transformation using crosstab analysis. One of the variables of the crosstab was the existence of a digital transformation strategy, which was compared to the questionnaire's 7^{th}, 8^{th}, 9^{th} and 10^{th} questions. The data analysis suggests that the technological development was the main reason for enterprise digital transformation within the sample. This also appeared in the strategy, in the form of the digital transformation strategy. This is supported by the significant result of the Chi-square test, and the weaker than average correlation. This leads to how technological development forced the enterprises into a situation where they had to intervene, and move towards the process of digital transformation. One of the manifestations of this occurrence is the formation of a digital transformation strategy. It may seem surprising that the second question of the 7^{th} block, which asks if the Coronavirus

pandemic had an impact on the digital transformation didn't show correlation. This also shows that the process of digital transformation has a planned nature.

In the next part, I analysed the 8th question group of the questionnaire, which groups enterprise interventions. Assessing digital transformation solutions and the strategy for digital transformation showed a weaker than average connection, which is logical in the sense that the entry of the digital transformation is the assessment, if the enterprise knows the solutions and resources at hand. On that note, this is related to assessing the state of affairs, the first step of strategic management. Forming the strategy is related to the interpretation, conceptualisation stage. It's no surprise that the strength of the correlation is close to the average, 0.5, and only lags behind slightly. As the process perspective was imperative during the design of the questionnaire, priorities were in a more advanced as a partial element, making the connection's strength weaker than average. Developing digital competences also shows a weaker than average connection with strategy, similarly to usage of artificial intelligence. Though the Coronavirus pandemic had no connection to the existence of a strategy, tools assisting the virtual tasks already appeared in enterprise practice. Surprisingly, structuring the conditions of hybrid work showed a strength barely above weak, similarly to the discussion important to introduction. Usage of robotic automation mainly became relevant in the processing industry, however, it's highly prevalent for them. This explains the weaker than average connection. The usage of technological conditions generally resulted in weaker than average connection, however, communication, big data methods and innovative processes showed a connection converging towards average with it.

In the process of forming a strategy, measurement, following up on effects is very important. The analysis found no connection with the 9th question group, which could suggest that the enterprises don't create the indicators and KPIs related to the measurements necessary. This assumption is supported by how only introduction of the strategy, and capacity issues showed a weaker than average relation within the 10th question group, the rest of the variables didn't have observable connection. This, therefore, supports the assumption that enterprises integrate the opportunities and tools of digital transformation into the operational context, but the measurement of programs is much less prevalent. I measured the joint effect of these factors using the classification tree, shown on figure 5.



5. figure Classification tree of interventions related to existence of digital transformation strategy (n=288)

Source: self-made

The usage of classification trees is generally done using a CHAID process, which is based on a crosstab method. In this case, the dependent variable is the digital transformation strategy, while independent variables are the 7th, 8th, 9th and 10th question groups' variables. This means that the existence of a digital transformation strategy was compared to the causes resulting in enterprise digital transformation processes, interventions to initiate a digital transformation, following up on their effects, and issues during digital transformation processes. The method is usable to illustrate visual connections, and also has a prediction function. The analysis also shows the internal connection system of variables.

3.3.2. Conditions of keeping key employees

Increasing employee dedication is a systematically constructed process, while behavioural patterns form. The key of change is to include employees in reaching organisational goals as much as possible, and make them have emotional investment, which comes from strengthening motivation and loyalty. Looking at the data summarised in table 6, we can conclude that all variables are significant except the constant value, which makes the regression

model's equation definable. It's necessary to make steps so that the members of the enterprise workforce feel that they can work with common goals in mind, which can be managed via understanding common goals, deepening said understanding, and creating trust and delegating responsibility. A supportive organisational culture supports constructive and cooperative atmosphere in forming. A frequently appearing issue is that enterprises can't sense the existing cultural motivators and beliefs. If we include our employees, and allow them to tell their opinions, we can strengthen the trust within the organisation. In order to reach common goals, the executives and the employees have to be developed together in two-way communication, which constructs transparency.

6. table Regression model to validate keeping key employees

	Non-standard coefficient B	**Est. error**	**Standard coefficient B**	**t**	**Significance**
Constant	9,484E-17	0,034		0,000	1,000
Task management	0,294	0,039	0,294	7,562	0,000
Professional conditions factor	0,385	0,043	0,385	8,915	0,000
HR tasks	0,287	0,039	0,287	7,280	0,000
Modern management	0,189	0,040	0,189	4,729	0,000

Source: self-made

By creating an organisational identity, members of the organisation can be motivated towards proactive behaviour and responsibility. ***This is supported by the equation of the regression model, as seen below:***

Keeping key employees = 0,294*Task management + 0,385*Professional conditions of recruitment + 0,287*HR tasks + 0,189*Modern management.

