How do people´s cultural backgrounds influence their perception towards new technologies within the labour market?

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ABSTRACT

With the introduction and popularization of Artificial Intelligence, machine learning algorithms and other technological developments into workplaces all around the globe, the need for workers to work and interact with these technologies is higher than ever. Some workers, however, have prejudices or fears towards these technologies, leading to a less effective working environment. Therefore, it is of great importance to find out about what influences those workers in their views and perceptions. One of those factors can be a person´s cultural background, which this thesis focusses on in detail. To do so, a combination of quantitative, empirical data on workers´ perception towards new technologies and the Hofstede cultural dimensions theory will be used in order to find connections between a person´s cultural background and their views on new technologies such as Artificial Intelligence. These results are then used in order to give recommendations to future employers and policy makers to enforce specific changes and policies in order to allow workers and technologies to work together in an effective and productive way. By doing so, it helps working towards a better workplace in the future, not only for companies and firms, but also for the workers themselves.

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Keywords

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1. INTRODUCTION

Over recent years, millions of workers and their respective workplaces have been influenced or even changed completely by technological innovations such as robots, laptops, and smartphones. With the introduction of new technologies such as Artificial Intelligence and machine learning algorithms, this trend is expected to continue, with spending on digital transformation technologies and services having increased from 0.96 to 1.59 trillion U.S. dollars worldwide from 2017 to 2021, with forecasts believing that this value could go up to 3.4 trillion U.S. dollars by the year 2026.[1]

These types of technologies and innovations have significant impacts on the labour market and the people operating in it. For once, in areas in which technologies such as robot adoption have been introduced to the workplace, employment rates have been sinking.[2] However, this technological shift has also led to new job opportunities being created. For example, while certain jobs have been replaced by machines, this has allowed new jobs to be created that evolve around building, designing, and maintaining machines.[3] With more machines and other technologies being introduced into workplaces in the future, this also leads to more jobs in this specific field. Another way in which new technologies such as robot adoption have influenced workplaces is by improving labour productivity in those areas, they have been introduced in.[4]

Closely connected to this topic is the topic of robophobia, also called robot anxiety or technophobia. It generally describes fear or other negative feelings towards new technologies such as robots.[5] This is important as the people´s perception of robots, automation systems, and other technologies at their workplace can have a big influence on how they interact with these technologies and how they react to their integration. The less people are willing to accept and integrate them into their work, the less productive and efficient can these be for the overall work process. In addition to that, the people´s robophobia can lead to technologies and innovations being implemented less into their workplaces, leading to less job opportunities, productivity, and economic growth as a society.[6] This shows how much influence people´s perception towards new technologies and innovations has on the labour market and the future of work in general. Therefore, it is important to further investigate this topic.

One way to do so is by getting a deeper insight into what influences people to have a specific perception or opinion of robots and other technological innovations, especially within the labour market. There are many different aspects that could possibly influence a person in its views on these. One of these aspects includes a person´s technological experience, as prior experiences with technology can positively influence a person´s perspective towards it.[7] Other aspects that could possibly influence a person in their views are a person´s perception of technology, as well as a person´s future assumptions on the effect of technology.[8] However, another aspect that seems likely and has not been researched on yet includes a person´s cultural background. Therefore, it is the research objective of this bachelor thesis to investigate the relationship between a person´s cultural background and that person´s view on new technologies, such as robots and other technological innovations, with the focus being on the labour market specifically.

2. RESEARCH QUESTION

Consequently, the focus of this bachelor thesis will be the research on the question: “How do people´s cultural backgrounds influence their perception towards new technologies within the labour market?”. In addition to that, the research will also include what those results mean for future employers and policy makers.

3. LITERATURE REVIEW

There are several key literatures available supporting the research topic of new technologies in the labour market and workers´ perception of these. Besides that, there are also several different key literatures on the topics of robophobia, new technologies such as robots at workplaces, and the future of work.

3.1 Literature on Technology at Workplaces and the Future of Work

An example for literature on the topic of robophobia is “Robots at work” by Georg Graetz and Guy Michaels, which offers insights on the impact of industrial robot adoption on employment and productivity. It highlights the relationship between robots, employment, and productivity outcomes, showing positive as well as negative influences robots can have on a business and the labour market in general.[9] Another useful literature is “The Future of Jobs 2020 Report” by the World Economic Forum that focusses on the impact of technology on the global workforce in the future. It does so by highlighting the upcoming challenges, as well as opportunities that could arise in the future due to new technologies being introduced and existing ones being expanded.[10] Similar to that, “The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies” by Erik Brynjolfsson and Andrew McAfee focusses on new technologies such as Artificial Intelligence and machine learning and their influence on the economy and society a whole. It highlights the possible changes the economy could be facing, for example inequality, the displacement of certain types of jobs, and the need for new skills, knowledge, and training to keep up with the technological innovations and the changing labour market. On

