Professional MBA
Automotive Industry

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“Implications of virtual trainings onto operational excellence at Lear”

A Master's Thesis submitted for the degree of
“Master of Business Administration”

supervised by
Prof. Mgr. Ján Uriga, PhD

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Vienna, 19.01.2022

Affidavit

I, **LIDIJA SOLDIC**, hereby declare

1. that I am the sole author of the present Master's Thesis, ""IMPLICATIONS OF VIRTUAL TRAININGS ONTO OPERATIONAL EXCELLENCE AT LEAR"", 82 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted the topic of this Master's Thesis or parts of it in any form for assessment as an examination paper, either in Austria or abroad.

Vienna, 19.01.2022

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Signature

Scientific Work to obtain Degree of

Professional MBA in Automotive Industry

at the Technische Universität Wien, Austria

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"Implications of virtual trainings onto operational excellence at Lear"

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To my mentor, for all the help and criticism that helped make this essay a reflection of my work and my personal and professional development.

Lidija Soldic

Abstract

Modern business conditions have imposed continuous monitoring of changes in the field of technical and technological solutions, and their application in the automotive industry is increasingly based on the requirements of Industry 4.0. Digitalization of business processes in the automotive industry has become synonymous with progress and development, and the constant finding of new solutions that will enable quality improvement, cost reduction and competitive advantage, becomes a necessity. As a result, it is not surprising that more and more automotive industries are now using virtual tools to train and develop their employees, but also virtual reality (VR) technology in different business segments to achieve greater efficiency - whether it is design, research production, sales or marketing.

This paper aims to examine the attitudes of engineers to indicate the ability to execute innovative solutions for the implementation of virtual training and the use of various tools in the context of achieving greater business efficiency. Accordingly, the basic barriers in the implementation of Industry 4.0 and its tools based on virtual training and development methods and tools will be pointed out. The paper will indicate the accelerated dynamics of the development of technological solutions and the limiting factors of its application in the practice of Lear Corporation.

By emphasizing the speed of change, the need to strengthen flexibility, attitudes towards employees, resistance to change, this paper implies the need to create clear strategic solutions that will contribute to the future development of this company, both in terms of realization of virtual trainings, and in terms of application of virtual reality tools to increase business efficiency.

Creating strategic documents to acquaint employees with the need and essence of their application can contribute to strengthening organizational culture, eliminating gaps in technology solutions, and raising motivation and employee loyalty to the corporation.

Keywords: virtual training, virtual reality, automotive industry, technological changes.

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1. Introduction

The question of how to manage in modern conditions, and under the influence of intensive development of technology, largely depends on the management of the company. Company management makes decisions on how to organize, manage and control business processes. The dynamism of the modern business environment requires the application of new management tools that, in combination with traditional activities of planning, organizing, leadership and control, become a prerequisite for achieving positive business performance.

Modern technological solutions and their application in practice play an important role in organizing business activities. Consequently, it is necessary to adequately provide training for employees, transfer knowledge and experience to enable their joint action in the direction of achieving business goals. Here, virtual trainings are gaining in importance, especially in conditions when the global pandemic has imposed the needs of social distancing and adaptation to new working conditions. Virtual trainings, as a relatively new form of employee training, are becoming a key tool in the acquisition and application of acquired knowledge in this way. Employees at all levels, and especially engineers, are facing new technological challenges that virtual training brings with it.

The subject of research of this paper is reflected in the need to consider the role and importance that virtual training has in creating common processes associated with functional design in the automotive industry.

1.1. Relevance of the topic

The conducted research aims to point out the current application of different approaches in learning and the possibilities of such an approach to provide retraining in the automotive industry. On this basis, it will be developed new models that will allow monitoring the behaviour of employees and their relation to a virtual environment in a constant training to develop specific systems of motivation that would encourage learning. Given that there is a significant generational and cultural gap among employees, this research should contribute to the development of new

methods that will bridge this gap and digitization of business activities in the automotive industry and that on this basis contribute to the collective development of employees and the company. It is expected that a positive impact will be achieved on the engagement of engineers in the adoption of modern virtual tools based on the elimination of key barriers that currently exist in Lear Corporation. Through increasing the volume of investments in R&D, but also improving communication with employees and showing the importance and necessity of implementing virtual training and the application of virtual tools in business, conditions will be created to increase efficiency and productivity.

1.2. Objective of the research

The main goal of the paper is to assess the impact of virtual training methodology through quantitative analysis so that on this basis the challenges of their application in the organization are explored in order to achieve the set goals within a defined time frame. Accordingly, the paper will analyse various factors that affect the application of virtual tools for employee training and development.

The derived goal of the paper is reflected in the consideration of ways to raise the level of efficiency of virtual trainings and remove barriers that hinder their application. To this end, special attention will be placed on analysing the possibility of using virtual reality glasses in relation to current knowledge, engagement and relationship engineers to virtual training tools and modern industries E 4.0 in order to increase efficiency of business processes by implementing additional virtual tools.

1.3. Structure of the thesis

The master thesis consists of five chapters that are connected into one whole.

Chapter I is an introductory part of the paper that indicates the importance of the topic, goals and tasks of research and its social and scientific justification.

Chapter II is based on the basics, definitions, and reviews of previous research on the use of virtual training and modern tools in the automotive industry. Through the consideration of the necessity of following modern trends and changes in the field of

application of technological solutions in the automotive industry, the drivers of change and challenges that Industry 4.0 brings with it will be analysed. Special attention will be paid to virtual reality and the possibilities of its application in the automotive industry, and accordingly, the possibilities of implementation and development of virtual trainings and tools in the function of developing existing and acquiring new knowledge.

Chapter III shows the data sources, methodologies used in this study, as well as hypotheses to be tested in operation. The collected data were processed in order to present the obtained results on the basis of descriptive qualitative analysis.

Chapter IV provides findings derived from the analysis of the conducted research and a presentation of the results. In this chapter, the emphasis is placed on the key problems that have been identified in the process of realization of virtual trainings and application of virtual tools. The analysis was performed among engineers employed in the R&D sector at Lear Corporation, where the results indicated the need to transform training and development from traditional to virtual, the application of modern methods and techniques in learning and business, but also key barriers to implementing these changes. By considering the factors that contribute to the development of opportunities for further implementation of innovations, the efficiency of virtual trainings and tools in business, a basis is created for noticing the current state and potential of future development of the company.

In the last, *fifth chapter*, the conclusions are presented, and the findings of the hypotheses set out in the paper are explained in more detail.

2. Fundamentals, definitions, and Literature review

2.1. Digitalization of business activity in the automotive industry

The digitalization of business processes imposes the need for companies to adapt to new environmental conditions. The growing volume of business and the growth of competition in the automotive industry, but also the trend of development of modern technologies, create pressure on productivity, costs, prices, and the need to optimize and rationalize production. This means that companies adapt their activities to different target markets and customer needs, but also to the requirements of the market, which relate to the constant improvement of new technologies, application of new and innovative solutions that will contribute to greater business efficiency.

In the development of the automotive industry, and before the global economic crisis, investing in new technologies, research and development was more affordable - low interest rates enabled cheaper financing, but also higher sales, which reflected on the profitability of companies (Madić, 2009). Today, a decade after the World Economic Crisis, the global car industry is facing new challenges that bring not only changes in the market, but also the need to apply new technologies, facing global challenges that, in the field of health, require social distance and additional attention. For this reason, the automotive industry is at a turning point in its development as results are set on the one hand and investment in research and development on the other to offer new production opportunities, maintain quality and reduce production costs. In addition, special attention is paid to the necessity of environmental protection (Orsato & Wells, 2007).

Digitization in the automotive industry is a particularly important area to which increasing attention is being paid. New manufacturing processes based on various technological solutions such as 3D printers, the application of robotics, DPP (platform for digital production) require new skills in product development and create new requirements to employees, and the value that the auto industry on the basis of digitization of business processes creates, will continue to move to other segments of the economy and society.

2.1.1. Drivers and challenges of digitalization in the automotive industry

The digital transformation is affecting organizations of all sizes, and the way it shapes the automotive industry is based on the application of new technological solutions that Industry 4.0 brings with it. The impact of these trends is increasingly being felt in day-to-day business activities from manufacturing through administration, sales, and communication. To improve business activity, increasing attention is paid to digital transformation strategies that reflect the complexity and multidisciplinary approach to change. Kotarba (Kotarba, 2018) points out that organizations need to change traditional business models, which are characterized by a high degree of robustness and transform their organizations to adapt to these trends.

It is precisely the factors that shape the way of doing business that have influenced the necessity of accepting changes and due to their complexity dominantly influence the organization and implementation of business processes (Winkelhake, 2019). In practice, we are primarily talking about globalization as the main driver of the development of the automotive industry, which gives the opportunity to conquer new markets, consumer diversification and accelerated modification, modern design, and product diversification.

The process of digital transformation of the automotive industry is focused on the application of a holistic and integrated approach, with a focus on combining value for the customer and organizing operations to deliver it (*Figure 1*). Digital transformation requires a fundamental approach to the analysis of a strategic approach that will enable the most efficient integration of employees in each phase of business process transformation. Emphasis is placed on the possibility of improving existing knowledge and skills and improving the ability of employees to adopt changes. In practice, (path 1 in Figure 1) this means creating and integrating digital operations in the business process. Through the improvement and advancement of production methods and value creation for customers (path 2 in Figure 1), the focus is on the integration of digital operations. Providing synergies (path 3 in Figure 1) contributes to the development of an operational model whose application will contribute to the improvement of the business process, more productive execution of work tasks and reduction of costs.

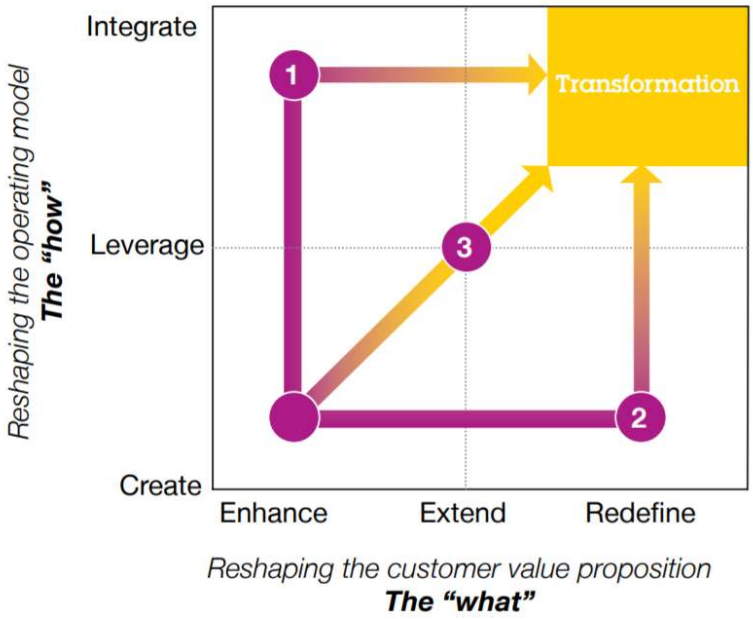

Figure 1. Digital transformation in automotive industry (Gyimesi & Berman, 2011)

The importance of digitalization in the automotive industry is best illustrated by research data showing that 24% of car manufacturers expect their factory to become a smart factory, while 49% of car manufacturers have invested more than $ 250 million in the development of smart factories. Yet only a few car companies have turned this enthusiasm into tangible results - 42% of smart factory initiatives struggle because the digital maturity of their manufacturing operations is below the level (CRI, 2020). The key challenge they face in the process of digitalization, and the process of large investments, concerns the transformation of the way employees are trained, their education, skills development, and interpersonal relationships, but also the development of motivation systems in these processes.

One of the most important questions that arises is how digitalization together with Industry 4.0 affects employees and their attitude towards work. The fact is that technology is evolving faster than people can adopt such changes. The automation of business processes and new solutions in organizing the way work is done, increasingly imposes the need to consider that such activities will focus on the need to transform jobs, train employees and apply innovative approaches in performing business tasks. This means that, although the business task can be automated, employees can, through

the adoption of specific methods and techniques, create significant economic benefits and contribute to value creation based on job transformation and clearer definition of work tasks. In a study conducted by McKinsey, as many as 60% of jobs contain 30% of work tasks that could easily be automated if appropriate methods and techniques are applied (Manyika, et al., 2017). By adopting modern solutions brought by Industry 4.0, car companies can develop and move their borders in the direction of achieving new, strategically challenging, and digitally created goals. In this way, it is possible to improve not only employees, but also the way they treat each other and towards work, react to changes and adopt new solutions to ensure the quality and safety of vehicles.

2.1.2. Industry 4.0 and the future of the automotive industry

Over the last five decades, the automotive industry has made drastic investments in the development of technology and its application in practice, pointing out the importance and necessity of business process automation. Despite strong efforts to improve and automate business activity, the automotive industry is facing a lag in certain segments - segments where Industry 4.0 has yet to experience its expansion. Those companies that have developed automated systems for organization, monitoring and control, are taking significant steps to improve the way they work. It is precisely these technologies that enable the transformation of the entire sector of the automotive industry that are marked as CASE technology. On this basis, the way in which the automotive industry develops is changing, emphasizing the four pillars of development (Daimler, 2018):

- Connectivity (C),
- Autonomy (A),
- Shared mobility (S),
- Electrification (E).

This approach to technology development aims to provide synergies in all fields to ensure market participation and the development of the automotive industry. The essence of Industry 4.0 is reflected in the improvement and facilitation of the production process in the creation of such innovative solutions that will contribute to the creation of value for customers.

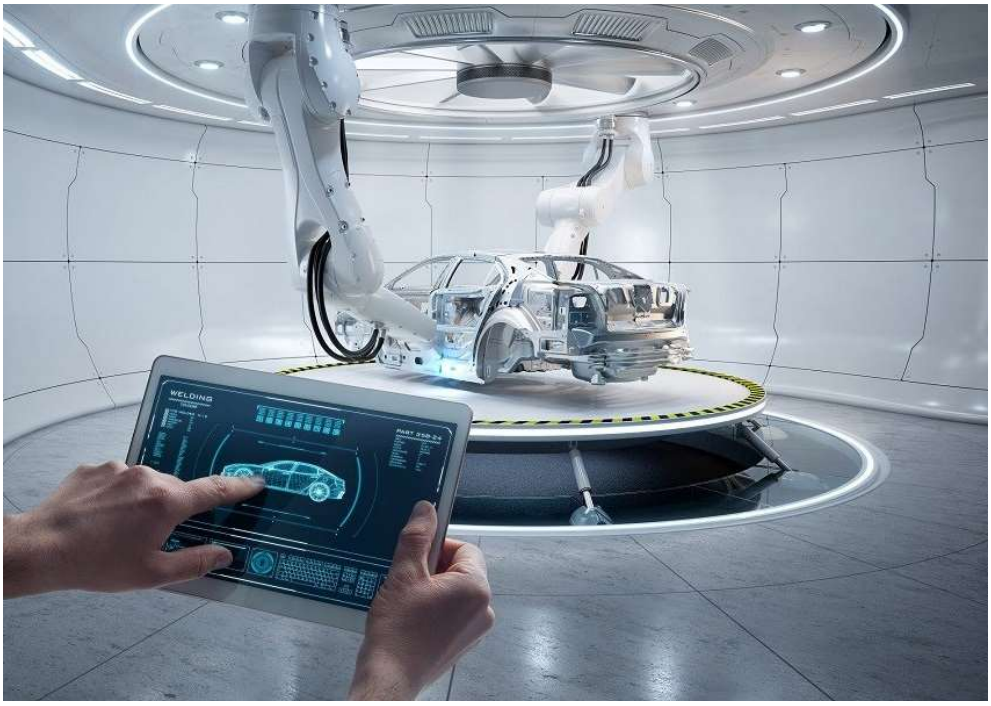

Figure 2. Future of the Industry 4.0 in automotive industry (Sulivan, 2019)

Industry 4.0 and the foundations of digitalization in the automotive industry are set with the aim of taking initiatives in the context of increasing business efficiency by improving the production process, finding new technological solutions that will be applied not only in production but also in employee training and development, including smart devices and virtual communication. However, focusing on the development and application of new technologies to improve business activity in addition to continuous monitoring of market changes, should consider the possibility of creating a new virtual reality and transforming existing jobs through training and development of employees. To achieve success, it is necessary to combine modern, digital technologies on which Industry 4.0 is based, with an integrated organizational design to ensure the transformation of the business process based on the application of modern technological solutions. Companies that are successful in this field can monitor, analyse, and create such business strategies that will be based on real data and information to create conditions for exponential growth of opportunities in the direction of achieving innovation.