As the data are sourced from factor variables, the practical usage depends on adapting the scale, however, it shows which areas have what level of contribution to keeping the key employee.

For ***professional conditions of recruitment***, it's important to define organisational goals and intentions to new employees, which strengthens the

feeling of moving towards the same goal with other members of the enterprise. The onboarding, in other words, new employee makes enterprises want to integrate them, which process is important for the enterprise as the fluctuation can be reduced, while dedication and efficiency can be increased. In terms of ***task management***, there's a necessity of activating organisational values and behaviour patterns in the form of an experience, creating harmony among colleagues, and creating employee safety. ***HR tasks*** include development of uncertainty management for both executives and employees, the capability of learning from mistakes and from each other, and the interest in new possibilities. Among ***modern management tools***, agile, proactive and responsible employee culture as an initiative appears next to assisting the developed technological and digital processes. In order to reach the enterprise mission, employees need to create connections, everyday willingness to act, and linking in feelings is imperative for these goals.

3.3.3. Importance of enterprise culture increasing

When designing enterprise ownership strategy, one of the main questions we have to answer to controllers is if the enterprise is truly efficient enough. The Coronavirus pandemic showed that digital transformation isn't only about technology, but about thought process. This made the entire enterprise necessitate a transformation that takes this into consideration. The proper answers, planning of proper interventions, and decision-making also makes it imperative to analyse the enterprise itself, starting from enterprise culture, all the way to optimising processes. Getting an overall picture about how and where it's advantageous to intervene in the enterprise's life is imperative. And this all has to be done while efficiency and operations are spared from impact, and adaptivity increases in the meantime.

Partial elements of enterprise culture appear in the success of business processes. In light of this, I analysed how the renewing human controlling activities – motivating key employees, human-centred thought process and employer branding – changed before and after the Coronavirus pandemic, as enterprise culture factors. Data can be seen in table 7 below.

7. table Appearance of renewing human controlling activities in enterprise culture

	Keeping and motivating key employees		**Human-centred thought process**		**Employer Branding**	
	Pre-Covid	*Post-Covid*	*Pre-Covid*	*Post-Covid*	*Pre-Covid*	*Post-Covid*
Sample	288	288	288	288	288	288
Mean	3,68	**3,97**	3,79	**3,94**	3,51	**3,59**
Mode	5	6	3	6	1[a]	1
Std. dev.	1,701	1,760	1,634	1,693	1,731	1,786

Source: self-made

Questionnaire results suggest that the role of the variable in question became more important post-Coronavirus for all three variables, which is supported by the value of mode and mean in all cases. Another conclusion is that deviation also increased for all variables. The statistical analysis of data evaluated showed that there's a significant difference between analysed variables. Therefore, in a supportive, positive organisational culture, steps must be made for the dedication of employees, to make them happy to go to work, and to make them understand the general direction the enterprise is going towards, while telling them the principles and goals the enterprise follows. Within the enterprise culture, it's important to determine what should be defined towards employees, and towards customers, which has to be constructed within the organisation.

In the following part, I'll analyse how much getting the employee to know the enterprise culture is connected to digital enterprise culture and employee integration. The data of correlations can be seen in table 8. Based on the data, we can state that there's a correlation between the two variables. This means that digital enterprise culture doesn't only appear in enterprise strategy, but appears as an integral part of enterprise culture as well, which has to be properly communicated towards new employees. It's important to note in the communication that digital enterprise culture has a toolset, how it can support work processes, and how it serves strategic and organisational goals.