[1] See Statista, 2022
[2] See Greatz & Michaels, 2018
[3] See Autor, 2015
[4] See Greatz & Michaels, 2018
[5] See Hayashi & Wakabayashi, 2018
[6] See Graetz & Michaels, 2018
[7] See Bartneck et al., 2007
[8] See Ha et al., 2011
[9] See Graetz & Michaels, 2018
[10] See World Economic Forum, 2020

the other side, it also shows possible effects on society as a whole, for example the need for new policies and regulations to distribute benefits of the technological progress fairly and manage risks properly.[11] Another literature that focusses on the relationship between technological advancements and labor displacements is "Automation and new tasks: How technology displaces and reinstates labor" by Daron Acemoglu and Pascual Restrepo, which argues that, while losing certain types of job profiles, especially ones with a low skill profile, due to technological advancements such as automation, it also offers opportunities for workers as they create new, more difficult tasks that the workers suffering from job loss can benefit from. [12] Another literature that predicts a disproportionate negative effect on workers of low-skilled jobs by technological advancements such as computerization is "The future of employment: How susceptible are jobs to computerisation?" by Carl Benedikt Frey and Michael A. Osborne. It argues that, while many jobs are at risk due to technological advancements such as Artificial Intelligence and machine learning algorithms, this is especially the case for jobs that involve low-skilled labor.[13] The consequent job insecurities and fears of job loss have been investigated by Jeffrey C. Dixon et al. and Marcel Erlinghagen, which offer different perspectives on what exactly causes people to fear for their jobs, especially looking towards the future of work.[14] [15]

3.2 Literature on Robophobia

Meanwhile, "Fear of robots at work: The role of economic self-interest" by Frank Dekker, Arjan Salomons, and Jan van der Waal is focussing on a more concise part, investigating robots at workplaces and how people in different positions, specifically with different economic self-interest, experience different levels of fear from those robots as well as from potential job loss.[16] In connection to that, "Job insecurity and the difficulty of regaining employment: an empirical study of unemployment expectations" by Francis Green, Alan Felstead, and Brendan Burchell focusses on the fear of job loss and job insecurity in more detail.[17]

3.3 Research Gap within existing Literature

While there are many relevant literatures available about the topics of robophobia, new technologies at workplaces and the future of work, what these literatures are missing is a closer look into what influences people in their perception of robots and other technological innovations. What is missing especially is the look from a cultural perspective on this topic, as there has not been any research conducted on the relationship between cultural backgrounds of people and their view towards new technologies such as robots. This is where a research gap can be identified, which should be filled due to several reasons. For once, the cultural perspective is an additional factor to be considered in the overall list of possible influences on people´s opinion towards new technologies, therefore adding to the overall knowledge in this field of research. In addition to that, it also adds to the current knowledge of cultural backgrounds and their influences on people´s views and perspectives. This knowledge can also offer the opportunity for new research following up on topics such as cultural dimensions and their influence on people´s perspectives. To fill this research gap, this bachelor thesis will combine people´s perspective on new technologies within the labour market with their cultural background, comparing results and identifying connections between them.

4. RESEARCH METHOD / DESIGN

The purpose of this research is to obtain information about cultural backgrounds of workers and how these influence their perception towards new technologies at their workplaces. Therefore, it is necessary gain data on both the cultural background of a person, consisting out of several cultural values, as well as data on that person´s perception towards new technologies. In the end, both of these variables should be combined in order to see if a correlation and therefore a significantly strong relationship between the two variables exists, in this case between a person´s cultural values and that person´s perception towards new technologies in the labour market.

4.1 Data on Cultural Backgrounds

The cultural background of a person can hardly be described as one single variable. Since a person´s cultural background is a complex structural concept, one way to facilitate this problem is by utilizing different cultural variables that, together, describe a person´s cultural background. One of the most widely recognized approaches that utilize this strategy is the Hofstede model, also called 6-D Model of National Culture. This model utilizes six different cultural aspects on national level in order to describe the cultural values and background of a country and its citizens. The model was created by Geert Hofstede and was first published in 1980, in his book *Culture´s Consequences*.[18] At this point, the model was only consisting out of four dimensions, adding a fifth one in the 1980s and finally, a sixth one in the 2000s.[19] The model has been widely recognized and has been used in a variety of books and scientific articles as a variable for cultural backgrounds that can be combined with other variables to look for correlations. Some examples for such books and scientific articles would be *Are cultural dimensions relevant for explaining cross-national differences in antibiotic use in Europe?* by Deschepper, R., Grigoryan, L., Lundborg, C.S. et al or *A multilevel research*

[11] See Brynjolfsson & McAfee, 2014
[12] See Acemoglu & Restrepo, 2019
[13] See Frey & Osborne, 2017
[14] See Dixon et al., 2013
[15] See Erlinghagen, 2008
[16] See Dekker et al., 2017
[17] See Green et al., 2000
[18] See Hofstede, 2011
[19] See Hofstede, 2011

framework for the analyses of attitudes toward immigrants by Leong C.-H..[20] [21]

Like the name suggests, the model consists out of six cultural dimensions, the first one being the Power Distance dimension. This dimension describes the level of inequality within a specific country and how society within that country deals with it. In this case, "inequality" includes the differences in factors such as physical and intellectual capacities, power, health, or status. The Power Distance dimension hereby indicates how big the gaps between people of a higher level of power and people of a lower level are perceived and acted on within a specific society. An example for such a gap could be the distance between a worker and a respective supervisor within a specific company. A high score within this dimension indicates a big gap between people of different power levels, while a low score indicates that people are treated more equally, even if they do not hold the same amount of power between each other.