2.1.3. Virtual reality in the automotive industry

Virtual reality has been talked about since the 1960s, but this concept was more often recognizable under various names - from cyberspace to simulator technology. However, today the term virtual reality is used to explain:

> *"A highly interactive, computer-based multimedia environment in which the user becomes a participant in a computer-generated world (Onyesolu & Akpado, 2009)."*

This definition of a virtual and different reality four component (Laval, 2020):

- Targeted Behaviour - Targeted behaviour in which the subject has some experience (for example, exploring, falling, flying).
- Organism - as a subject that could experience virtual reality.
- Artificial sensory stimulation - artificial sensory stimulation that allows the activation and engagement of one or more senses in which artificial simulation comes to the fore.
- Awareness - refers to the awareness of presence in the virtual world. In this way, the operator adjusts a virtual e-learning reality, accepting it as true.

Through virtual reality, the imagined environment is simulated so that it is experienced in different dimensions - through the creation of a sense of breadth, depth, and height. This creates the possibility of an additional interactive experience that simulates complete real-time movement with simultaneous access to other information necessary for business. Virtual reality provides a sense of ability to visualize, manage and communicate in the segment of extremely complex data and complex environment. Observing virtual reality as a 3D environment in which the interaction of many participants is provided, their application enables engagement and communication with actually present or simulated forms from the environment. This technology is based on the simulation of various sensory aspects that characterize a complex and dynamic environment (Onyesolu, 2009) thus creating virtual reality and simulation of real-life situations.

The application of virtual reality in the automotive industry is largely becoming an integral part of business. The reason for this is reflected in the fact that the application of modern technologies is a key factor that determines success in the market and determines the quality of products. Due to its specificity, a virtual reality is regarded as one of the technologies that can be used to ensure greater market share and improve product quality while better management of organizational processes (Mujber, et al., 2004). In the automotive industry, the application of a system based on virtual reality allows users to interact, move, observe and act as if active engagement makes contact in a real business process.

The application of virtual reality in the automotive industry has found its place in the field of design and training and employee development. The need for constant modification and improvement of the design requires numerous tests, testing and combining solutions that will be effective. Once they get into production, the design comes to the fore and any mistake would cost dearly. Hence, the use of a virtual reality is one of the most important aspects that greatly contributes to cost savings in the production process, because in the early stages of design and design of the car can achieve savings of up to 70% of total costs, while reducing the time (Shao et al., 2012). The application of the concept of virtual reality facilitates the detection of design errors and the work of teams of experts from different fields (which do not have to be physically in one place), enable the sharing of knowledge and experience, thus reducing costs and time for developing new innovative design solutions and raise quality at a higher level.

It can be concluded that in the time of Industry 4.0, people, and technologies work together. This has also contributed to the robotization of business processes, which has significantly reduced the role of human resources in performing physical work. The synergy and joint action of humans and robots allows the combination of expertise and skills on the one hand, and strength on the other. In this way, the robotization of business processes, depending on the needs and goals, allows the customization of business processes and products to meet customer expectations and the requirements of related project engineers. Davis and Ribicks (Davis & Ribickis, 2011), in order to test the efficiency of robots in the automotive industry, came to the

conclusion that robotization of business processes can reduce energy by up to 40% by adjusting braking power, asynchronous braking control and path optimization.

The use of modern technological solutions such as robotics, virtual reality and the development of digital production platforms contributes to reducing production costs and assembly costs, while ensuring the integration of different parts which, individually, represent parts of a system that form one whole. The development of business activities in the automotive industry based on digital production platforms enables the improvement of business processes based on the collection, storage, processing and use of data. Thanks to this way of organizing business processes, the whole context of planning, organizing, leadership and control contributes to the creation of added value.

In order to achieve such goals and efficient results, the use of digital platforms enables the application of application scenarios by creating conditions for the development of virtual activities that will be stored on the Cloud system and thus enable efficient interaction and communication with various interfaces and protocols, common data models, semantic models and data interoperability. By using specific, specially developed models of digital production platforms, it is possible to efficiently manage product life cycles, integrate different perspectives of engineers in their implementation and understanding of 4.0 technologies. In this way, even complicated systems can be produced thanks to the advantages that design provides through virtual reality. For this reason, as Gibson (Gibson, et al., 2010) points out, the automotive industry can benefit significantly from the potential integration of mechanical and electrical functions and the synergy of people and technology. This is supported by the fact that the use of virtual reality software in the automotive industry contributes to reducing the costs of research and development, production, and risk, but also to increase sales through the application of innovative solutions. At the end of 2019, the global virtual reality market in the automotive industry was worth $ 759.3 million, while growth forecasts are expected to reach $ 14,727.9 million by 2027 (ScienceSoft, 2020).

2.2. Virtual training - role and significance

> *„Be really intentional about choosing virtual training as a modality [...] virtual training is the same learning experience as face-to-face training, but with a team located in cities around the world it's the most efficient way to deliver a consistent learning experience."*
>
> *Dan Gallagher (ASTD, 2012)*

Modern tendencies in the development of technology and ways of organizing business activities require innovative approaches in the training and development of employees. The fact is that with the changes in the global environment, especially in the conditions of a pandemic, when social distance is marked as a priority, the engagement of employees gained a new dimension. In practice, more and more talk about the activities of a virtual e-learning training, as well as the application of innovative technological solutions that will meet the requirements of social distance. For this reason, virtual trainings and their implementation in practice is a particularly important area of research that is receiving increasing attention.

To understand the importance of virtual training, it is necessary to consider virtual training as:

> *"A highly interactive synchronous class that provides training for employees under the appropriate guidance of a mentor, with the entire process taking place online. In the process, learning objectives are clearly defined so that they are understood by participants who are individually connected but physically located in different geographical locations* (Hugget, 2013)*."*

Application of a virtual training in the automotive industry represents the primary factor which is based on e-learning. This tendency of development and training of employees based on virtual trainings stems from the fact that car design is a virtual reality until the production process begins. Striving to realize that lower production costs and better product performance, virtual trainings enable faster and easier to master new knowledge that can be applied in the use of equipment, development of new prototype vehicles, their design.

Research conducted in this area has given positive results in the application of virtual training in the education and development of engineers. Fast and co-workers point to the importance of virtual training through the use of virtual reality systems in the areas of digestion (Fast, et al., 2004) while Dawei and co-workers emphasized the importance of virtual training in assembling equipment and car parts (Dawei, et al., 2009).

Research on virtual training and the way it is implemented in the automotive industry is also shown by research according to which Borsci et al. (Borsci, et al., 2015) point out that in modern conditions, virtual training and e-learning are increasingly preferred over traditional approaches based on observation. Following this, the data show that simulated training achieves better business results in practice by up to 60%, with the dominant tasks of assembly and disassembly, and especially a higher degree of knowledge acquisition.

The increasing availability of modern technological solutions and numerous innovations bring closer the need to intensify virtual training in practice. The current situation at the global level, especially at the time of the Covid-19 virus pandemic, has influenced the more intensive application of these solutions in practice. The advantages of applying virtual training in practice are reflected in providing a focus on the processes to be adopted. Virtual trainings implemented through virtual reality reduce the required training time and encourage faster acquisition of knowledge. In virtual reality-based virtual training, engineers are isolated from the real world and more focused on areas that need to be mastered. In this sense, virtual training that is realized through virtual reality is a good solution for mastering design issues, mechanical actions, or the impact on employee logistics. This means that through virtual training and reality simulation, a certain activity can be performed indefinitely (for example, measuring the distance of the seat from the steering wheel, installing rails, welding) which further enables better memory and higher productivity, with no costs in terms of materials and equipment.

Virtual trainings combine visual, auditory, verbal, and physical interactions that encourage different learning styles through the simulation of different scenarios in a risk-free environment. In this way, not only is learning encouraged, but employees refer to each other, collaborate and share knowledge. In that way, it additionally

increases the satisfaction of employees and their motivation to learn and develop together with the company.

2.2.1. Knowledge and knowledge sharing in a virtual environment

During their private and professional training, employees strive to adopt new knowledge and supplement existing ones, and accordingly, knowledge sharing is one of the most important aspects that contribute to its acquisition. If we start from the assumption that it is:

> *"Knowledge is a personal belief that increases an individual's ability to take effective measures (Nonaka, 1994)."*

Then we can talk about knowledge as the basis on which the possibility of incorporating new experiences and ways of thinking into the way the organization operates is based. This means that the application of knowledge in practice with the aim of efficient decision-making, attitude towards work and execution of work tasks, contributes at the same time to the progress and development of the employee as an individual, based on his experience and skills. Peter Sengi (Sengi, 2007) points out that knowledge is a resource that finds its application in practice through the explanation of the term *metanoia.* This concept is related to the shift of the boundaries of thinking, especially when it comes to the learning process that is to be conducted continuously, by continuous improvement and adoption of new information.

The need for constant adoption of new knowledge and skills in the automotive industry stems from the necessity for flexibility in the process of adapting to new techniques, methods and tools used in practice. Human resources should not be neglected, especially their flexibility and ability to adapt to the resulting production conditions (Gong, et al., 2017). The diversity of knowledge and experience in terms of cooperation on work tasks provides a greater opportunity to adapt to change and respond quickly in case of problems. Although creativity and the ability to learn, as well as the attitude towards problems, are individual personality traits, in the conditions of a virtual environment, the role of managing and sharing knowledge is one of the most important issues.

Pointing out the necessity of acquiring and sharing knowledge in the conditions of a virtual environment must be viewed from two aspects: technical - technological and social (*Figure 3*). In the dimension of knowledge creation, based on the virtual environment, the employee discovers new dimensions and through self-learning gets acquainted with possible problems as well as ways in which it is most efficient to adapt a particular product to market requirements. From the social aspect, learning in a virtual environment helps to acquire new knowledge through the exchange of experiences in different ways - using Skype, zoom, webinars, but also using visual glasses that allow direct communication with employees not only in another sector but also in another geographical area, remote location. Sharing knowledge from the technical - technological aspect contributes to its transfer through digital channels, which directly reflects on the social interactions that take place between people, building relationships between them and strengthening the organizational culture.

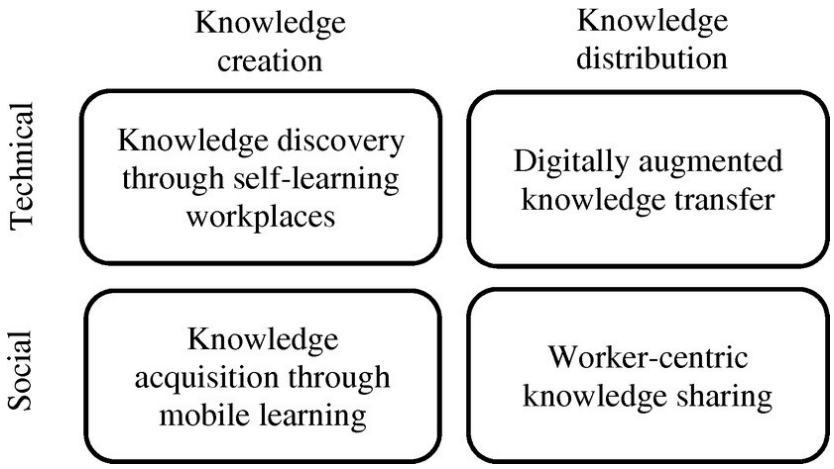

Figure 3. Creating and knowledge distribution in VR (Hannola, et al., 2018)

The importance of the realization of training in a virtual environment is also shown by the research conducted in 2019, which shows that the largest percentage (90%) of what is said and done in practice is manifested through memory, development of knowledge and experience. Simulation of real-world processes in a virtual environment enables error-based learning with simultaneous cognitive engagement that contributes to greater work efficiency. Interaction with other employees and participation in the discussion to the extent of as much as 70% affects efficiency and

memory, while watching and listening to what others do without direct participation leaves a trace in the memory of 50% (*Figure 4*).

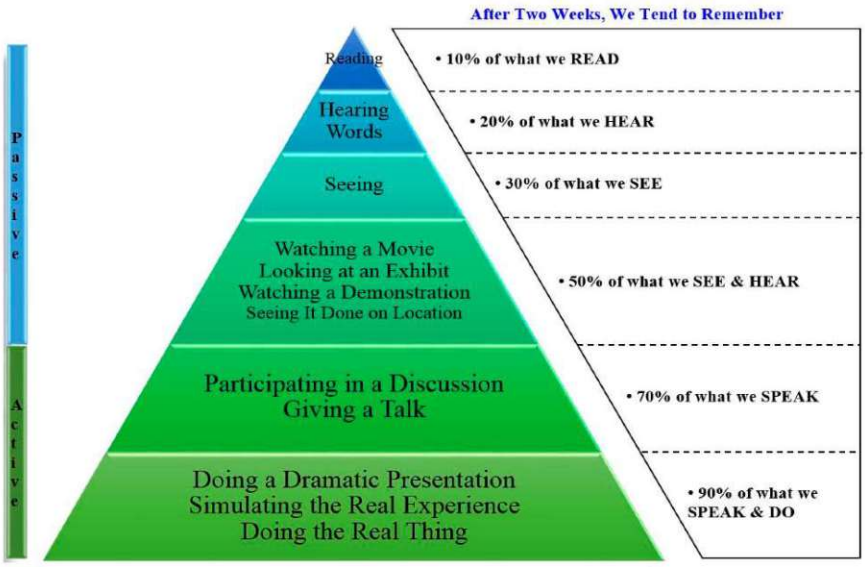

Figure 4. Active vs. passive learning and it's efficiency (Salah, et al., 2019)

Thanks to the development of IoT (Internet of Things) and their application in practice, employees can use various devices to communicate and monitor, collect, process, and analyse numerous data that can contribute to the improvement of the work process. In that way, by using the virtual environment, the so-called a smart environment uses information and communication technologies to improve the functioning of various segments of business activities. This means that communication, from the classic messaging channel, takes on a completely different meaning and it becomes a protocol that is developed in the long run with the aim of providing a connection between the sensor and the device.