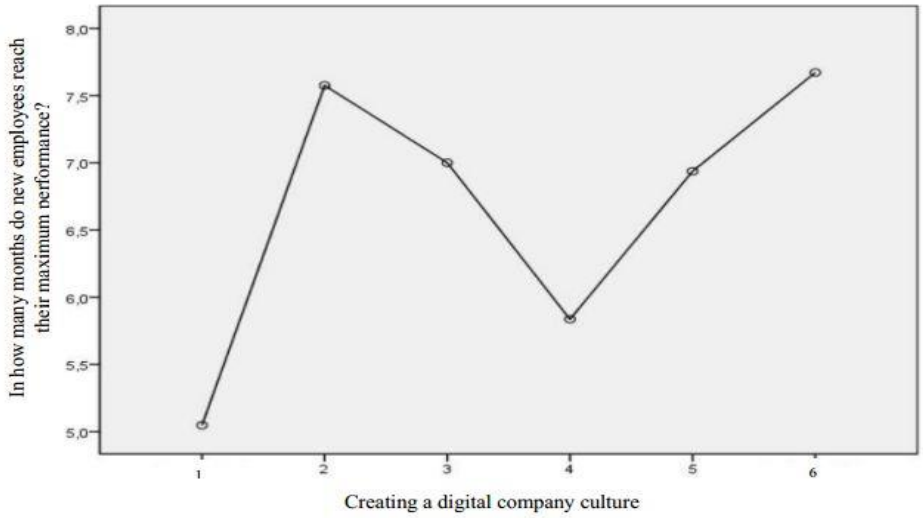
8. table Relations between introducing enterprise culture and enterprise digital culture

	Value	Degree of Freedom	Two-tailed significance level
Pearson's Chi-square	89,234	25	,000
Probability rate	82,735	25	,000
Linear association	54,353	1	,000
Total	288		

Source: self-made

Strength of the connection based on Cramer's V was weaker than average (0.249) however, which means that existence of digital enterprise culture has less of an impact on the process of fitting in on the introduction to the enterprise culture. Traditional elements based on analyses have stronger presences, most notably introduction to enterprise mission, introduction to tasks and processes necessary for work, introduction to development opportunities, etc.

During my analyses, I also tested what effect elements of the enterprise culture's attributes have on the successful fitting in of employees, in other words, how fast the employee reaches their performance maximum. The Scheffe-test validates, using the sample in question, that in enterprises with a lower degree of digital transformation, employees reach their performance maximum faster, whereas in enterprises that have a further developed digital transformation process, it happens slower. This can be seen on figure 6. The reason for this is found in the industry's environment, since for enterprises that have manual tasks in a greater quantity, teaching the management of machinery happens faster, and takes shorter time. Whereas in sectors with higher added value, this process is slower. Since technological development, digital development, process monitoring, and data-driven decision-making necessitate continuous innovation and adaptive operations.



6. figure Correlation between existence of digital enterprise culture and performance of employee through fitting in

Source: self-made

The hypothesis was partially validated, since post-Coronavirus, enterprise culture's partial elements became more important for the enterprises. Digital enterprise culture is a part of the process of new employees fitting in, however, this doesn't mean a faster employee performance maximisation. The validation of research hypotheses is shown in table 9.

9. table Validation of research hypotheses

Hypotheses	Hypotheses were proven
H1: There's a connection between HR factors' efficiency, the controlling system, the business efficiency, and the IT background support.	**Partially valid**
H2: The Coronavirus pandemic had influenced the attitude and behaviour of enterprise human controlling.	**Valid**
H3: A process-oriented approach describes enterprises' digital development, which can thereby assist the reworking of strategy.	**Valid**
H4: During enterprise transformation processes, keeping key employees has well-defined conditions, which are influenced by the recruitment process, the general enterprise management and the HR context.	**Valid**
H5: The role of enterprise culture became more important after the Coronavirus pandemic appeared, as digitised operation and enterprise culture became necessities.	**Partially valid**

Source: self-made

4. NEW SCIENTIFIC RESULTS

1. The means figure, as a visualisation tool proved that HR tasks and task management-related factors show increased efficiency during usage if the generic and functional controlling are both available.
2. The operational form of the controlling system showed significant correlation to business IT support, which concludes that digital transformation has a strong effect on the controlling background.
3. Modern IT support, and restructuring the organisation and business model's digital transformation processes can increase the organisation strategy and functional presence of controlling, which thereby supports the efficiency of HR factors, contributing to business efficiency.
4. Using factor and cluster analyses, the research proved that the Coronavirus pandemic differentiated the organisational behaviour of enterprises related to human controlling.
5. Administrative and strategic HR tasks separated enterprises into four groups: innovators, conservatives, moderates and passives.
6. The classification tree illustrated that for enterprises, where more sophisticated controlling mechanisms are operating, more efficient steps are taken in the process of digital transformation, as there's a long-term connection between strategic decision and technological development.
7. The equation of the regression model derived from statistical analyses validated that keeping key employees relates to well-defined conditions, which are influenced by task management, the professional conditions of recruitment, HR tasks, and modern management tools. Since the data was derived from factor variables, the practicap application depends on the adaptation of the scale, however, it unearths how much it contributes to keeping the key employee.
8. The hypothesis was only partially validated, as with the appearance of the Coronavirus pandemic, partial elements of enterprise culture *– as in, keeping key employees, motivating them, human-centred thought process, employer branding* – became more important for the enterprises. Digital enterprise culture is a part of a new employee's process of fitting in, however, this does not mean that the employee reaches their performance maximum faster.