The second dimension of the Hofstede model is called the Individualism dimension. It describes if people within a society are acting more in their own interests, therefore acting individualistic or in the interests of a group, therefore acting collective. This does not only involve situations within the business world, but also everyday situations such as family dynamics. While a high score within this dimension indicates a society to be individualistic, a low score indicates a more collective society within a specific country.

Another dimension within the Hofstede model is the Masculinity dimension. It mainly divides societies into whether people within a specific society are acting assertive or modest. While in masculine societies, "men are supposed to be assertive, tough, and focused on material success, (…) women are supposed to be more modest, tender, and concerned with the quality of life."[22] On the other hand, in feminine societies, gender roles are more overlapping and men are also supposed to be modest, tender, and concerned with the quality of life. An example for such difference can be the hiring process within societies with different levels of masculinity within them. While in masculine societies, applicants are more likely to oversell themselves with their CV and within the interview, this is the opposite in feminine societies, where applicants tend to undersell themselves. A high score within the Masculinity dimension indicates a society to be more assertive, while a low score within the dimension indicates a society to be more modest.

The next dimension within the Hofstede model is the Uncertainty Avoidance dimension. Like the name suggests, this dimension involves itself with societies´ views on uncertainties and how much effort is being put into avoiding these uncertainties. Geert Hofstede himself defines it as "the extent to which the members of a culture feel threatened by ambiguous or unknown situations."[23] A high score within this dimension therefore indicates a higher level of fear towards uncertainties, while a low score indicates a lower level of such.

The fifth dimension of the Hofstede model is called the Long-Term Orientation dimension. It covers the way in which a society orientates itself and its efforts, either towards future, long-term rewards, or towards more present, short-term rewards. A high score within this dimension indicates the society within a specific country to orientate its efforts and virtues more towards long-term rewards, while a low score indicates such society to focus more on short-term rewards with its efforts and virtues.

Lastly, the final dimension of the Hofstede model is the Indulgence versus Restraint dimension. As the name suggests, this dimension differentiates between cultures that show a high level of indulgence and cultures that show high levels of restraint. Indulgence is hereby defined as allowing people to follow their human desires such as having fun and enjoying life relatively freely. On the other hand, restraint is being defined as the opposite, where these human desires need to be regulated by specific norms within the society. A high score in this dimension indicates a society that has high levels of indulgence within it while a low score indicates one with high levels of restraint within it.[24]

To gather these specific scores within their respective dimension, already existing data was utilized. For example, to gather the scores for the Power Distance dimension, a survey conducted on IBM employees from 57 different countries was used in which these employees were asked about how they experience power inequalities within their work, while another 19 countries´ data were gathered from replications or based on informed estimates. The scores from the IBM employees on three most applicable questions of the survey were then analysed and their respective means calculated. Using these means, a formula was utilized in order to create index values for the countries that are ranging on a scale from about 0 for the lowest values and around 100 for the highest ones. The formula used for this was simply adding or subtracting the three scores after multiplying each by a fixed number and then adding another fixed number to create the earlier mentioned values for the scale of around 0 to around 100.[25] Like for the Power Distance dimension, index values that fit on this specific scale have been gathered for the other dimensions as well, making them comparable with each other and easier to calculate with.

4.2 Data on workers´ perception towards new technologies at their workplaces

There has been a lot of research on people´s perception towards new technologies with the increase these have experienced over recent times. One of these researches has been conducted by the European Commission, which specifically investigated the perception of workers towards new technologies, such as robots, and digitalisation itself as part of the Eurobarometer survey series. To do so, the European Commission interviewed over 26,000 respondents representing the workforce, aged 16 to 65 years old, from 27 different European Union member states. The research was conducted in three separate waves, the first one being conducted in 2012, the second one in 2015, and the third one in 2017. While the respondents have been interviewed on many different questions, the five questions with the closest connection to this research have been selected for gathering data on this topic.

[20] See Deschepper et al., 2008
[21] See Leong, 2008
[22] See Hofstede, 2011
[23] See Hofstede, 2011
[24] See Hofstede, 2011
[25] See Hofstede, 2011

These five questions are:

1. Generally speaking, do you have a very positive / fairly positive / fairly negative / very negative view of robots and AI?

Please tell me to what extent you agree or disagree to each of the following statements:

2. Due to the use of robots and AI, more jobs will disappear than new jobs will be created.
3. Robots are necessary as they can do jobs that are too hard or too dangerous for people.
4. Robots and AI steal peoples' jobs.

Using a scale from 1 ('totally uncomfortable') to 10 ('totally comfortable'), how would you personally feel about:

5. …having a robot assist you at work.

All of these questions had to be answered on a scale from 1 to 4, indicating the amount of fear experienced by the workers in regard to these specific questions. These five questions and their respective answers were then combined by taking the answers for the workers of each country and calculating the mean of their answers. Before doing so, the answers for questions 2, 4, and 5 had to be reverse coded in order to make the answers unified towards one direction, in this case, a value of 1 will always be the lowest amount of fear on the scale and a value of 4 will be the highest. After reverse coding and averaging these values, a so-called "fear variable" for each country could be calculated.