In this way, in addition to constant insight into the course of the production process, the possibilities of early detection of possible errors that would lead to production downtime and high costs are realized. Learning and sharing knowledge in a virtual environment greatly reduces the time required to acquire knowledge, the ability to test different solutions in a virtual reality system at no cost, while increasing product quality.

2.2.2. Virtual tools and methods of effective engineer training

The virtual environment and training of employees in the conditions of virtual reality enable the use of all sensory senses, which creates great potential for increasing the efficiency of cognitive processes, and thus productivity. Using virtual training in conditions of virtual reality, activates brain functions that allow information processing in the nervous system that would in practice this same information applying in the process of creating and, or constructing concrete products. In terms of a virtual environment, the application of modern technological solutions can contribute to the development of cognitive abilities of engineers, the level of their interaction and integration (Zhao & Lucas, 2015). The use of different approaches in virtual training, allows to increase the efficiency and effectiveness of learning without increasing the costs associated with the material spent to try and test possible solutions. For this reason, creating a virtual environment in which engineers will learn and work is an essential part of a modern organization that learns and develops the skills of its employees.

The development of Industry 4.0 has influenced the creation of opportunities for engineers to communicate with their production facilities, practice on them and analyse their performance in a virtual environment. The development and application of IoT and Cloud technologies can significantly contribute to the development of engineers, their efficiency and productivity (Mourtzis, et al., 2018). For this reason, the adoption of new training methods for engineers is crucial to improving their abilities and skills. Numerous ideas and methods of realization of virtual trainings in practice in Lear Corporation have been developed and for the most part they have taken place through webinars, skype, zoom. However, with the development of new technologies came the need to develop new innovative training and development techniques, as well as guidelines that focus on the role of virtual training in a simulated, virtual environment. This paper introduces a methodology based on virtual training and training opportunities for engineers through the application of modern methods such as collaborative platforms for meetings / webinar, Augmented reality (AR), Virtual reality (VR), wearable technologies, e-classrooms, virtual glasses and preparing engineers to face future challenges in production.

In practice, visualization, testing and modification of 3D prototypes is performed in a virtual environment. The flow on which the prototype modification is based (Figure 5) implies access to selected design tools in a VR environment and interaction with a model based on pre-programmed actions. This means that the engineer, in the process of modifying the prototype can manage the prototype, records the efficiency of its application as well as any limitations. On this basis, it is possible to generate feedback and further develop the prototype with a reduced possibility of errors.

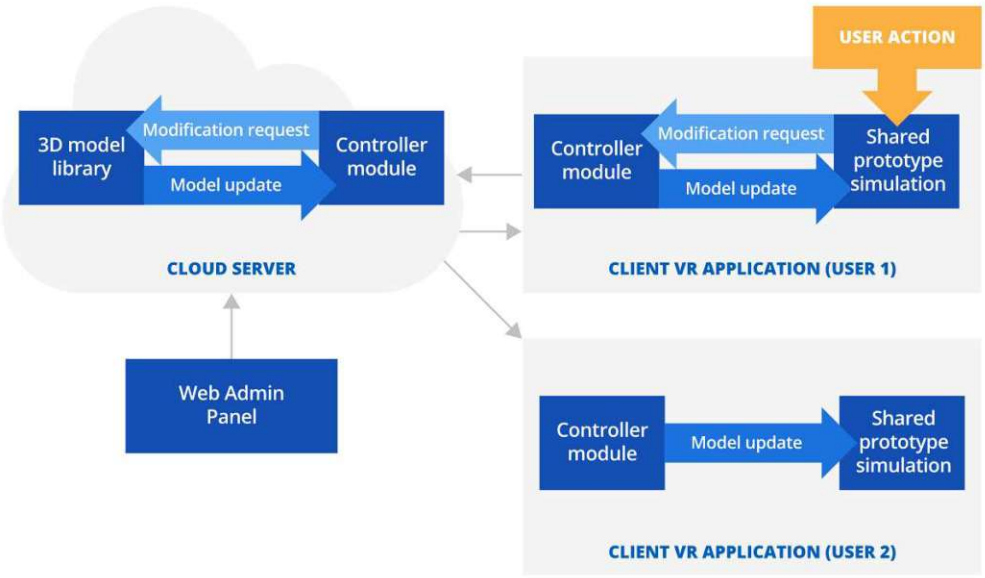

Figure 5. Virtual Reality for Prototyping in the automotive industry (ScienceSoft, 2020)

By combining the real and digital worlds, engineers face numerous benefits that come with the ability to perceive augmented reality (AR). This means that from the digitization and conversion of analog information into digital platforms, the processes of business processes in the automotive industry are observed. In Lear Corporation's practice, designers and engineers use AR in the design process by overlapping virtual images to actual models and evaluating different options to achieve better and more efficient results. Thus, Augmented Reality and its application as a virtual tool in the automotive industry is based on fine-tuning the design and prototyping, and later the production itself, thus eliminating the possibility of errors

before cars appear on the market. This is largely made possible by improved image processing software, dynamic design technology, and improved remote control capabilities.

Compared to traditional methods of production and control, cars had to undergo complex tests to ensure that they met all the necessary qualifications to move from one phase of the production cycle to another. Using an augmented reality model allows engineers to test key features and capabilities without the need for physical use of the vehicle. By creating a responsive and realistic virtual environment, in augmented reality, real situations can be created that not only facilitate the realization of critical logistics and technical checkpoints, but also create additional time for designers and engineers to dedicate to creative segments and business improvement.

By simulating a workspace that supports the necessary material flows and production processes, the augmented reality method enables the company to make the most efficient use of the available budget and on that basis to achieve savings in other fields. The success of using augmented reality is especially evident in pandemic conditions, where there is the application of AR through the organization of dislocated teams, achieving the same level of approach and practical impact as in the traditional system of employment. Monitoring each step of the production process with the help of realistic representations and simulation of a dynamic response, creates a connection with all team members and their communication.

In addition to the mentioned tools, the use of wearable technologies is becoming more and more intensive, accessories that are installed or added to the clothes or accessories of employees. These technologies connect to the Internet of Things and are a common addition in the automotive industry. However, in practice there are a large number of designs and interfaces of these technologists and me, but their purpose is the same: to provide access to real-time data and to enable quick and easy decision-making in business processes.

Figure 6. Using wearable technology (Amaxperteye, 2020)

Understanding the functioning of the virtual environment and the need to hold virtual training is the basis from which to provide an understanding of its importance and application of acquired knowledge in practice. When they understand what they are doing and what they are doing, employees, and above all engineers, have a different attitude towards this type of training. Through the simulation of the department that will help employees attend virtual trainings and use the content of virtual reality, it creates the possibility of working in small groups on a specific task. When conducting training and implementing modern virtual reality solutions, it is important to establish an adequate hierarchical level among the members of the engineering team and clear communication between them. Each team member who participates in the virtual training has a role to play, with the project leader taking care of planning specific tasks, organizing team members, coordinating team members, managing conflicts between team members. This definition enables the understanding of competencies and positions of power, which further implies the possibility of providing exchange of

opinions and sharing of knowledge and ideas (so-called brainstorming) through two-way communication.

The use of virtual tools requires cooperation between team members, which is why each project during its development and project implementation must be based on the interface between employees and defining the main and performed tasks so that based on their implementation allows evaluation of achieved results and progress in project implementation. The use of various software and virtual solutions that support the implementation of the project and communication systems can contribute to increasing motivation among employees based on the ability to use innovative solutions and personal and professional advancement. Performance measurement can be performed based on various analyses, which enables an understanding of the ways in which teams are created, applied, and managed, and interact in a virtual environment.

Figure 7. Application of tools in virtual training (Williams, 2020)

2.2.3. Problems and limitations of virtual engineer training

> *"VR has already proven its potential to reduce the time needed in the real factory for planning and, above all, integrating new production structures"*
>
> *Matthias Schindler, BMW (Williams, 2020)*

In the conditions of Industry 4.0 and the expansion of the virtual environment, the realization of virtual training and the adoption of new methods of work, training, and development, encounters numerous problems. The knowledge and skills of engineers to continuously adopt and share their knowledge with other employees significantly contributes to business efficiency, employee productivity and success in project implementation (Davenport & Prusak, 2000). The fact is that adequately managed communication is the basis of success of any organization, which is why, if engineers and managers do not have the ability to communicate clearly and unambiguously with members of their team, then there is no prerequisite for success. For communication between engineers and employees to have positive results on business activities, it is necessary to have the ability to listen, understand people and their attitudes and beliefs, and be well informed about the activities within the organization.

Culture has a special dimension in the development of social skills, and thus on the impact of the effectiveness of virtual training, for example, the acceptance of cultural, racial, religious, and other differences. Acceptance of diversity is the basis of the communication process, and communication transmits culture. In the literature, as a source of differences in culture can be cited (Rakita, 2012):

- Personality character (good, bad, mixed);
- Relation to nature (dominant, harmonious, subordinate);
- Attitude towards other people (direct, indirect, individualistic);
- Activity (action, hereditary, controlled);
- Relation to time (past, present, future).

Observing culture and sources of cultural differences as a specific phenomenon that enables the formation of a characteristic organizational policy, conditions are created for differentiating the way of doing business in different markets, which is why understanding culture enables raising the level of business efficiency. These differences, applied in the automotive industry, represent one of the limitations that significantly affects the ability to adopt new knowledge, methods and techniques, the application of new technologies in practice. It is not a rare case that we encounter conflicts in determining the character of a person, and an individualistic approach is often expressed in relation to people. Such personality traits and their behaviour towards other employees, but also the company as a whole, affect the efficiency of the process of organizing virtual trainings, but also their need to emphasize traditional ways as better than modern ones.

Hofstede also analysed the way in which employees behave in the organization, emphasizing the distance of power, avoiding insecurity, individualism versus collectivism and masculinity in relation to femininity (Zečević - Stanojević, 2007). This analysis is dominant in the practice of realizing virtual trainings and training using modern technological tools. The distance of power expresses the degree to which members of a lower ranking society accept and expect power to be unequally distributed. The basic question here is the way in which the issue of inequality among people is resolved. In Lear Corporation, it is possible to identify a high degree of power distance in which positions are clearly defined and the dependence between hierarchical positions is expressed.

In the implementation of virtual trainings and the need to adopt new virtual tools, there is a slight lag in the adoption and active engagement of both engineers and employees who are categorized as older than 45 years. This dimension of insecurity expresses the degree to which employees feel insecure due to the adoption of new knowledge, new technologies and their application in practice. Dealing with new technologies, especially among the older population of employees, has a pronounced high degree of insecurity, which is why they are more oriented towards traditional methods and concepts of work.

This is further followed by the attitude that employees have towards retraining and additional training, especially when it comes to mastering new technologies. Such

requirements and necessity in the automotive industry often encounter a barrier in the implementation process, which further complicates the experience gained, long years of work and the need to provide flexibility to change. In practice, Lear Corporation has identified, despite these limitations, a high degree of collectivism. This means that employees at all levels firmly adhere to defined frameworks, while jointly accepting responsibility for the decisions made and the outcomes of the implemented projects. Consequently, there is no pronounced social deprivation among people in the company. On the other hand, there are pronounced dimensions of culture in both the company and masculinity and femininity. This culture is based on striving for achievements and material rewards as systems of motivation, but at the same time encouraging cooperation and ensuring employee satisfaction at work.

Awareness of differences such as cultural dimensions, age, hierarchical levels, resistance to change is the basis on which to understand and define the way of communication to all members of the organization, and especially to team members who are particularly engaged in virtual training. Adapting the communication style to the style that best suits the members of his team, regardless of differences, contributes to the elimination of barriers, and each change in these segments is a special and dynamic area that can largely determine the success and end result of virtual training.

3. Methodology

3.1. Data and method

An analysis of current problems in the application of virtual training tools for engineers at Lear Corporation was performed during June and July 2021 using a questionnaire consisting of 15 questions. The questions are defined to provide insight into the attitudes of engineers based on the use of virtual tools in training and development, but also their implementation in the production process. Bearing in mind that the research was conducted online, 54 engineers aged 30 to 55 answered the questionnaire.

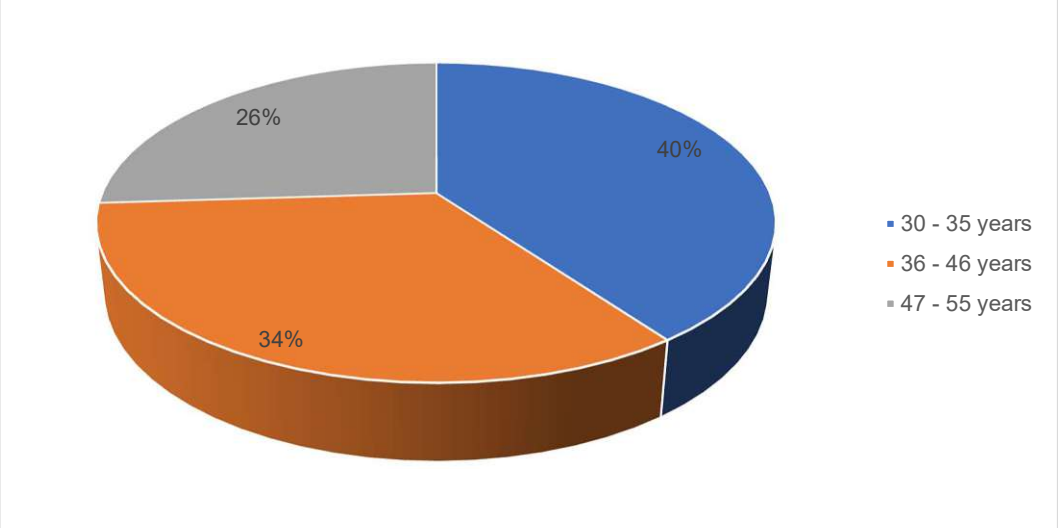

Figure 8. Structure of surveyed engineers by age

In the structure of respondents, the dominant participation is of employed engineers with work experience 5 to 10 years (a total of 38 respondents), while 11 engineers who participated in the survey had work experience longer than 10 years. Less than 5 years of work experience had 5 surveyed engineers and they were younger than 35 years.

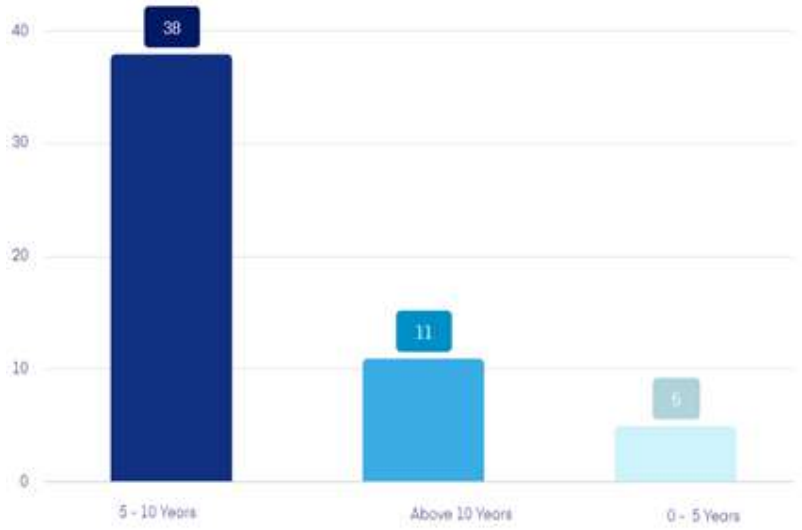

Figure 9. Employees work experience in Lear Corporation

According to the classification of respondents according to years of service and age, the dominant participation is of engineers aged 36 to 45 with a length of service of 5 to 10 years, while the lowest participation of engineers with less than five years and age up to 35 years. With work experience longer than 10 years and ages 46 to 55, 11 engineers were surveyed.