5. CONCLUSIONS AND SUGGESTIONS

The research of my doctoral dissertation aims towards the increased importance of human controlling, by evaluating the integration of controlling's perspective and functions into the area of human resource management. Human controlling, which acts as the compass of enterprises, isn't only supporting the classic form of executive decision-making, but becomes a more and more important actor in the strategizing process, which is clearly shown in its positive impact on supporting digital transformation, necessitated by the appearance of the Coronavirus pandemic.

While analysing the questions of business efficiency, I debated how the positioning of controlling areas and controllers changed in today's enterprise context. Throughout my analyses, I came to the conclusion that controllers have to keep their classic tasks introduced in the secondary research (Horváth, 1990; Véry, 2004; Hanyecz, 2006; Zéman 2016), and have to manage the most important key topics while functioning as active business partners. Examples are: profit-oriented nature, economising, liquidity, controlling and coordination. Reason being, in the current era of digital transformation, not only finding and following new topics, but managing classic areas should also be priorities. However, beyond this, as was proven in the research of Zéman-Tóth (2017b), new effects necessitate that the controllers take an active role in strategic financial controlling and management as well. Most notably, in so-called newly appearing, unique solution-driven areas, where there aren't any integrated strategies.

My research also supported the claim that databases about human resource management made for the executives and managed by controllers offer information about employees, which contribute to efficient development, benefit and motivation systems' creation, having a positive effect on reaching enterprise goals. Due to the Coronavirus pandemic, demands towards human controlling efficiency increased. Based on my primary and secondary research, I believe that obtaining adaptive knowledge and managing it, and assist-support human activities, which help realising and developing employees, are conditions for competition, and investing these values into organisational goals will increase joint efficiency. Using modern IT support, the organisation and business models' digital transformation, the strategic and functional presence of controlling can be achieved, which thereby help HR factors' efficiency, and business success.

During the analysis of attitude enterprises had towards human controlling, and during my secondary research, I obtained a wide overall vision of the work of

Karoliny – Poór (2017)'s research, showing the role and state human resource has in enterprises. I grouped the main tasks synthesized from the literature references, coordinated by controlling into two factors during my analysis, which differentiated between classic and administrative human activities, and assist-support strategic HR tasks. The Coronavirus pandemic's appearance and the shift along the two factors drew a division of four enterprise behaviours: innovators, moderates, conservatives and passives. In my opinion, ratios were strongly defined by how much the individual enterprises' economies were impacted by the pandemic, and how fast they could restructure and reorganise their task processes, how successful they were at managing their changing work environments, regardless of being executives or employees. My analyses validated that enterprises which already stepped on the road towards development pre-Coronavirus were successful in continuing this innovative journey, whereas enterprises, which had issues with resources and professional human resource, mainly oriented towards surviving the crisis of the pandemic instead of HR development. Therefore, enterprises' adaptive capabilities were impacted by how the human controlling role transformed in relation to the appearance of the Coronavirus pandemic. The HR sector has to base the future on shaping workforce, employee experience, developing enterprise culture, and data-driven activities. This is an opportunity to leave the most pressing administrative role, and orientate towards a strategic-level role in daily decision-making.

I introduced many approaches to digital transformation in my doctoral dissertation, of which the perspective of Poór – Schottner et al (2019) is closest to my research. This states that digital transformation and business and organisational activities, processes, competencies and models have to be redesigned to reach digital transformation. My research validated that digital transformation isn't simply a technological question, but relates to process, human and technology, as all three of these have a significant role in assisting digital transformation. The development of digital transformation is also shown in how nowadays, it's insufficient to talk about this three-member unit, the focus has to be placed on creating the culture itself. Enterprises' controlling background has to be strengthened, modern management tools have to be known and used, and by using them, employee competencies can also be developed. I believe that enterprises can reach success in digital transformation if they create the enterprise culture suitable for it. The enterprise is efficient if the unity between the three – technology, processes, humans – are continuously developed together, which will result in the digital culture creating itself within the enterprise. As digital transformation and digital management are more of a management building upon business demands, not only knowledge on the field of information technology. In

conclusion, we can say that knowledge-based and digital environments necessitate human controlling to affect cardinal areas like knowledge (data knowledge), its creation and adaptation within the enterprise, the process of integrating knowledge and its control, planning, validation, and the real-time analysis, evaluation and comparison of these processes. Therefore, in my primary research, I used factor- and regression analyses to determine a model with conditions, which, when introduced and efficiently assisted, the enterprise can contribute to keeping its key employees. The equation of the regression model is as follows: Keeping key employees = 0,294*Task management + 0,385*Professional conditions of recruitment + 0,287*HR tasks + 0,189*Modern management.