4.3 Combining the variables

To get concrete information out of these variables and two eventually answer the research question, the variables of the six dimensions of the Hofstede model and the fear variables of the Eurobarometer surveys have to be combined with each other. Since the purpose of this research is to find out about the influences of cultural backgrounds on worker´s attitudes towards new technologies, it makes sense looking for and calculating the correlation values between the cultural dimensions and the fear variables. These correlations will be calculated for each cultural dimension separately as this gives insights on which dimensions influence worker´s attitudes more and which ones influence them less. This also makes it more efficient for future employers and policy makers to consider specific cultural dimensions of countries they want to make business or policies in. The correlation values for this research will be calculated using the following formulas:

$$SS_{XX} = \sum_{i=1}^{n} X_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} X_i\right)^2$$

$$SS_{YY} = \sum_{i=1}^{n} Y_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} Y_i\right)^2$$

$$SS_{XY} = \sum_{i=1}^{n} X_i Y_i - \frac{1}{n}\left(\sum_{i=1}^{n} X_i\right)\left(\sum_{i=1}^{n} Y_i\right)$$

Using these formulas makes it possible to gather the needed values to calculate the values´ coefficient of correlation:

$$r = \frac{SS_{XY}}{\sqrt{SS_{XX} \cdot SS_{YY}}}$$

This coefficient of correlation indicates how strong the relationship is between the two variables. In this case, it indicates the strength of the relationship between a specific cultural dimension and worker´s perception towards new technologies at their workplace. Hereby, the higher the value of the coefficient of correlation is, the stronger the relationship is. The possible values range from -1 to 1, with the general rule that a value closer to 0 means less correlation and a value closer to 1 or -1 means higher correlation between the variables. A value of 0 is hereby indicating no correlation between the values at all, while a value of 1 or -1 is indicating the highest possible correlation between them. By utilizing this coefficient of correlation, the influence of specific aspects of a person´s cultural background on that person´s perception towards new technologies in the labour market can be analysed and interpreted, ultimately answering the research question of this thesis.

5. DATA COLLECTION AND ANALYSIS

After designing the research method, it was carried out using the data on workers´ cultural background as well as the data on their perception towards new technologies within the labour market.

5.1 Data Collection

To clearly represent and arrange the data collected from the Eurobarometer, as well as the cultural dimension values from Hofstede´s book *Cultures and Organizations: Software of the Mind*, several tables were created in the Microsoft Office spreadsheet tool Microsoft Excel.

5.1.1 Countries that are part of the research

Before gathering all of the data for these dimensions, the countries that were part of Hofstede´s 2010 book *Cultures and Organizations: Software of the Mind* had to be compared to the countries that were a part of the Eurobarometer surveys from the European Commission in 2012, 2015, and 2017. Since values of both data sources have to be combined in order to find out about their correlations, only those countries that were a part of both of these could be considered for this research. After executing this comparison between the data sources, data for twenty-two countries could be gathered for all dimensions and values, making these twenty-two countries the relevant ones that become part of this research. These countries are namely, in alphabetic order, Austria, Belgium, Bulgaria, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom, which was still part of the European Union by the time the Eurobarometer surveys have been conducted.

5.1.2 Gathering Data of the Cultural Dimensions

One of the tables created for this research had the purpose of giving an overview of the cultural dimension values of the Hofstede model.

For this table, the Hofstede model was split up into its six components, the cultural dimensions of Power Distance, Individualism, Masculinity, Uncertainty Avoidance, Long-Term Orientation, and Indulgence versus Restraint. For the twenty-two countries that are part of this research, their respective values in these dimensions have been noted down into one big table, giving an overview of all of the dimensions and their values that are relevant for this research. In addition to that, these tables were later used to calculate the coefficient of correlation for the cultural dimensions, the main objective of this research.

The table can be found in Appendix 1 of this thesis.

5.1.3 Gathering Data on Workers´ Perceptions

Another table that was created for this research had the purpose of giving an overview of the workers´ perception towards new technologies within the labour market.

This was done by utilizing the Eurobarometer surveys, conducted by the European Commission in 2012, 2015, and 2017. Like previously mentioned, the data for this table was gathered by calculating the mean of the answers of the participants on the five most applicable questions for this research, using reverse coding and averaging to gather the so-called "fear variables". These fear variables were, like in the previous table, calculated for the participants of the twenty-two countries that were also part of the Hofstede book *Cultures and Organizations: Software of the Mind*, and therefore part of this research. This table was created not only to give an overview over the values for each country but was also used to calculate the coefficient of correlation later.

The table can be found in Appendix 2 of this thesis.

5.1.4 Gathering the Correlation Values

After creating tables with the data of the cultural dimensions of the Hofstede model and the data of the workers´ perception towards new technologies in the labour market, the correlation values between them, more specifically the coefficients of correlation, can be calculated.