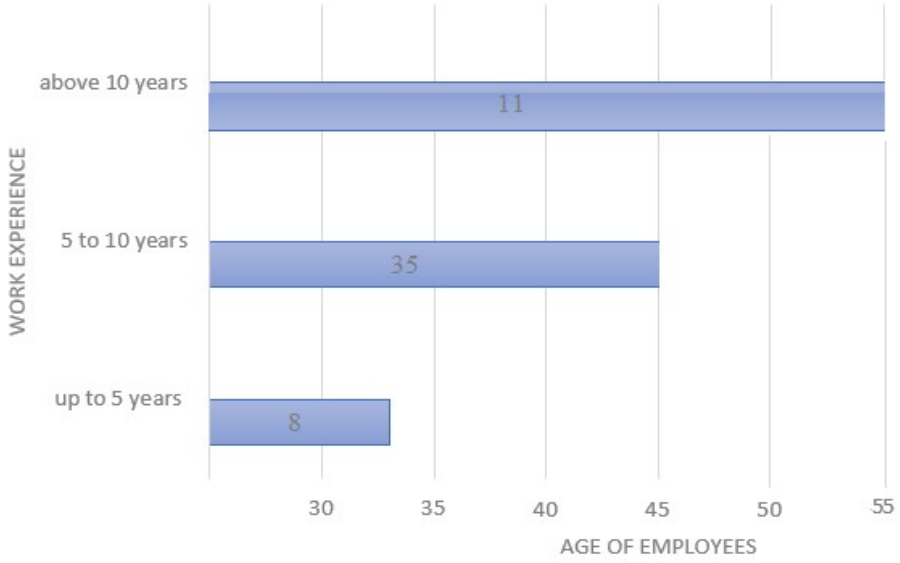

Figure 10. Work experience and age of employees in Lear Corporation

For the purposes of this research, the position of engineers in which they perform work tasks is of great importance, in order to create conditions for giving answers regarding attitudes towards new technologies, the use of virtual tools and the ability to apply them in practice. In a sample of 54 engineers, as many as 24 engineers were employed in the Junior Engineer position, while 13 of them were employed in the Lead Engineering position. In the position of Senior Engineer, 9 engineers participated in the research, and four employees each in the position of Analyst Engineering and Engineering Manager. This structure of employees according to the hierarchical position they are in, has a significant role in making conclusions related to the application of virtual tools in improving the business process, without taking into account only demographic characteristics, cultural constraints, gender, age and the like.

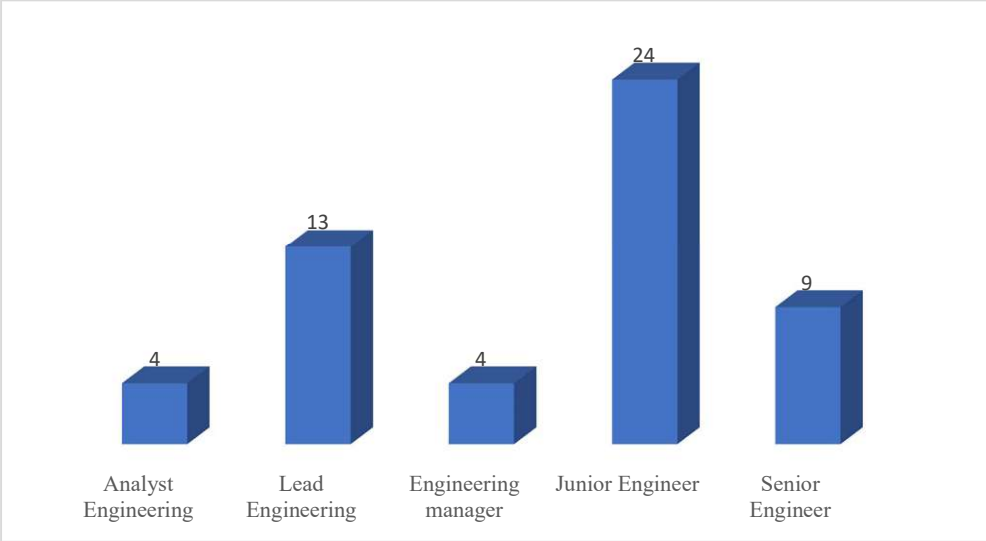

Figure 11. Position of Lear coroporation engineers who participated in the research

By grouping the questions into four categories, four key problems faced by Lear Corporation employees were identified, and they are:

- The need to adopt new technological solutions and virtual tools that will increase the efficiency of the production process.
- Application of new methods and techniques that will contribute to the improvement of business processes.
- Development of employee motivation system, and

- Elimination of key barriers in the implementation of new solutions and virtual tools.

The complexity of the problem area of research includes many elements and factors, and its multi disciplinarity additionally indicates the dynamism of the connections and relationships that are established, which is why the paper presents a systematic opinion. In addition, the content analysis will be applied in the paper with the aim of processing the available literature from the relevant scientific field. For the purposes of this paper, a qualitative research based on the Survey as a basic instrument will be conducted.

The survey is composed of 15 questions (Appendix 1), open and closed type, so that based on the answers applied descriptive analysis that will provide insight into possible ways to improve business on the basis of virtual training and application of modern technological solutions and eliminate key barriers in that segment. The research was conducted during June and July 2021, on a sample of 54 engineers employed by Lear Corporation.

3.2. Hypothesis

H0: Technology is evolving faster than people can adopt the new changes. If an adequate approach to employee training and development is applied, the gap can be reduced by applying systematically organized virtual trainings with clearly defined goals.

H1: For the realization of virtual trainings to be successful, it is necessary to apply different learning strategies that will be adapted to the age and cultural diversity of employees.

H2: If it is possible to understand the essence of the application of various virtual tools of engineers and get acquainted with the benefits of their application, it will contribute to increasing their engagement and productivity.

H3: The attitude of employees towards the adoption of virtual tools in the direction of improving the production process depends on the degree of technological literacy and position in the hierarchical structure.

3.3. Problem approach

- Point out the importance of digitalization of business activity in the automotive industry and modern solutions that contribute to its development
- Point out the role of virtual trainings in modern conditions through the possibilities of developing new approaches and methods of work.
- Identify the key differences of the traditional in relation to the virtual system of training and development and based on methods and techniques that will contribute to the development of engineers' skills.
- Point out the motivation systems that will contribute to greater efficiency in the implementation and elimination of barriers that hinder the implementation of modern technological solutions based on virtual training.

4. Analysis and Results

4.1. About Lear Corporation

Lear Corporation is a leading vertically integrated first-tier supplier to the global automotive industry. The company is leader in market in the production system and sitting, electric distribution and connectivity, electronic systems, and software for largest car manufacturers in the world. With 257 manufacturing, administrative and engineering locations located in 38 countries around the world, Lear Corporation has more than 174,000 employees.

In business, the company strives to optimize the cost structure so that with 68% of the production plants and 86% of employees who are located in countries with low costs enable the achievement of business goals based on innovation, operating our excellence and management skills and engineering program. Employee training and development is one of the dominant goals of Lear Corporation's development strategy. In the period from 2019 until today, more than 3.7 million hours of workshops were realized, which aimed to increase safety, development, leadership, improvement and development of quality, application of ISO standards and ATF training. During 2020, Leads Self Lite was launched, a leadership development program offered to employees from the beginning to the middle of their careers. The program is based on career development support using internal leadership development tools. The CEO Academy was additionally developed as a basis on which the possibility of improving leadership skills is based. Twice a year, a select group of leaders from different fields participate in a one-week event during which each of them presents business ideas and suggestions that can help improve the success of Lear Corporation's business. During the pandemic, the emphasis was placed on the development of virtual solutions and communication systems and the improvement of production.

The entire business is divided into two segments: car seats and e-system. Each of these segments has a diverse range of products and technologies in several component categories. In the field of car seat production, the business processes that

are realized concern the design, development, engineering and production of car seat systems, seat subsystems and key seat components. Our capabilities in supply chain operations and management enable synchronized (Just in Time) assembly and delivery of large quantities of complex complete seat systems to customers in the automotive industry. Development of the system design and manufacture of car seats has been extended to advanced systems when we speak about comfort, security and audio, and flexible technology products for seating, which are all compatible with the traditional architecture of the internal combustion engine ("ICE") and a whole range of hybrid, plug- and hybrid and battery electric architectures.

In the area of e-system predominantly is represented design, development, engineering, and manufacture of a complete system for distribution and connection of electricity, electronic systems and software and related services. The unique combination of these capabilities enables the offer of flexible solutions with optimized design at a competitive price. Lear Corporation is a large organization with a matrix system of organization that implies the existence of many hierarchical levels and business functions located around the world. Corporate governance relies on expertise in leadership, organization, and control. The basis on which the organizational structure is based derives precisely from the previously mentioned two business segments, which is shown in *Figure 12* - Seating and E-systems (Lear Home 2021). The structure of both categories is similar and includes a further breakdown of the sectors classified by category.

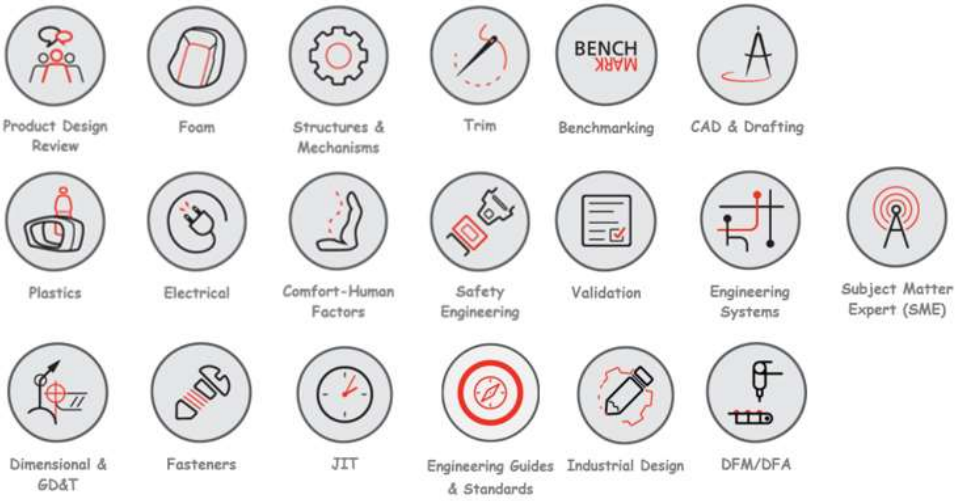

Figure 12. The basis of the hierarchical structure

If we look at only one sector, for example, SMEs, it can be seen, that the teams are divided globally and include China, the European Union, India, and North America. Given that the research was conducted in the territory of the European Union, a hierarchical structure in this area (Seating / Design / SME) can be further observed.

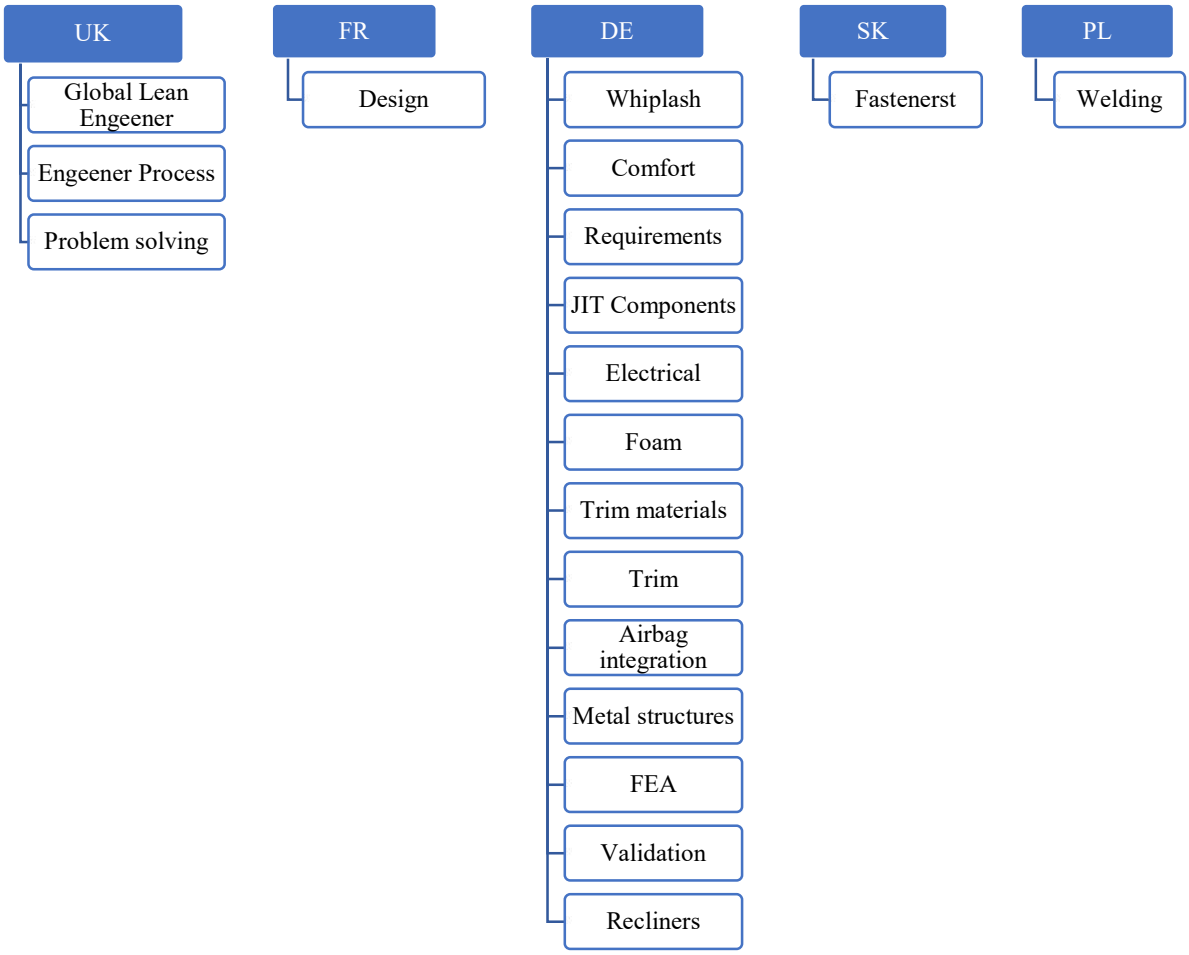

Figure 13. Organizational structure of SME (Subject Matter Expert Engineering team) in Lear Corporation

In its business, Lear Corporation uses custom technology that creates added value for customers. The use of such technology and understanding of software and data to create a unified proposal and new value for customers, creates the additional potential that can generate new and flows and income.

Such business is further followed by socially responsible business, because Lear Corporation takes care of the transformation of the business process into the

green production. This means that operations based on the efficient use of energy to reduce greenhouse gas emissions, prevent pollution, and ensure sustainable production business processes are used globally. The company's goals are aimed at reducing carbon by 2030. year, including 100% use of renewable energy and 50% reduction in carbon emissions in manufacturing plants.