Based on my research, we can clearly see that adapting to changes is done via the master key of the human in the enterprise, who can use their intellectual capital and its efficient management to reach adaptation capacity. The Coronavirus pandemic unearthed the known and unknown values of enterprise culture, which are introduced and taught to both old and new recruits, in order to make them find answers to critical decision situations easier. In order to establish an efficient enterprise culture, individual performance needs to be strengthened, and cooperative behaviour and innovativeness must be supported in shaping their norms. It's important to match strategy and culture, as enterprise culture itself holds enterprise values, actions, decisions, and the behaviour of employees. Strongly fluctuating environments give enterprises decision moments every single day, therefore, in order to reach future success, clear values that everyone understands, accepts, and adapts during their actions have to be defined.

Technological development, digital transformation processes have several positive side-effects, however, teleworking and hybrid work also have security issues during data processing, as various programs and sensitive enterprise data being processed at home may make enterprises more vulnerable to attacks. As digital transformation and work processes conducted on networks strongly necessitate cyber security to be taken into increasingly serious consideration and its continuous development, I believe that for my future research, it would be both valuable and worthwhile to research this topic from these perspectives as well.

6. SUMMARY

The main goal of my research was to create new information and results which support the claim of corporations that have a controlling division are the ones capable of adapting to shocking external effects. Technological development, volatile market context and the Coronavirus pandemic caused effects, which prompted corporations and within them, human resource management to take up new challenges. As such, in my Ph.D dissertation, I felt it a necessary task to analyse how controlling's function and perspective can be applied to human resource management, and what tools can it use to offer a productive answer to the effects mentioned above, in a way that the resilient and efficient operations of the corporation are also strengthened.

In light of the current challenges, human sciences cannot be satisfied by coordinating administrative and personal tasks. It needs to focus more on identifying how the activities related to human resources can be inserted into the process of completing the strategy, and as such, how the corporate goals can be met. As the operations of the corporation are interwoven in the information system, there is a need for a revolutionary change like digital transformation, which accelerates the innovative processes of the corporation, helping competitive edge. Human controlling has to offer a complex business answer to the management, in order to take steps towards digital transformation. Digitised and automated processes make new innovative HR activities implementable into the organisation that develop the human-centred organisational culture, thereby increasing the trust and devotion of employees. Throughout my analyses, I was able to prove that the operating form of the controlling system shows a significant correlation to the support of IT solutions, which means that digitisation has a strong impact on the controlling background. The digitisation process is a strategic decision, it consists of well-defined process elements, which follow a generic technological development process. In the case of corporations that have more sophisticated controlling mechanisms, digitisation is more advanced, as the two also assume the existence of each other.

In the case of corporations where apart from generic central controlling, functional controlling divisions also operate in tandem, the use of efficiency-increasing HR tools is more prevalent, as they manage their personnel-, labour-development and motivational strategies using more well-established tools and methods. They allow for renewing, supportive strategic tools, which do not only help with selecting and employing quality personnel, but makes it also possible to develop and motivate said personnel, in order to achieve organisational goals. Though the Coronavirus pandemic differentiated in

attitude corporations have towards human controlling, I did not cease by identifying innovative and well thought out corporate behaviour, but also isolated passive and conservative behaviour for administrative and strategic HR tasks as well. I base this on my result stating that a part of corporations didn't understand the Coronavirus pandemic as an opportunity for transformation through its effects, but as a necessity to survive a crisis, and sustain already existing activities.

In conclusion, we can say that the role of controllers in corporations became more important in recent years, which caused them to go beyond operating the generic controlling division and conducting classic reporting and cost-analysis calculations, towards answering the challenges of the new environment's new issues, for both areas of expertise and the global enterprise. Human resource management has to use the controlling perspective and functions to support managers and employees with gaining the expertise necessary to answer the world's challenges, developing creative and agile thought process, and improving communicational and digital skills. The conclusion of my dissertation is that in a digitised environment, human controlling has to affect cardinal areas like knowledge (f.e. data-held knowledge) creation and adaptation within the corporation, controlling, planning, reviewing and conducting the process of integrating knowledge within the corporation, and the real-time analysis, evaluation and comparison of all the above.

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