To do so, the previously mentioned formulas will be used. Firstly, the sum of squares of each value has to be calculated, starting with the Power Distance dimension. For this, the following formula is being used:

$$SS_{XX} = \sum_{i=1}^{n} X_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} X_i\right)^2$$

The first step in resolving this formula is calculating the square sums of the Power Distance values for all of the countries within the table. After doing so, these square sums get added up, leading to a final sum of square sums of 69,544, which makes up for the first part of the formula. After that, the sum of all the Power Distance values for all of the countries within the table gets calculated and then squared. The sum of these values is 1,136 and the squared value is 1,290,496. This value then gets divided by the number of values, in this case, the number of countries that are part of the research. Dividing the squared value by 22 leads to a value of 58,658.90909091, making up for the second part of the formula. Finally, this value has to be subtracted from the first part of the formula, the sum of square sums. This makes the sum of squares for the Power Distance dimension 69,544 – 58,658.90909091, leading to a final value of 10,885.09090909.

Next, the same calculation has to be done for the variable which is being tested for correlation with the Power Distance dimension, in this case the so-called "fear variable". For this step, the previous formula is being utilized again but this time, with the values of the fear variable, which replaces the X value to a Y value:

$$SS_{YY} = \sum_{i=1}^{n} Y_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} Y_i\right)^2$$

Like previously, the first step is to calculate the square sums of all of the fear variable values of the different countries, which then get added up to a final sum of square values of 211.8723044112. Next, the sum of all the fear variable values has to be calculated and then squared again. While all of the fear variable values sum up to 68.079024, the squared value of these is 4,634.7535087926, which then has to be divided by the number of countries within the table, 22, again, which leads to a value of 210.670614036 for the second part of this formula. Subtracting this value from the first value of 211.8723044112 leads to a final value of 1.2016903752.

The last component missing for the coefficient of correlation formula is the sum of squares of both variables combined. For this value, the following formula is utilized:

$$SS_{XY} = \sum_{i=1}^{n} X_i Y_i - \frac{1}{n}\left(\sum_{i=1}^{n} X_i\right)\left(\sum_{i=1}^{n} Y_i\right)$$

The first step for this formula is to multiply every country´s Power Distance value with its "fear variable" value. After gathering the values for every country, all of these values are added up to calculate the final value of 3,561.532672 in this case. After that, all values from the countries in the Power Distance variable have to be added up, then, the same has to be done with the "fear variable" values. The sums of both then have to be multiplied with each other, which leads to a calculation of 1,136 x 68.079024 = 77,337.771264 which then has to be divided by number of countries within the table, 22, again, leading to a final value of 3,515.3532392727. Subtracting this value from the first value of 3,561.532672 leads to a final value of 46.1794327273, which is the last value needed to calculate the coefficient of correlation for these two variables.

To finally calculate the coefficient of correlation between the Power Distance dimension and the "fear variable", the following formula is utilized:

$$r = \frac{SS_{XY}}{\sqrt{SS_{XX} \cdot SS_{YY}}}$$

By filling in the values from the previous calculations, this formula can be resolved. Starting with the lower section, the sum of squares of the Power Distance dimension as well as the sum of squares of the "fear variable" get multiplied with one another, leading to a calculation of 1.2016903752 x 10,885.09090909 = 13,080.50897863047. The, the square root of this value is calculated, which is 114,37005280505. Lastly, the sum of squares of both variables together, 46.1794327273 gets divided by this value. By conducting this calculation of 46.1794327273 divided by 114,37005280505, the final value of $r = 0.403772068$, or roughly $r = 0.4038$ for the coefficient of correlation between the Power Distance dimension and the "fear variable" can be found, showing a positive correlation between the two.

This correlation can also be seen in the following scatterplot of the two variables´ values:

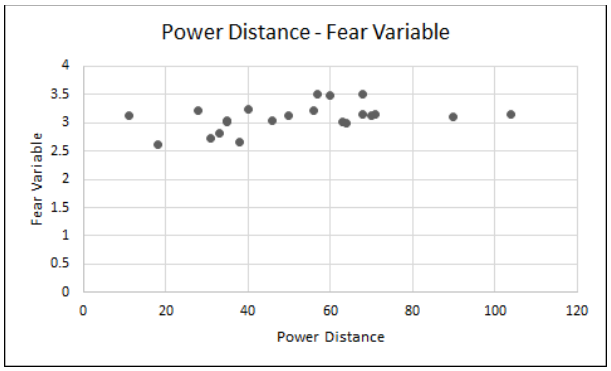

Figure 1. Scatterplot Power Distance – Fear Variable

After calculating this coefficient of correlation between the Power Distance dimension and the "fear variable", the same can now be done with the other cultural dimensions of the Hofstede model.

The next cultural dimension of the Hofstede model which influence on the perception of workers towards new technologies can be investigated is the Individualism dimension. By utilizing the same formulas as the earlier and changing the values of the Power Distance variable to the ones of the Individualism variable, a negative coefficient of correlation of r = -0.558970304, or roughly r = -0.559, can be found.