4.2. Transformation of engineer training - from traditional to virtual

The use of modern tools and transformations from the traditional form of business to the creation of a virtual environment and a learning-based company is the basis for the development of the idea for the implementation of augmented (AR) and virtual reality (VR). Understanding the transformation of the way engineers are trained must be based on a clear distinction made in business, with AR transforming the way information is used by overlapping digital content and analytical data in the actual business process, while VR contributes to creating new experiences by creating simulated environment. Through AR, it is possible to view operational data and drawings with the help of 3D or 4D glasses or a mobile phone, while with the help of VR, it is possible to assemble individual parts based on drawings and their testing, without physically consuming resources, thus reducing the possibility of errors.

Examples from practice also speak about the necessity of implementing different VR tools, especially when different phases of the design process are in question. Jaguar Land Rover integrates different VR concepts in designing the process of introducing new products because it facilitates the decision-making process in the initial stages of design, and thus reduces time and costs directly related to research and development (Zachmann & Gomes de Sa, 1999). In addition, Ford, Hyundai, and Volvo also use virtual tools in both production and sales to enable efficient user experience and useful assessment during the initial stages of designing new products (Falcao & Soares, 2015).

Compared to traditional methods of learning, training and development, AR and VR enable fast action in different cases. For example, quality control engineers may be alerted to a possible shortcoming in business process planning, pointing to detailed troubleshooting instructions thanks to AR. Various attempts at design and

implementation before the very beginning of the production process enable significant cost savings thanks to VR and the ability to verify the design itself through a VR environment. Compared to traditional methods of learning and organizing business processes, the practical assessments that are made and the possibility of human error leads to losses in all business segments. For this reason, the combination of AR and VR provides the best results not only for planning, organizing, leading, and controlling the business process, but also for evaluating engineers through practically achieved results.

By using modern virtual tools and transforming the training of engineers from the traditional to the virtual, conditions are created for collecting all the necessary data that will contribute to the improvement of training and development of engineers. Modern VR and AR tools have the ability to identify the possibility of errors, shortcomings in design and production, and accordingly identify those steps that in practice may result in a negative outcome, either in terms of resource consumption, inadequate installation or causing any risk that would jeopardize safety product users. The advantages of AR and VR over traditional methods of training and development of engineers are shown in Table 1.

Table 1. Advantages of AR and VR training compared to traditional methods

AR	VR	Traditional
The trainings are visual, auditory and kinesthetic	Improved learning and performance	High level of costs and resources
Detailed real-time visual and oral instructions are provided	Access to business process without the use of resources	Passive / individual learning
Identifies the necessary tools and parts	Accelerate the learning process	Rigid training structure
Warns and corrects errors with real-time feedback	Cost reduction	Ignoring diversity
Performance monitoring and control	Distance training and availability	
	Product testing and elimination of errors before starting the production process	

A survey conducted on a sample of 54 engineers employed by Lear Corporation, shows that in their work virtual training was used by all 54 engineers, with as many as 12 engineers (22.2%) applied the highest level of training (advanced), up to 30 respondents (55.6%) used virtual training for intermediate level training and 19 engineers (35.2%) for beginner training program.

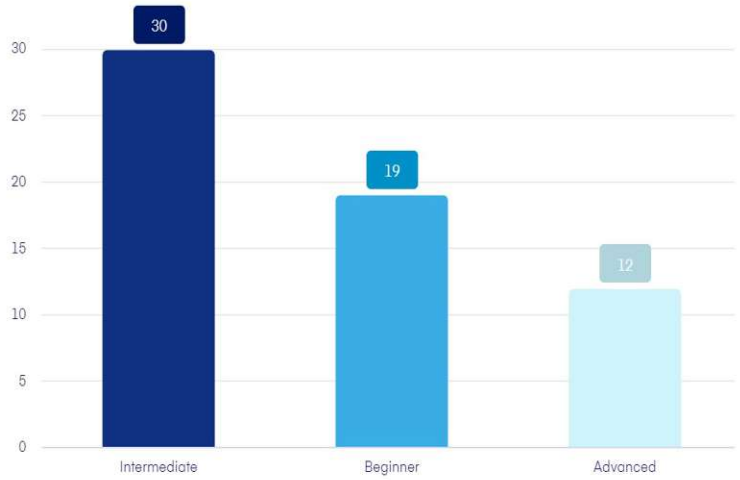

Figure 14. Level of access to virtual training

If we look at the time spent by engineers on an annual level in training using virtual trainings, it can be concluded that for the use of such training programs most engineers spent least time (30 engineers spent less than 20 hours) while only 11.1% (6 engineers) spent more than fifty hours a year. According to the previously shown graph, a connection can be made that the most time is spent on advanced training programs, which are also the most complex.

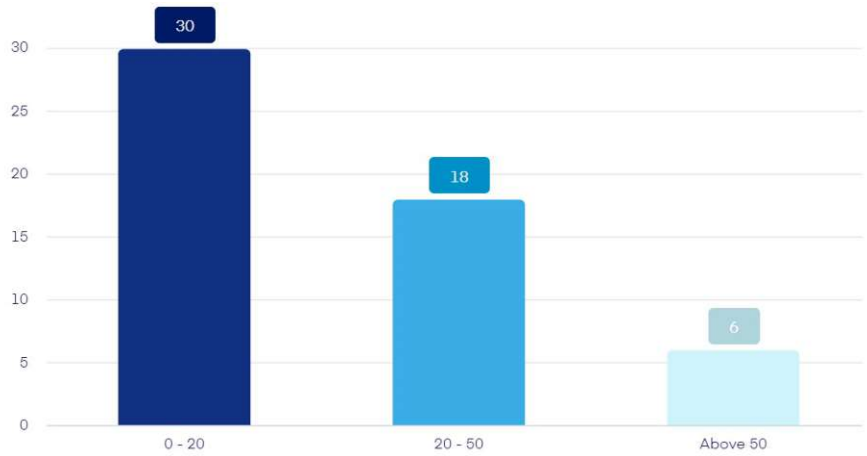

Figure 15. Average duration of the virtual trainings attendend per year in hours

The use of virtual tools in relation to traditional ways of training can affect the speed of decision-making as well as an adequate approach to crisis situations. For example, always, engineers must be prepared for situations that can stop production, but also situations when it is necessary to implement innovations in order to improve and develop a given product. The use of virtual tools can contribute to a quick and flexible response and adaptation to changes, thus preventing greater business risks. For this reason, the transformation from traditional to virtual training can contribute to the creation of great value. In the context of the production environment, virtual tools can show how different responses and reactions affect production operations, regardless of the geographical distance of the location.

One of the more important issues we face in this complex research process, concerns the attitude of people towards the ways in which new solutions that Industry 4.0 brings with it are adopted, and which primarily relate to virtual tools. In practice, in the conducted research, opinions on the effects of the application of virtual tools are divided, as well as their expectations regarding the possible growth and development of the company.

> *"I think that a different approach is needed in the presentation and implementation of new technologies. We, as engineers employed in the automotive industry, need to be one step ahead of the competition that is getting stronger day by day, but we need to encourage the development of an organizational culture that will fully support digital transformation, and when*

it comes to virtual tools, it is crucial that training on the benefits of their application is held in the right way. "

This response is just one in a series that indicates the need for greater involvement of the organization in the direction of better and more efficient use of virtual tools. The problem that Lear Corporation faces in practice concerns the lack of different mental models and the speed in launching and adopting an initiative that will be crucial for success, growth, and development at all levels. This shortcoming is especially important from the aspect of organizational culture and the need for its reorganization in the direction of encouraging employees to direct their attention and energy towards a joint effort towards achieving development goals.

"Virtual tools are not sufficiently represented, which means that I know they exist, but not how they are used. Only the introduction of virtual tools can be stimulating for the development of both engineers as individuals and the company as a whole, but this development is limited by insufficient engagement of higher levels in the delegation of knowledge. In that sense, there is a limit to growth mind-set and dealing with changes that can contribute to overall development. "

"One of the obstacles is the mental issues that some engineers have about new technologies. I think that the solution can help to use this technology is to mix VR technology with already established systems. This solution can help all employees to use this technology without any unpleasant circumstances, and it can also help those who are fixed mind-set to adopt the virtual tools more efficiently. "

This approach to innovation and the application of virtual tools in the practice of Lear Corporation can influence the perception of new approaches in creating future business strategies. Namely, while the standard way of thinking (fixed mindset) implies that employees' abilities are limited and that their attitude is generally pessimistic towards innovations, growth mindset encourages each individual team member to progress and develop through continuous learning and application of

acquired knowledge in practice. It is crucial that management promotes a way of thinking about growth among team members, encourages learning, development, and new ideas. This means that the condition for the survival and successful implementation of virtual tools in practice is focused on innovation, which will support organization to develop. Although the promotion of innovation raises a number of issues highlighted in this paper, including the need to change employees "traditional mind-sets" to encourage creativity and new ideas, often the fear of failure or inability to take risks is what prevents people from expressing their creativity and applying innovation.

4.3. Methods and techniques for improving skills development

The achieved level of development and application of modern virtual tools in the training and development of engineers in Lear Corporation show that there is an intensive program of virtual training, but that the tools used are still underdeveloped. According to the obtained data, engineers in virtual training predominantly use Skype (26%), MS Teams and Zoom (24% each), while slightly less use Webinars (11%) and Webex (9%). Only 4% of the engineers who participated in the research mentioned the use of Virtual glasses as methods of skills development (*Figure 16*).

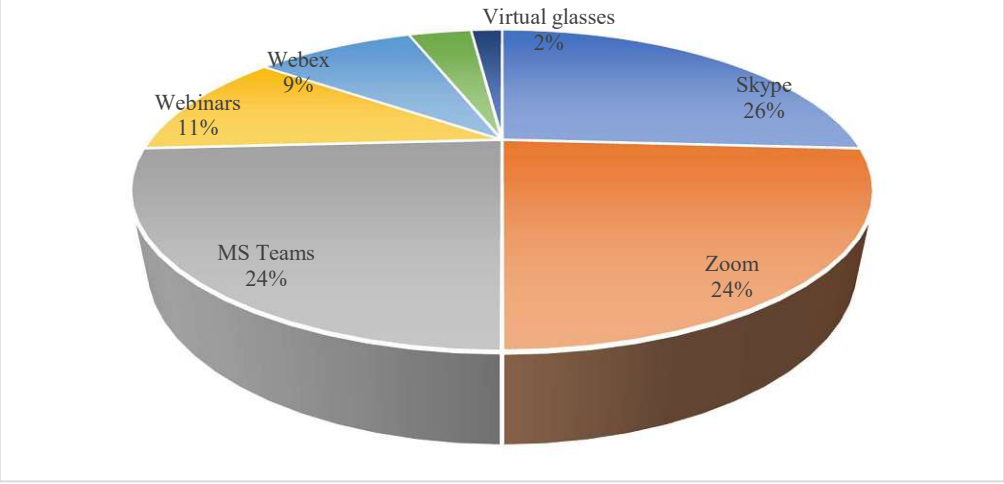

Figure 16. Types of virtual training tools used in organization

The use of these methods has a numerous functions and advantages that are reflected in the maintenance of online meetings, communication, video calls, screen, and file sharing (e. g. Skype, Zoom, MS Teams). Experience using these methods is presented in different ways by the respondents, with the main restrictions referred to network infrastructure, the quality of Internet connections and the lack of greater interaction between participants.

> *"Glitch on the tools and network connection sometimes interrupts the momentum of the training. Participants tend to be not as interactive compare to face to face training. However, virtual trainings are also effective since attendees can be more focused and will have lesser tendency of distractions."*

Using Skype, Teams and Webinars has proven to be insufficiently interactive, and accordingly too traditional, because in these forms of virtual training, power point presentations presented online are simply used.

> *"Webinars are still "old-school" realized through power point presentations, simply presented online... Skype trainings are mostly unidirectional, do not keep participant engaged."*

On the other hand, use the Zoom -a enabled a greater degree of interaction between engineers and their joint operation in solving problems. The way in which the work tasks and the needs of hiring engineers are presented are clearly defined and presented, which reduces the possibility of misunderstanding.

> *"In Zoom we were able to interact with the other participants. We can also be divided into groups using the breakout room, so we can be able to work on a project or presentation. In Team Centre, it is same as Zoom without the breakout room. We can also collaborate and interact with the participants and show some presentations. Both virtual trainings are effective even if the participants are not in a training room."*

In addition to the above shortcomings and limitations in the application of tools necessary for virtual training of engineers, there is a high degree of interest in future activities that will be realized by implementing more modern solutions and eliminating existing barriers. More than 93% of engineers are interested and would be actively involved in the application of modern tools of virtual training and business, while only 5.6% of engineers stated that they would prefer to use traditional tools for training and development, as well as organizing business activities. This interpretation of the necessity of presence observed more than simply logging in to virtual training is confirmed by previous research (Weibel, et al., 2010) which shows that personality traits such as openness to experience and extraversion are positively associated with presence and acquisition of new knowledge.

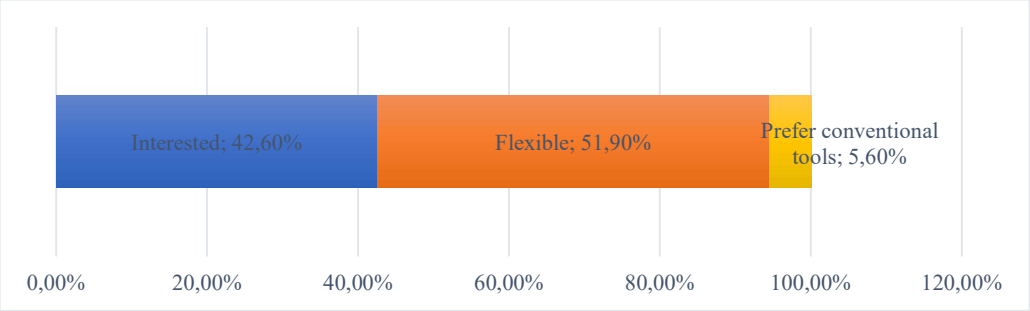

Figure 17. Adaptability to future virtual training tools

The fact is that virtual trainings are effective and that the use of virtual tools can give positive results both in the work of engineers and in increasing their productivity, but only if certain conditions are met. The following answer best describes how the efficiency of the implementation of these solutions can be achieved:

> *„Virtual trainings are only good if the participants are focusing and not just logged in. In the real training sessions, this option is not available. Hence, virtual trainings are more participant dependent. Moreover, connectivity issues especially in developing countries, is always a concern."*

The use of modern virtual methods and the attitude of engineers towards their implementation in the production process engineers especially emphasize in the field of design and process, design developments, engineering dimensions, theoretical

tendencies, proactive approaches, virtual measurement of parts and visualize actual manufacturing environment for product. Attitudes regarding the implementation of virtual tools in Lear Corporation are of the unanimous opinion of the surveyed engineers, according to which it can be pointed out that:

> *"Some function could be performed well, but face to face relationships and problem solving are a key part of making people feel part of a team or family. There needs to be a mix of both virtual simulation and physical."*

It is interesting to note that in the application of modern virtual tools, the use of virtual glasses is at an extremely low level. Implementation of Virtual glasses is an effective solution for detecting potential design flaws in all aspects of a car before their integration in production and product can have a significant impact on end users of the product and the company distributing the product. Consequently, the application of this tool with virtual glasses can contribute to the improvement of the planning and control system, as well as the early detection of critical control points, which can greatly save both the company's time and money.