This correlation can also be seen in the following scatterplot showcasing the values of the Individualism dimension and ones of the "fear variable":

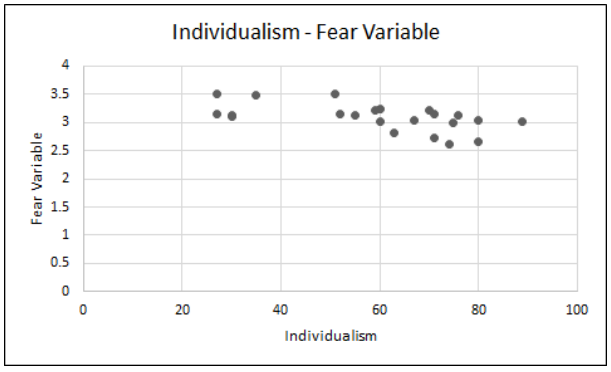

Figure 2. Scatterplot Individualism – Fear Variable

Another cultural dimension of the Hofstede model which influence on workers´ perception towards new technologies can be investigated is the Masculinity dimension. By utilizing the earlier mentioned formulas and putting in the values of the Masculinity dimension, a positive coefficient of correlation of r = 0.329147469, or roughly r = 0.3291, between the Masculinity dimension and the "fear variable" can be calculated.

A visual representation of this correlation between the two variables can be seen in the following scatterplot:

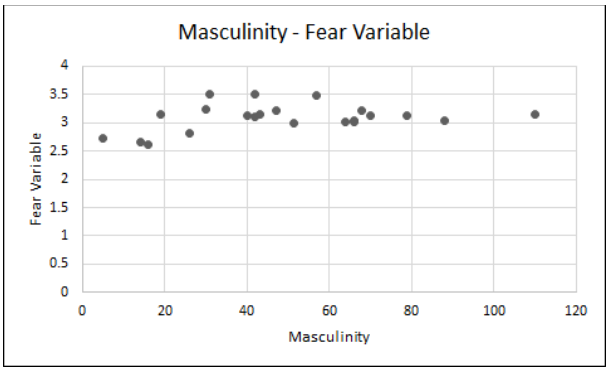

Figure 3. Scatterplot Masculinity – Fear Variable

The same calculation can also be used for the fourth cultural dimension of the Hofstede model, the Uncertainty Avoidance dimension. After putting in the values of this dimension into the formulas, a positive coefficient of correlation of r = 0.629325415, or roughly r = 0.6293, can be found between the Uncertainty Avoidance dimension and the "fear variable".

This correlation between the two variables is also visualized in the following scatterplot:

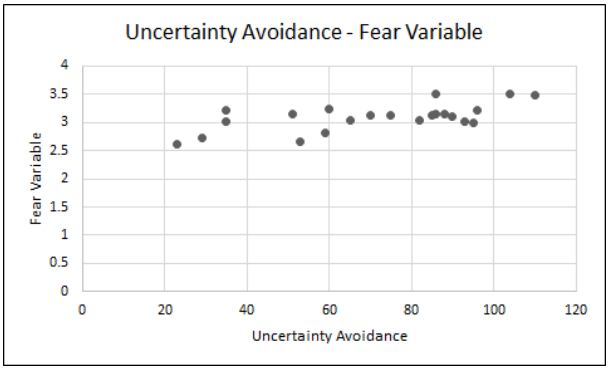

Figure 4. Scatterplot
Uncertainty Avoidance – Fear Variable

The next cultural dimension of the Hofstede model which correlation with the perception towards new technologies by workers can be investigated is the Long-Term Orientation dimension. Calculating with the values of this cultural dimension leads to a result of a negative coefficient of correlation of r = -0.111487589, or roughly r = -0.1115, between the Long-Term Orientation dimension and the "fear variable".

A visual representation of the correlation between the two variables can be found in the scatterplot below:

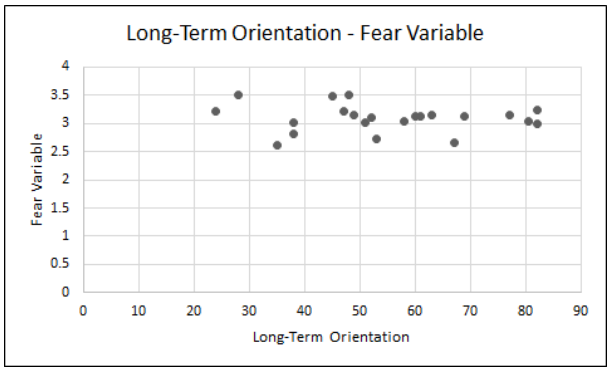

Figure 5. Scatterplot

Long-Term Orientation – Fear Variable

The last cultural dimension of the Hofstede model that can be investigated for correlation with workers´ perception towards new technologies is the Indulgence versus Restraint dimension. Using the previous formulas and incorporating the values of the Indulgence versus Restraint dimension, a negative coefficient of correlation of r = -0.430922769, or roughly r = -0.4309, can be found between it and the "fear variable".

This correlation between the two variables can also be seen in the following scatterplot:

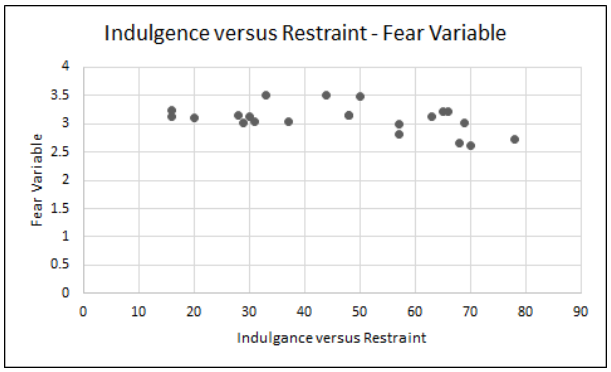

Figure 6. Scatterplot

Indulgence versus Restraint – Fear Variable

5.2 Data Analysis

The different cultural dimensions of the Hofstede model show quite a lot of disparities between their correlation results and therefore also their influence on workers´ perception towards new technologies within the labour market.