The use of virtual tools and the use of virtual training distinguishes two dimensions:

- Immersion - an objective description of aspects of the VR system such as field of view and screen resolution and
- Presence - a subjective phenomenon such as the feeling of presence in a virtual environment.

Using virtual reality tools, such as virtual glasses, provides a sense of experience and presence. The theory points out that there are three dimensions to a virtual experience: personal presence (the degree to which a person feels part of a virtual environment), social presence (the degree to which other beings - living or synthetic - exist in a virtual environment), and environmental presence (the extent to which the environment itself interacts with the person) (Heeter, 1992). However, the effectiveness of the application of virtual tools depends not only on the presence, but also on the cognitive performance and the delegated task. Previous research shows that

an intense presence experience increases attention and cognitive resources to achieve higher performance in accordance with delegated tasks (Moreno & Mayer, 2002).

VR and AR tools in Lear Corporation can be applied in the field of design and planning, where the use of hardware and software solutions can provide efficient, reliable, and flexible use of virtual tools in different business segments. For example, the integration of HTC Vive used with high-performance computing for VR applications and Microsoft HoloLens, may contribute to delays in production and more efficient management of resources.

In practice, VR has contributed to reducing the time required for planning and design, but also the integration of new production structures. In that way, a virtual check of the entire production process is enabled, from the beginning to the end. In this way, certain processes can be shortened to the required execution time by up to 60 minutes, compared to traditional ways of managing the production process for business activities that took up to several days. Following the example of BMW and Mercedes Benz, the use of virtual tools can be used to create a Virtual assembly station, whereby the established station will work in a similar way as a motion control video game console, allowing virtual avatar assembly and testing of advanced design, development and product control.

The use of virtual tools in the business process significantly contributes to increasing efficiency and security performance. Collaborative product design in VR is increasing, along with security, reducing resource costs and time spent testing products. Placing the product in a 3D simulated space that allows the interaction of different design components, the possibilities of collaboration of data, parts and platform for virtual reality are considered. If virtual reality tools were not used, it would take a lot of resources, time, and money to agree on the design and test its usefulness and value. If we look at the activities in which modern virtual tools can be applied, for example, virtual glasses, we can see an increase in efficiency, safety and productivity while saving costs (Table 2).

Table 2. High benefit and low complexity of using virutal tools (Cohen, et al., 2018)

Activity	Benefit
Simulate human motion for a process to engineer alternative actions	↑ Efficiency ↑ Safety ↑ Productivity
Early design of concept fully created in VR	↑ Efficiency ↑ Safety ↑ Productivity ↓ Costs
Visualize digital equipment piece into production environment to see final product	↑ Efficiency ↑ Safety ↑ Productivity ↓ Time
Remote collaboration across locations to view same project design and resolve conflict	↑ Safety ↑ Efficiency ↑ Productivity

The application of virtual tools, for example virtual glasses could contribute to increasing business efficiency based on the possibility of implementing 3D systems for design and projecting, model testing before the start of the production process. To achieve efficiency it is important to introduce employees on the potentials and benefits of their use through quick and thorough monitoring of business processes and the use of visualization in real time in order to affect the debugging. In this way, small improvements in the implementation of modern technological solutions can affect the achievement of higher productivity and efficiency of employees and the results of their work.

However, by analyzing the responses of employed engineers and the frequency of using virtual techniques and tools, as well as training, it seems that increasing business efficiency through virtual tools like simulators is a distant possibility for now, because people, both customers and suppliers, must understand and accept concept. Also, this would require huge capital expenditures which would again require manpower to maintain. So, this may be possible in the future , if financial resources are provided that will enable engineers and employees of Lear Corporation to understand the importance and necessity for accepting innovative solutions in design and production.

4.4. Barriers in the application of virtual trainings

The conducted research pointed out certain barriers that engineers face in the implementation of modern virtual training tools and methods of their implementation. The obtained answers of the surveyed engineers show that the technology is developing quite fast, but that it is not applied in accordance with the degree of development, as well as that the employees cannot master the changes quickly enough. In the analysis of the obtained answers, the following problems are highlighted as key:

- Internet connection, internet access and infrastructure;
- Lack of participants motivation and attention;
- Orientation towards traditional learning systems - resistance to innovation;
- Missing physical touch, eye contact, body language;
- Technologies are subject to rapid obsolescence and the inability of organization and employees to follow them.

These problems stem from the way in which the implementation of virtual training is organized, which further implies an underdeveloped infrastructure and a problem with the Internet connection, which is crucial in the implementation of virtual training. This problem not only makes it difficult to communicate between engineers located in different geographical locations, but also makes it difficult to concentrate and ensure attendance and monitor training continuity.

A common problem faced by employees concerns the inability to clearly assess whether a virtual training attendance is real or whether only a physical presence without active listening and learning has been identified. This problem is further compounded by the problem of insufficient motivation and active engagement of engineers in the acquisition of new knowledge. The lack of motivation and desire for engineers to be actively involved in virtual trainings should be considered from the aspect of identifying a pattern of such behavior and applying an adequate learning strategy that will raise this engagement to a higher level.

In the analysis of the obtained answers, it was noticed that, in addition to the problems related to the quality of the network in communication, the problem of lack of physical contact and maintenance of attention is repeated in order to make it traditional channels of training and development. The large number of obligations that

engineers face on a daily basis indicates that such trainings are often imposed as an obligation and that their implementation requires additional time. However, the problem that stands out is the possibility of adopting new learning strategies and their application in practice.

> *"I have learning strategies that have worked and that I have been successful with for 28 years in automotive. The barrier would be me."*

The answer of one respondent with the longest work experience indicates a serious problem in the implementation of virtual (and other) modern tools for training and development of engineers in practice, which concerns the relationship to new technologies, attitude towards change. This problem, if we look through the aspect of knowledge and skills and abilities and employees, may be essential for the survival and future development of the organization. Due to the resistance of employees to accept innovations, new technologies, but also learning methods, even 2/3 of the changes ended in failure due to resistance caused by poor email communication, understanding change and the inability of the employees to these changes conform. For this reason, the attitude of employees towards change is the most important segment to which attention is paid in the management of organizational change, and especially the application of new, virtual methods of training and development.

However, one of the key sources of resistance to change is the habits of employees. Any change that requires a change in personal habits and getting out of the personal comfort zone can lead to resistance. When it is necessary to change the way of working and the course of the organizational process, for example due to the introduction of new technological solutions, habits can be a barrier to change. When there is no adequate communication, it is obvious that employees will not be aware of the purpose and reason for implementing the change. Therefore, employees will refrain from changes and will more often resist their implementation. Conversely, when information is available and employees are aware of the purpose of its implementation, it is more likely to be accepted. Good communication strengthens trust among employees and organizational culture, as well as the ability to adapt more easily.

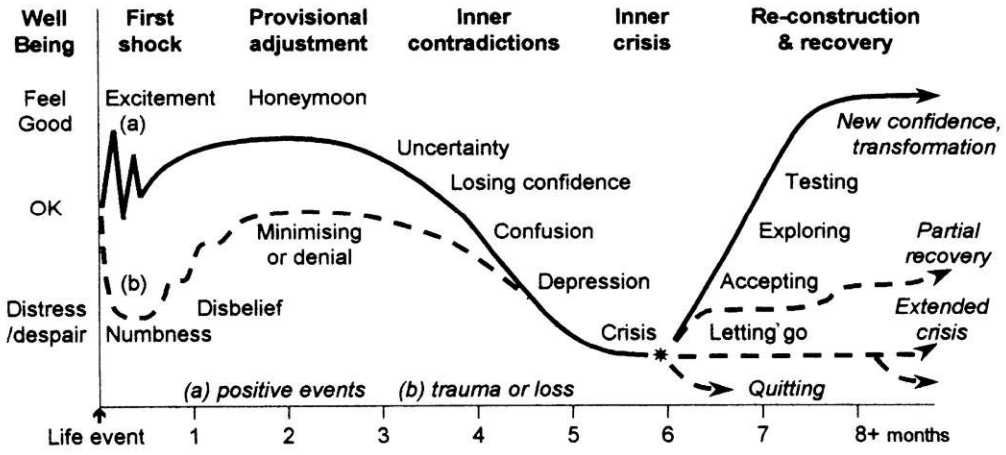

Figure 18. Resistance to change (Williams, 1999)

Resistance to change (*Figure 18*) shows the different phases that engineers face in acquiring new knowledge and skills, especially when it comes to implementing new, virtual tools. Coping with change is difficult, especially when you consider that the changes that organizations face both internally and externally are particularly dynamic and turbulent, and that the ability to monitor them is relatively limited. Engineers strive to continuously improve and educate themselves, but the dynamics of the changes they face in a number of cases are so great that they adapt slowly to the changes.

In the adoption of changes and the implementation of new digital changes, a great role is played by the organizational culture that will manage the resistance of employees and enable the cultural acceptance of innovations in the implementation of new virtual tools. During digitization and virtualization projects, engineers adhere to adopted attitudes and beliefs, making current customization results impossible. For that reason, the company should focus on the internal transformation of the culture, where it will be possible to use virtual trainings to create a starting point in establishing a new strength for the acceptance of virtual tools in the future. Eliminating cultural barriers must be based on building a strong culture of innovation through:

- Understanding innovations for organizing and sharing a common understanding of the essence.

- Existence of guidelines for action with the provision of an explicit and motivational mission.
- Development of abilities for continuous learning and development through the application of modern and virtual tools.
- Willingness to understand and accept mistakes as learning opportunities through simulation in a virtual environment.
- Application of participation and empowerment to participate in change.
- Knowledge exchange within the organization at all organizational levels.

Success in managing change and encouraging employees to embrace innovation, these processes must be adequately coordinated and communicated. This is especially important in conditions where the organization is divided into parts that are eventually interconnected. The specific characteristics of the Lear corporation's organizational structure are such that the design of car seats, for example, must be adapted to different requirements and needs of drivers, or variations in different cars of the same model. The requirements for subsystem compatibility are high, as the components are reused in all vehicle models. The way in which employees will react to the application of virtual tools depends on the way in which their significance is communicated.

When implementing virtual learning tools for the improvement of the production process, we must consider certain factors that influence the attitude of employees to accept these tools as valid.

The first is to learn to treat technology as the tool and not as the target. The question is not whether the training we can implement with technology is better or worse, but that it makes a difference, because of everything it allows us to do and everything that would not be possible without it. And thus, to see if these differences are convenient in terms of the objectives that we intend to achieve with each training.

Some of these characteristics that must be valued when choosing this training, are for example: interacting with more people without necessarily being in the same place and time; practicing individually or with more colleagues, interacting, learning from and with them; learning using two or more senses thanks to multimedia; getting

immediate feedback; self-evaluating and trying again, in case of error; choosing from different options and seeing the results, comparing them with others' results.

The most senior and experienced engineers, in the core of their profession, have not learned what really helps them in the classroom or in front of a computer in a passive way, but by facing daily problems, developing strategies, and making decisions. Learning does not depend on the teacher or the content but is individual and non-transferable to the learner. From the learner's point of view, although the intention is to transmit knowledge, no one will learn it for him/her. It will depend on the degree of motivation, time and practice he/she can devote to it. It also depends on the mistakes he/she has made. Generally, the more mistakes overcome, the better the learning. Virtual technology enables greater interactivity, but if the engineer has spent more time as a passive learner and the more learning was acquired in this way, and therefore the more difficult it will be, to break this inertia. Difficult, but not impossible, because once the value of the tool is appreciated, it is possible to adapt it to any rank or age within the company.

Requirements at lower hierarchical levels are technically clearly defined to ensure system integration. However, at higher hierarchical levels, for example between two levels of hierarchical structure, there is a gap because there is no clear connection between them. It often happens that there is a problem in communication where the requirements are such that, for example, the Senior Engineer corrects them without communicating it to lower levels, which significantly complicates the business process and contributes to the emergence of critical points. In addition, the introduction of new tools that would contribute to the improvement of the production process is a challenge for engineers at all levels. The process of introducing virtual tools requires engineers to be managers who will manage the application of virtual tools, which is why they are then in a dual role - they are responsible for introducing new virtual tools into routine use and in charge of transferring knowledge to employees at lower levels of hierarchical structures.

This means that engineers are at the same time implementers who not only develop new products, but at the same time delegate responsibilities to those who are at lower levels but are quite knowledgeable in their areas of application. In practice, however, engineers are often not interested in taking responsibility for implementing

new technologies. The engineers responsible for implementation are also responsible for its efficiency, which means that it should take on the roles of leaders, organizers and controllers of the way employees accept and apply new innovative solutions.

If such barriers are eliminated, it will enable better use of existing expertise and economies of scale, contribute to the systematic strengthening of synergy effects, and speed up decision-making. Adoption of virtual tools will contribute to a better understanding of the need to implement virtual tools and create an organizational structure that will be simpler and more efficient with greater autonomy of hierarchical levels. In accordance with the principle of subsidiarity, decisions will be made at the lowest competent level, close to business operations, improving cooperation at all levels and directing efforts towards achieving common goals. This is certainly supported by the fact that employees in the automotive industry must be continuously focused on acquiring knowledge about new technological changes and raising technological literacy to a higher level in order to conduct training for the implementation of virtual tools with minimal costs and maximum results.

In addition to these limitations, the company continuously strives to build a culture of diversity and inclusion through different human resource practices and policies. In that way, the possibility of discrimination in all forms is prevented, and the adopted regulations in 2020 make that impossible. This plan is based on a combination of grants with external organizations, as well as internal investments for the education and engagement of our employees. Creating diversity of employees, through their cooperation and joint action, enables the realization of the strategy of diversity, equality, and inclusion, giving priority to activities and encouraging responsibility and results. In this way, the application of virtual tools additionally enables the elimination of differences among employees.

Technological changes in the automotive industry are experiencing a significant expansion globally, with an increasing focus being placed on environmentally sustainable vehicles and components. As a result, the success of the business is based on the continuous development, procurement, and implementation of new technological solutions, but also the limitations arising from the dynamics of these changes and the inability to respond quickly to these changes. Implementation of new technological solutions, however, is associated with the ability of customers to

implement their strategies to exploit these technologies, as well as the adoption of such technologies by the consumer. Considering that changes quickly arise, technologies are also subject to rapid obsolescence of a key barrier for future development and implementation of new technological solutions is reflected in un- do 'skills' and to keep access to these technologies (developing, acquiring or licensing) that can negatively affect the competitive advantage and position on the market.

Lear Corporation's internal data show that 10 to 15% of the total planned funds were invested in the innovations & development (*Figure 19*). However, although investments in innovation and development of new technological solutions are at an enviable level, the problem exists in the form of access to employees and their implementation.