5.2.1 Power Distance dimension

The Power Distance dimension shows a positive coefficient of correlation of roughly 0.4038, which can be described as a correlation that is not that strong, however, it is also not completely irrelevant, as it is above a value of 0.35, which can be described as a moderate correlation according to widely recognized standards.[26] [27]

Since the correlation is positive, the higher the power distance is present within a country, the higher is the fear of new technologies by the workers. There are several reasons for such influence on the workers and their perceptions towards new technologies.

One factor could be that in cultures where a high power distance is present, workers can feel less powerful in their position. This could give them a feeling of not being able to defend their job in case of an introduction of new technologies such as robots into the workplace.

5.2.2 Individualism dimension

The calculations show a negative correlation of roughly -0.559 between the Individualism dimension and the workers´ fear towards new technologies within the labour market. This correlation can be described as moderate and is the first dimension to surpass a correlation value of plus or minus 0.5.

Since the correlation is negative, the lower Individualism is present within a country, the higher the amount of fear from the workers towards new technologies, or in different words: Where cultures are more collective, the lesser is their fear towards new technologies within the workforce.

A reason for why this is the case could be that people feel more secure in a collective culture, as they expect to be helped by others in case of negative influences by new technologies, such as job loss. This could make the people within such culture less scared of interacting with these technologies at their workplace.

5.2.3 Masculinity dimension

The Masculinity dimension of the Hofstede model showed a positive correlation of 0.3291 within the calculations. While there is still some correlation to be found between the two variables, with a correlation value closer to 0 than plus or minus 0.4, this correlation can hardly be described as moderate or relevant.

Since the calculations still show a positive correlation of over 0.3, it can still be stated that a higher masculinity within a country can lead to higher amounts of fear from workers towards new technologies within the labour market, even if it is only to a small extend.

A possible reason for this could be that in a more masculine culture, men are expected to work and bring money in, so a job loss would also mean a loss of respect within the culture. This could increase their fear of anything that could lead to them losing their job, including new technologies.

5.2.4 Uncertainty Avoidance dimension

The calculations conducted on the Uncertainty Avoidance dimension of the Hofstede model and its influence on the workers´ perception towards new technologies show a positive correlation of 0.6293 between the two variables, making it the highest positive or negative value within this research. Since its correlation value is above 0.6, the correlation between Uncertainty Avoidance and the fear towards new technologies from workers can be described as pretty significant.

Since the correlation can be described as highly moderately or strongly positive, it indicates that a culture in which people are highly interested in avoiding uncertainty, the fear towards new technologies within the labour market is experienced much stronger than in a culture, where this is not the case.

The reason for such a high correlation is simple. New technologies, such as Artificial Intelligence or machine

[26] See Weber & Lamb, 1970
[27] See Mason et al., 1983

learning algorithms come with many uncertainties. Some examples for these uncertainties could be how these technologies will develop in the future or if these technologies could replace specific jobs completely. This makes people within such a culture more feared of these technologies, leading to the high correlation between the dimension and the fear towards these technologies.

5.2.5 Long-Term Orientation dimension

The Long-Term Orientation dimension of the Hofstede model shows a negative correlation of -0.1115 towards the workers fear of new technologies, which is the closest value to 0 within this research. This makes it the variable that is influencing workers´ perception towards new technologies within the labour market the least. With this low of an influence, this dimension can not be described as being relevant towards the "fear variable".

The results of the calculations towards the correlation between the Long-Term Orientation and workers fear of new technologies, it can be assumed that a difference in the long-term orientation of a culture does not influence those cultures´ perception towards new technologies within the labour market.

One reason for why there is almost no correlation between these could be that these new technologies are not only influential for the long-term, but also for the short-term orientation. This could make the cultural dimension of long-term orientation less relevant.

5.2.6 Indulgence versus Restraint dimension

Lastly, the Indulgence versus Restraint dimension of the Hofstede model shows a negative correlation value of roughly -0.4309 between itself and the "fear variable". With a correlation stronger than 0.4 from 0, this makes it around as influential as the Power Distance dimension. Similar to that dimension, the Indulgence versus Restraint dimension can also be described having a moderate correlation towards workers´ perception of new technologies within the labour market.

Using these calculations, indications can be found that higher amounts of indulgence within a culture can lead to a higher fear and therefore a more negative perception towards new technologies by the workforce within that culture.

A reason for why this is the case could be that people within indulgence cultures put a lot of importance on their ability to enjoy life and have fun, while things such as control are usually disliked by them. New technologies could give the impression of control to these people which could make them fear for their ability to live freely, which could eventually lead to them feeling more negatively towards these.

6. CONCLUSIONS AND RECOMMENDATIONS

After calculating all of the correlation values for the different cultural dimensions of the Hofstede model and identifying what these values mean for the workers´ perception towards new technologies within the labour market, conclusions and recommendations can be made, for theory as well as for practice, while also taking limitations of this research into account.

6.1 Limitations

This research, while being able to gather significant information and results on the investigated relationships between cultural backgrounds of people and their views towards new technologies within the labour market, was also limited by a few factors. The most significant one of these factors is the amount of time that was available to conduct this research. As there were only around three months of time to conduct this research, the amount of research into more specific topics and therefore possible results were limited. This also lead to the impossibility of conducting qualitative research in addition to the quantitative one conducted in this research, which could have left to further results and additional knowledge. However, the amount of data on cultural dimensions as well as people´s perspectives towards new technologies still led to a complex and significant research.

6.2 Conclusions

There are several conclusions to be made from the performed research. Firstly, the research shows that there are definitely relationships between cultural dimensions of a person and that person´s perception towards robots, Artificial Intelligence, or other new technologies within the labour market. While there are some cultural factors like uncertainty avoidance that have high correlation with workers´ fear towards new technologies and have therefore high influence on them, there are other cultural factors such as long-term orientation that have almost no correlation with these workers and their fears. This shows that, while the cultural background of a person can have influence on that person´s perceptions towards new technologies, this is not the case for every cultural factor. Therefore, it can be concluded that not every part of a person´s cultural background is relevant for their view towards new technologies, but the ones that are relevant can have considerable impacts.

6.3 Recommendations

Based on the conclusions of this research, it can be noted that it is important to differentiate between the different cultural dimensions and look at them separately from one another.

6.3.1 Recommendations towards practice

There are several entities that can benefit from this information. For once, future employers can use this information when introducing new technologies such as Artificial Intelligence or machine learning algorithms into the workplaces of their employees. For these future employers, it is recommended to inform themselves about the cultural backgrounds of the people in the countries that they want to operate in. Not only should they investigate the country´s general culture, but it is recommended for them to also investigate the single dimensions that these cultures consist of. This makes it possible for them to utilize this information correctly and optimize their introduction of these new technologies. Another entity that can benefit from the outcomes of this research are future policy makers. As people´s negative perspectives towards new technologies can influence the public opinion on new policies and regulations that include these technologies, it is recommended for the creators of these policies and regulations to take these perspectives into account. Like with the earlier mentioned future employers, it is also recommended to them to

investigate the single cultural dimensions instead of the general cultures alone in order to give them a better insight on how people will react to the introduction of new policies or regulations involving new technologies. This is also recommended due to the fact that this research showed that some cultural dimensions have little to no impact on people´s perspectives towards new technologies, while others have high impacts. Overall, considering these cultural dimensions and values could be crucial to how a policy or an introduction of new technology would be received and utilized. Therefore, doing so should be of upmost importance for the ones planning and implementing these introductions.

6.3.2 Recommendations towards theory

For future research, it is recommended to continue to differentiate between the different cultural dimensions and not see a person´s cultural background as a single factor. For future researchers investigating the relationship between cultural backgrounds and people´s view towards new technologies, it is recommended to use this research and its results in order to gain insights on which cultural aspects have more significance to a person´s view towards these technologies than others. Possible recommendations for future research could be to take a closer look into the qualitative aspects of how a specific score within a cultural dimension influences a person in its view towards new technologies. Perhaps, this could be done by utilizing qualitative data gathering methods such as conducting personal interviews. Continuing this research in all kinds of ways and directions is highly recommended as there is much potential and possible value for people and society as a whole in doing so.

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8. APPENDIX

8.1 Appendix 1: Cultural Dimensions Table (Hofstede Model)

	Hofstede Dimensions					
Countries	Power Distance	Individualism	Masculinity	Uncertainty Avoidance	Long-Term Orientation	Indulgence versus Restraint
Austria	11	55	79	70	60	63
Belgium	64	75	51.5	95	82	57
Bulgaria	70	30	40	85	69	16
Denmark	18	74	16	*23*	35	70
Estonia	40	60	30	60	82	16
Finland	33	63	26	59	38	57
France	68	71	43	86	63	48
Germany	35	67	66	65	80.5	37
Greece	60	35	57	110	45	50
Hungary	46	80	88	82	58	31
Ireland	28	70	68	35	24	65
Italy	*50*	76	70	75	61	30
Malta	*56*	59	47	96	47	66
Netherlands	38	80	14	53	67	68
Poland	63	60	64	93	38	29
Portugal	68	27	31	104	28	33
Romania	90	30	42	90	52	20
Slovakia	104	52	110	51	77	28
Slovenia	71	27	19	88	49	48
Spain	57	51	42	86	48	44
Sweden	31	71	5	29	53	78
United Kingdom	35	89	66	35	51	69

8.2 Appendix 2: Fear Variables Table (Eurobarometer)

	Eurobarometer Values
Countries	Fear Variable
Austria	3.138375
Belgium	2.993596
Bulgaria	3.119543
Denmark	2.626012
Estonia	3.24747
Finland	2.825978
France	3.153455
Germany	3.042244
Greece	3.490481
Hungary	3.050391
Ireland	3.224822
Italy	*3.122718*
Malta	*3.208159*
Netherlands	2.668322
Poland	3.010288
Portugal	3.506286
Romania	3.1
Slovakia	3.154489
Slovenia	3.144763
Spain	3.506442
Sweden	2.721436
United Kingdom	3.023754