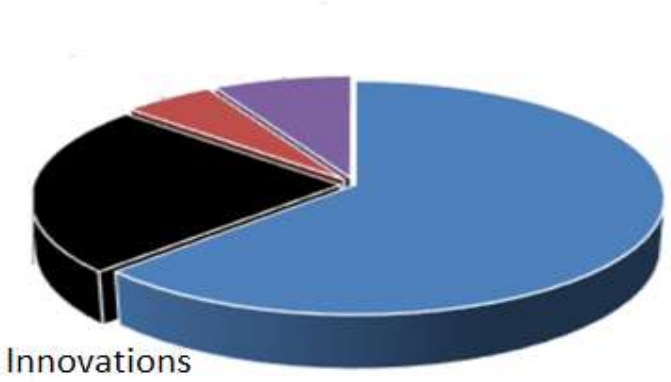

Figure 19. Investment in Inovations & Development in Lear Corporation

In order to survive in the market , the company needs to adapt the introduction of changes in the organization to its employees. Virtual trainings and tools used in line with Industry 4.0 flows should be based on strategies that will increase the ability to understand the need to introduce new technologies, develop existing ones and acquire new knowledge in order to exploit the potentials provided by Industry 4.0. When defining the approach for getting acquainted with innovative solutions that will be applied in practice, it is necessary to take into account the age structure of employees, cultural characteristics and abilities to adopt new knowledge and use new technologies.

Employees who have a long period of work experience and several years, will find it harder to accept changes and switch from the traditional to the virtual learning system, and the application of new technological solutions. However, if this category

of employees is adequately approached, the changes brought about by Industry 4.0 and virtual trainings can result in positive results. Although many changes in age abilities are negative and result in functional limitations, it is important to note that some changes are positive and serve to increase functional benefits. For example, semantic memory refers to the storage of factual information that accumulates throughout the life of learning and experience, which is why this type of memory does not change and increases with age.

In addition, there is evidence that decision-makers use domain knowledge and prior experience to make accurate and timely decisions. Therefore, implementation of new technologies, virtual training and tools to be used in the practice must be designed so that the account taken old-age deficit of memory and perceptual factors that may endanger the safety of the workplace. In this way, complex information can be transmitted in discrete procedures that offer cognitive support to senior engineers in an amount different from any background noise that could impair understanding. Such an approach is possible only thanks to advances in technology.

In accordance with the answers of the respondents who emphasize the need for a clear presentation of goals and tasks, during the implementation of virtual trainings it is necessary to provide tailored training to different age categories of employees to enable clear and unambiguous understanding. For this purpose, virtual trainings can be organized as:

- Interactive approaches with a smaller number of participants;
- Information should be clear and concise;
- Tasks should be accompanied by appropriate instructions with numbered steps;
- Combination of colors with high contrast while providing intelligible speech function.

Involving engineers regardless of gender, race or age in the implementation of technological solutions imposed by modern trends, will create opportunities to differentiate products, reduce resource consumption and ensure business sustainability with a strong competitive advantage. Any deviation and lag in the implementation of new technologies could negatively affect the business and financial goals of the business.

4.5. Motivation systems in the function of stimulating virtual trainings

Continuous education, training and development enable engineers to keep up to date with the latest developments in various fields, apply the latest technologies and knowledge, and based on that create the opportunity to gain a sustainable competitive advantage. Based on the acquired work experience and knowledge, education ensures the consistency of basic policies and procedures. This ensures compliance with laws, norms, affects security and prevents discrimination. Education as a generator of change with positive consequences also contributes to a higher degree of employee satisfaction. Job satisfaction can be defined as a positive emotional state that results from someone's job or work experience (Jex, 2002) .

Some of the factors that affect job satisfaction are the amount of earnings, the possibility of individual development and advancement, fairness in relation to superiors, organizational culture, the nature of work, interpersonal relationships. It is precisely these factors and their change that greatly influence the behavior of employees in the conditions of change and determine the conditions of their acceptance. However, from the aspect of implementation of virtual tools and digital technologies, respondents were offered the opportunity to choose key motivators that would contribute to increasing the efficiency and frequency of application of virtual tools in practice. *Figure 20* shows that remote access (distance learning) is predominantly represented among the respondents, which is followed by ensuring the quality of the network infrastructure in order to increase the efficiency of the application of virtual tools. If the need to save time and flexible working hours is further added, harmonized with new technologies will reduce costs and ensure business sustainability.

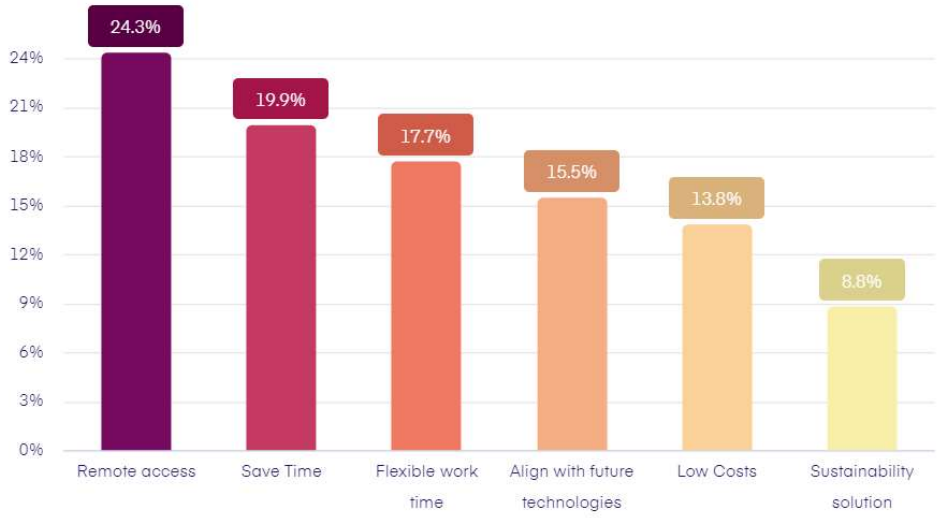

Figure 20. Key motivators for more intensive use of virtual / digital technologies in the business process

Examining the motivation of employees to implement virtual tools in the automotive industry is directly related to the policies and procedures that are implemented in a given company. The commitment of employees tends to grow into the commitment of an organization that strives to achieve the set results. Therefore, in order for engineers to be motivated to work and apply modern tools of virtual technology, the organization should continuously motivate employees, but also provide clearly defined standards and procedures that will enable easier facing of business process challenges. There is partial agreement on the existence of standardized training material, which implies the conclusion that each virtual training is accompanied by appropriate material, but that this material is more intended for lecturers who use it to maintain the course of their presentation during training, which further indicates the fact that virtual trainings mostly take place in the form of monologues by lecturers without the direct engagement of engineers who follow that training.

> *„All trainings have standard agenda and study material supported with any live examples. [...] The curriculum to be developed within the didactic training program for employees is essential for acquiring the necessary skills for the*

full development of their work. The implementation of virtual reality tools in the curriculum can push these programs to new limits."

When engineers, but all other employees are motivated adequately - through professional and individual development, professional possibility in training and promotion, material and immaterial, employees will feel satisfied with what will eventually result in increased productivity:

"Much more efforts are recommended to keep the team motivated, we become more like a robot or machine rather than human due to lack of direct interaction.“

4.6. Present and future application of virtual tools in engineer training

Virtual reality plays a major role in employee training and represents a future that begins in the present. The effects that the application of virtual training brings with it are primarily related to the fact that the acquired practical knowledge remains longer remembered in relation to classical, traditional learning methods. In the automotive industry, significant efforts and benefits have been noted that are realized by implementing various methods, techniques and tools in the improvement and development of business processes.

Compared to other companies, it can be seen that, for example, BMW has implemented VR tools in product design to test the ways in which the various components installed in a car look without making a physical prototype (implementation rate 27%). Ford, on the other hand, uses VR to ensure the collaboration of engineers in different geographical locations and to showcase its products and innovations to factories that are geographically distant (implementation rate 27%) (Cohen, et al., 2018). In the automotive industry, virtual reality enables the engagement and cooperation of a large number of experts, especially when it comes to product design. For example, using virtual reality, ergonomists can reproduce the exact movements of car users in the software and accurately assess the comfort of the seat and body position and improve it if necessary.

Thanks to virtual reality, Ford has also reduced the number of employee injuries by 70% and reduced ergonomic problems by 90%. In addition to the above research, additional data support the increase in efficiency, productivity, and safety of end users. The implementation of virtual tools so far contributes to the growth of operational benefits of 10%, which in practice is measured by several tens of dollars of savings (VR, 2021).

It is expected that the implementation of modern virtual solutions will contribute to:

- Improving product quality - design modern solutions that improve navigation, comfort and fun, providing a better user experience.
- Increase sales while providing functionality that is accompanied by the latest technological trends.

Lear Corporation recognizes the importance of implementing new virtual tools into the production process and the contributions that will be made through increased efficiency, safety and productivity, time savings and reduced error rates. Internally available data indicate benefits and savings that will contribute to the improvement of the business process, where a significant part of the savings will be realized through the application of new tools that Industry 4.0 brings with it and cost reduction based on the use of its benefits.

Based on the research, it is possible to conclude that there is a good basis for the implementation of virtual tools, especially given the technological literacy and willingness of employees to apply these tools in practice. From the aspect of organization, it is important to note that the costs of implementing these tools are high, but the expectations in the savings that will be realized are significant and that such an investment will contribute to long-term sustainability and efficiency in the future (*Figure 22*). The experiences of employed engineers also speak about that.

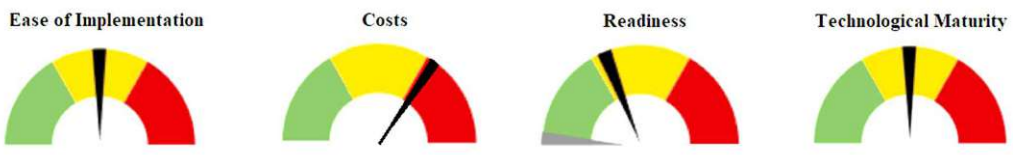

Figure 21. Main characteristics of implementation VR in Lear Corporation

It is expected that the application of virtual tools will achieve a great advantage in the decision-making process, especially in the early stages of development, where decisions account for as much as 70% of the total life cycle costs (Shao, et al., 2012). In this regard, the practical application of virtual tools will greatly contribute to reducing the costs that may arise if the implementation of new technological solutions in practice is neglected, which will also contribute to improving product quality.

> *„Implementation of VR can be beneficial because I am sure that it can improve efficiency. But if we do not know how to use it, I am not sure how it can be good. We have very realistic and challenging goals that can only be achieved with effective communication at all levels and a clear understanding of how to apply virtual tools."*

If we analyze the return on investment, as one of the most important indicators that shows the profitability of investments, in the past three years, the value of this indicator, which is expressed as a percentage, has tended to decline. This indicator shows how much earnings were made on invested funds as a percentage. To analyze the contribution that investments in virtual technology and training and development of engineers would have, ROI can be seen as a significant indicator that can greatly influence strategic planning and business reorganization towards the implementation of virtual technologies.

Table 3. Return on investment in Lear corporation – history and projection

	2018	**2019**	**2020**	**2021***	**2022****
Net income***	1,247	831	234	800	1,100
Investment***	7,258	8,133	8,270	8,371	9,040
ROI	17,18	10,21 %	2,83%	9,56%	≈ 12,17%

**At 03/07/2021*
***Projections*
**** In million $*

Providing information on the ROI is important as it managers and stakeholders could have analytical information and direct evidence on the performance of the whole

business system, and further provides justification for the expenditure on investments in virtual technology and training engineers.

Interpreting the movement of this indicator by years, it can be seen that with the decrease in the volume of net income and the increase in the volume of investments, there was a decrease in ROI in the first three years of the observed period.

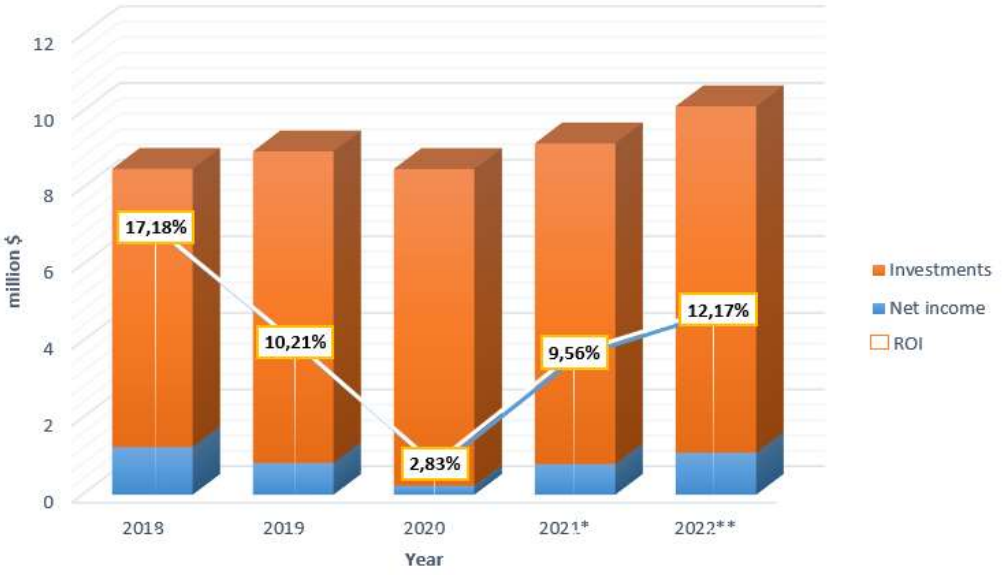

Figure 22. Net income, investments and ROI

A drastic decline was recorded in 2020, which is a consequence of the reduction in the volume of business, and consequently the realized net income due to the effects of the Covid-19 pandemic. However, the level of investments was at a higher level than the previous year, which was a good basis for 2021 and the realization of higher net income, and thus ROI (10,14% at the end of the first half of the year). However, it is difficult to give a projection in the long run, having in mind the growing uncertainty of business and the impact it has on the global economy. Globally, total investments in new technologies follow the growth trend which was interrupted due to the global health pandemic that affected all sectors of the economy in 2020. But still, the following year, 2021, was year of recovery, where we can predict a further growth trend and continued investment in a volume similar before the escalation of the global health crisis.

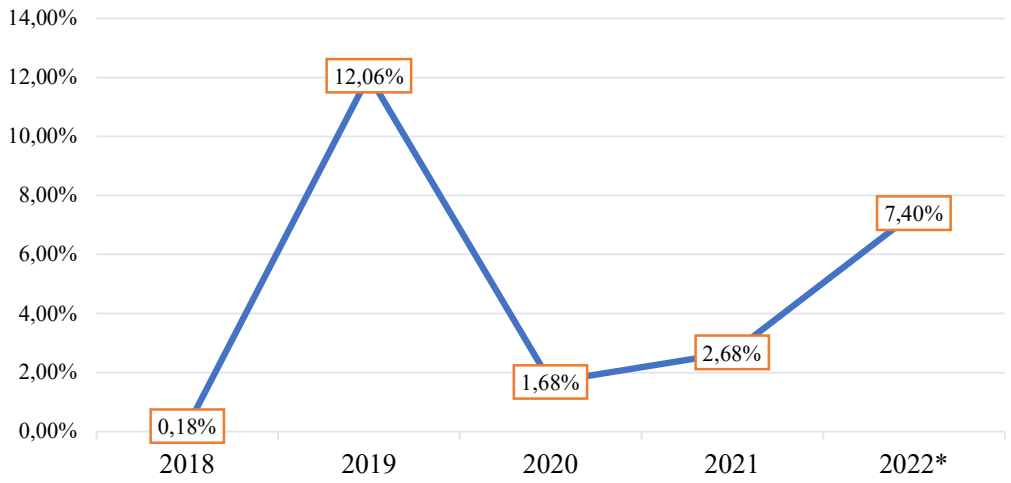

Figure 23. Y / Y Investment Change Trend

It is expected that the recovery of the economy at the global level will contribute to a further increase in the volume of investments in the application of virtual technologies and thus the training and development of engineers, which will enable further growth in the value of this indicator. Thus, investments in virtual technologies and the implementation of training of engineers should not be seen only as a step that will contribute to increasing savings, but as a means that can serve to increase net income.

Recognizing the importance and necessity of virtual training in development of engineers, but also taking into account the barriers faced by engineers in the process of their implementation, there is agreement of engineers on the need to implement VR / AR technology, methods and tools in training and development. Engineers point out that this would not only save time, but would also enable the active engagement of engineers in the adoption and application of new knowledge, and the way in which communication would contribute to increasing the expertise of all employees. Such attitudes further emphasize the need to work in small groups to ensure greater interaction as well as increase the frequency of training.

As there is agreement on the implementation of VR / AR technology, the engineers employed by Lear Corporation who are included in this research point out the following activities that would contribute to increasing efficiency and productivity:

- Reorganization of business processes in accordance with the development of Industry 4.0.
- Real-time information sharing.
- Encouraging employees to face changes - by showing the benefits that are achieved in this way.
- Implementation of new technological solutions and training for the application of virtual tools.
- Clear definition of goals and tasks to be fulfilled.
- Fewer participants and more interaction during the implementation of virtual trainings.

The solutions of engineers proposed in this way can be considered to improve the way in which virtual trainings are organized, apply the acquired knowledge and organize business processes. In that way, the productivity of engineers who use virtual reality would increase, because they will have a greater amount of knowledge and react faster in the conditions of crisis situations. In addition, by forming virtual stations that will be simulated through the virtual into reality, employees can also make use of training new workers.

When it comes to the areas of application of virtual methods and tools of training engineers in order to achieve the requirement of improving the quality of products and business in accordance with the requirements of industry 4.0, the report came to the conclusion that more than 20% of surveyed engineers not familiar with the concept of industry 4.0 and the demands it carries with it. However, 42% of engineers pointed out that virtual training methods can be used in all areas of business, while 38% of engineers emphasize the areas of Engineering Consultant, Engineering services and design modules, Engineering software training and those areas where it is possible to replace the physical presence of employees but that this presence is not completely eliminated.

> *"I don't see the need to limit training to any roles and think the more diverse the job roles of people on the course, the more benefit everyone else gets. You get to see how different people from different job functions take on problems and there is as much learning from them as there is from the actual training. Implementation of VR is a win-win method."*

In order to ensure the effective implementation of virtual trainings, it is necessary to acquaint employees at all levels with their meaning and benefits that this type of training brings. When an understanding of the role and significance of such changes - from traditional to virtual, will provide an understanding of the application of acquired knowledge and tools of virtual technology in the segment of design and installation, as well as in the field of repair and maintenance. According to a survey conducted in 2018, on a sample of 603 companies in the automotive industry, companies recognized the value of certain areas of application of VR in practice (Cohen, et al., 2018).

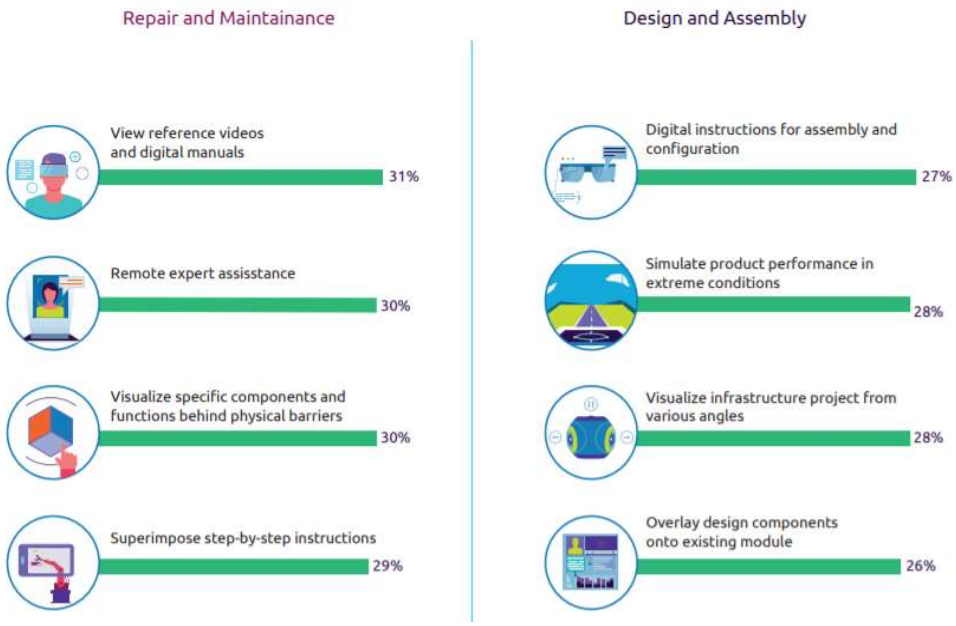

Figure 24. Where do organizations find value with immersive technology? (Cohen, et al., 2018)

A comparative analysis of Lear Corporation with the data obtained in the research conducted at the global level, it can be concluded that Lear Corporation still lacks clearly defined concepts that allow understanding and doing business in line with the trends of new technologies. By interpreting the statements of the engineers who participated in the research, the field of design was certainly recognized as a potential in which the application of virtual tools, such as virtual glasses, would have a special significance for the improvement and development of business processes.

Special attention on the implementation of virtual trainings, development of employees, but also the application of virtual tools in practice was imposed by current events at the global level concerning the global pandemic caused by the Covid-19 virus. Global pandemic has affected the need to meet the basic conditions of work in compliance with all prescribed measures (provision of natural or mechanical ventilation without recirculation, continuously and disinfection and hygiene and maintenance of social distance with the obligation of wearing protective masks and personal protective equipment and prevent stay a larger number of people in one place). The pandemic became a global challenge overnight, which brought with it numerous negative consequences. The impact of the Covid-19 virus on employees in the automotive industry was particularly reflected in the reduction in the number of employees. The European Union is 1.1 million employees in the car industry (from a total of 2.6 million) was affected during the closure of the plant in March 2020, where more than half of the employees were working engaged in Germany (ACEA 2020) while in the United States, General Motors, Fiat Chrysler Automobiles and Ford have suspended production indefinitely.

At Lear Corporation, the pandemic has reduced business, production, and sales. This decline is in line with trends at the global level of the automotive industry, where production decreased by 6% in 2019 and another 17% in 2020 to 72.6 million units, mainly due to the COVID-19 pandemic. During the pandemic, efforts were focused on adapting to the new working conditions, which is why, in response to the Covid-19 pandemic, the Safety Work Manual was created, which provides a standardized approach for each Lear Corporation business facility. Accordingly, a safe working environment has been created and the manual offers insight into coping with the operational challenges associated with the Covid-19 pandemic.

Analysing the answers of the engineers, to the question: Describe how your responsibilities have changed during the pandemic situation and to what extent do you agree with the implementation of virtual trainings? There is a dominant agreement about working from home, increasing the number of calls, but also the fact that the scope of obligations has not changed. The answer speaks best about how the trainings were realized during the pandemic:

„Virtual trainings were implemented during a pandemic at a much higher rate because there was no other way. Clearly it was new for both some colleagues and training leaders, but during the time we got more used to it and can now see the benefits which it can have even for future purposes. I believe that ideally in post pandemic time the balanced combination of both personal and virtual training should provide the best outcome."

Although the pandemic distanced its employees, it influenced the creation of a new form of connection and perception of the possibilities of all employees, regardless of age, years of service and attitude towards innovations, to adapt to changes and attend virtual trainings and use virtual tools during a pandemic.

"All members of my team have been in the virtual world with and without trainings this has shown that I am still able to complete my roles and responsibilities without having to be in an office environment. I think virtual trainings are extremely valuable during remote work to help simulate other environments. Could be beneficial to save on travel in the future as well."

During the pandemic, the maintenance of virtual trainings encountered certain barriers, which, although previously mentioned, in such conditions further complicate the implementation of virtual trainings. Problems of internet connection, the presence of family members that can often affect concentration and attention, but also the motivation to learn in such conditions, are marked as specific categories whose improvement must be worked on in the future.

„I conduct a training of 50 hours on each different technical topic to develop our FEA (Finite Element Analysis) Engineers. WFH leads to much more overtime hours, Team members harder to call as it depends on the quality of the internet they have. Family and work will interfere with each other, outfit and mood might be affected. Much more efforts are recommended to keep the team motivated, we become more like a robot or machine rather than human due to lack of direct interaction."

Lear Corporation data show that during the Covid-19 pandemic, employee participation and their work engagement at a distance, working from home and interacting among employees via the Internet, various virtual tools, was dominant. This reliance on virtual working methods has resulted in increased cyber security risks, including data protection risk. In such conditions, additional attention was paid not only to the engagement of employees to perform their work tasks remotely, but also to the efforts of the company's IT sector to continuously work on data security, development of reliable systems for their exchange and additional engagement of employees in mastering new techniques and remote working method.

5. Conclusion and future scope

For years, the automotive and transportation industries have recognized the potential and importance of applying virtual training and tools in planning, designing, and organizing business processes. With the development of Industry 4.0, the practical application of virtual tools is becoming more and more accepted and represented as a training tool and as a basic aid to advanced production. Thanks to the application of virtual trainings and virtual reality systems, it is possible to provide immersive simulation experiences which shows that the development and application of both virtual trainings and virtual tools that contribute to the realization of virtual reality not only keeps pace with technological progress, but also becomes a driver of technological change in automotive industry.

The application of virtual trainings and virtual reality tools enables the simulation of a real environment and its experience through different dimensions that are equal to reality. This, by creating an interactive experience, allows engineers to move fully in real time while simultaneously accessing other information necessary for business. Virtual reality provides a sense of ability to visualize, manage and communicate in the segment of extremely complex data and complex environment. The application of virtual trainings and thus innovative virtual tools such as, for example, virtual glasses, enables significant savings in resources, costs, control processes. The simulation, which enables the measurement and design of prototypes without their physical production, significantly reduces costs, enables testing of correctness and quality before the start of the production process and elimination of errors before the entire production process is started.

The research conducted during June and July 2021 at Lear Corporation aimed to assess the effects of the virtual training methodology on R&D engineers. A survey consisting of 15 questions was used as a research instrument. The study involved 54 engineers aged 30 to 55.

Qualitative analysis of the obtained answers shows an insufficient understanding of the importance and essence of the application of new forms of training organization. Virtual training methods have become a necessity in the context of the Covid-19 pandemic, which has resulted in the active engagement of all

employees to adapt to virtual working methods. Such a change on a global level, influenced the emphasis on the fact that technology is changing very quickly, day by day, which makes it difficult for people to follow the changes and adopt them. Industry 4.0 and its application in the automotive industry has begun its activities, but the expansion of tools and techniques is still expected. One of the key problems facing the organization is the lack of interaction with engineers, but also the resistance to the application of innovative virtual tools and new, virtual learning systems.

Although there is an understanding that the use of virtual tools in relation to traditional training methods would have a positive impact on productivity and efficiency, decision-making speed and adequate approach to crisis situations, if an adequate approach to training and employee development is applied, the gap can be reduced by systematically organized virtual trainings with clearly defined goals. In this way, virtual trainings and tools can show how different responses and reactions affect production operations, regardless of the geographical distance of the location. This confirmed the first hypothesis set in the paper.

The dominant orientation towards traditional business and learning systems can greatly limit and hinder the future development of the corporation. Not only the attitude towards the way in which new knowledge is acquired should be taken into account, but also the way in which different age categories of employees accept changes, adopt new knowledge, use new technologies and apply them in practice. Therefore, the organizational culture that will manage the resistance of employees and enable the cultural acceptance of innovations in the implementation of new virtual tools also plays an important role. The paper proves that employees who have a long period of work experience and several years of work experience, find it harder to accept changes and move from the traditional to the virtual learning system and the application of new technological solutions. However, if this category of employees is adequately approached by creating an adequate learning strategy, the changes brought by Industry 4.0 and virtual trainings can result in positive results.

The research also proved that there are differences between engineers employed at different hierarchical levels, which indicates the need to solve problems related to the dual role - both engineers and managers. At the same time, engineers get the role of a manager who will lead the way of implementing new virtual tools, which

further complicates their tasks. In addition, it often happens that employed engineers at higher hierarchical levels inadequately communicate with engineers and employees at lower hierarchical levels, which further complicates the implementation of new technological solutions.

The problem of internet connection, interruption of communication, vaguely defined goals and expectations, employees lack work in small groups, interaction, and personal communication. Although it is pointed out that nothing can replace face-to-face communication, during the *Covid*- 19 pandemic almost all engineers pointed out that there were no changes in the scope of work tasks, but that there was interference from family members which made it difficult to maintain concentration and focus on work tasks.

To increase the focus of efforts towards more intensive use of virtual tools and virtual training, it is necessary to adequately motivate employees. In addition to standard motivators as creating opportunities for professional and individual development, expert in training and promotions, employees will feel satisfied with what will eventually result in increased productivity and efficiency to do their jobs. However, the essence is to provide an understanding of the essence of the application of various virtual tools of engineers and to get acquainted with the benefits of their application, which will further contribute to the development of their loyalty to the company. In addition, if you are using virtual training methods and tools to bring the need to save time and flexible working hours, harmonized with new technologies will impact on reducing costs and ensuring the viability of the business.

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Appendix 1

1. **What is your work experience?**

   Question instructions: Select one answer

   □ 0-5 years □ 5 – 10 years □ Above 10 years

2. **What level of virtual training have you attended?**

Question instructions: Select one or more answers

□ Begginer □ Intermediate □ Advanced

3. **What was the average duration of the trainings attended per year?**

Question instructions: In hours

□ 0-20 □ 20 – 50 □ Above 50

4. **Which Virtual training tools are you aware of in our organization?**

5. **Could you elaborate on your experience with Virtual Training in terms of:**

Question instructions: Tools (webinar / virtual reality, etc) | Standardization | Efficiency

6. **How is your adaptability to future virtual training tools?**

Question instructions: Select one answer

□ Interested □ Flexible □ Not interested □ Prefer conventional tools

7. **Were the training objectives achieved with virtual training tools?**

Question instructions: Can you elaborate with examples?

8. **What improvements would you propose in virtual trainings tools within Lear organization?**

Question instructions: Explain with examples if possible

9. **When conducting trainings, is there any standard training agenda and study material structure aimed at effective understanding by the participants?**

10. **Which types of jobs or function is achievable through virtual training tools to achieve future product development/Industry 4.0 objectives?**

11. **How would you assess the possibility of realising business activities entirely through simulators ?**

Question instructions: (For example, virtual measurement, design & production based on the improvement of work processes through virtual systems etc.)

12. **What are the key motivators for more intensive use of virtual/digital technologies in the business process?**

Question instructions: Select one or more answers

☐ Remote access ☐ Save Time ☐ Lower Costs ☐ Align with future technologies ☐ Sustainability solution

13. **List the basic barriers that made it difficult to accept/implement virtual training?**

14. **What would be your solutions to implement virtual trainings tools and methodologies?**

15. **Describe how your responsibilities have changed during pandemic situation and to what extent do you agree with the implementation of virtual trainings?**

Question instructions: Explain with examples if possible