

Middle East Technical University

Department of Statistics

STAT 365

**SAMPLING AND SURVEY
TECHNIQUES
TERM PROJECT**

UNIVERSITY STUDENTS' ATTITUDE TOWARDS
METAVERSE

February 2022

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1. INTRODUCTION

1.1 ABSTRACT

Metaverse is a hypothetical iteration of the Internet, supporting persistent online 3D virtual environments through traditional personal computers as well as virtual and augmented reality devices. In this study, we investigated the general attitudes of university students towards the metaverse in Turkey. The survey was conducted on 6-20 December 2021 online with 398 university students from different universities in Turkey. 19 questions asked participants in two parts to understand their general familiarity with Metaverse and opinions as scale questions. The data was analyzed using R programming, and descriptive statistics utilized by frequencies and percentages.

The main purpose of this survey is to measure how much knowledge university students have about the metaverse and their impressions of it. As a result of this research, questions such as the effects of university students' use of social media on the use of metaverse, their fears against the metaverse, and how concepts such as law and human rights are realized in this virtual world have been tried to explain by establishing statistical models, hypothesis tests and data visualizations.

1.2 DATA DESCRIPTION

The data set had 398 observations and 20 variables after the data collection period. However, due to the NA value occurrences in the data set, some of the observations are deleted. The final data set has 381 observations and 20 variables.

69.6% of the participants are undergraduate students, 20.2% are master's students, and 10.2% are doctorate students.

Variable	Description
Gender	Gender identity of the participant
Education Level	Education level of the participant
Faculty	Faculty that participant belongs to
Social Media Applications	Social media applications that participants use (i.e Instagram, Facebook, etc.)
Social Media Usage Time	Daily time spent on social media in hours
Metaverse Concept	Participant's familiarity to the Metaverse Concept
Virtual Reality	Participant's virtual reality experience
Thoughts about Metaverse	Thought of the participant about Metaverse (i.e I have no need for the Metaverse in my life.)
Development Area	The area where the participant thinks Metaverse will improve most (i.e Social)
Leading Company	The company that the participant wants it to lead Metaverse (i.e Amazon)
Laws & Rules	The organization that the participant wants it to create the laws and rules in Metaverse (i.e Governments, companies, both, none)
Change in Laws & Human Rights & Economy	Participant's thoughts about whether there will be a positive change in human laws, human rights, and economy.
Satisfaction of Achievements	Satisfaction level of participant in the Metaverse after achievements
Fear of Metaverse	Participant's opinion about Metaverse in terms of fear
Ethics in Metaverse	Participant's consideration about Metaverse in terms of ethics
Spending Time in Metaverse	Participant's desire to spend their time in Metaverse.
Socio-economic Factors	Thought of participant about the affect of socio-economic factors while joining the Metaverse
Compatibility Issues	Participant's thought about the compatibility issues between different universes
Suffering from Cyber-syndrome	Participant's thought of he/she will suffer from cyber-syndrome in long-term

2. LITERATURE REVIEW

The term “metaverse” comes from the science fiction novel SnowCrash by Neal Stephenson. Metaverse is derived from the words “meta” (meaning “beyond”) and “verse” (from “universe”). Users can interact with each other and software programs in a three-dimensional (3D) virtual environment as avatars on the next-generation Internet. The development of this terminology has taken around 30 years (Duan&Li, 2021). With the development of relevant advancements, the metaverse has attracted a lot of attention from all around the world. The anticipated metaverse would be a realistic society with more direct and physical contacts, with race, gender, and even physical infirmity weakened, which would benefit society. However, the metaverse is still in its development stage, with many opportunities for improvement. The industry has already begun to prepare for metaverse's enormous potential, supported by great investment, although there are not many academic debates about metaverse to lead its development scientifically (Alrayes&Sutcliffe,2011). On this subject, the attitude of university students towards metaverse also has great importance. This attitude may shape the future, as university students make up a large proportion of Turkey's young population, and technology is used too widely among young people. As mentioned, Lik-Hang Lee et al. (2021) indicate that in ease of access, diversity, equality, and humanism, the metaverse is enormously useful to society. On the other hand, there are also some concerns caused by fear, the possibility of being unethical, and distrust of companies. Moreover, the inability to provide sufficient resources and infrastructures for the metaverse is one of the major obstacles to spreading this concept.

3. AIM OF RESEARCH

3.1 MAIN OBJECTIVE

The main purpose of this research is to investigate university students' attitudes towards the metaverse concept to observe their desire to join this virtual environment with the help of laws, human rights, and ethics. Moreover, three plots, including familiarity with the metaverse concept, which areas the metaverse will develop more and daily time spent on social media, were shown for preliminary information.

With the results obtained from this informations, it was also requested to learn the factors affecting university students' attitudes towards the metaverse.

Have you heard about Metaverse concept before?

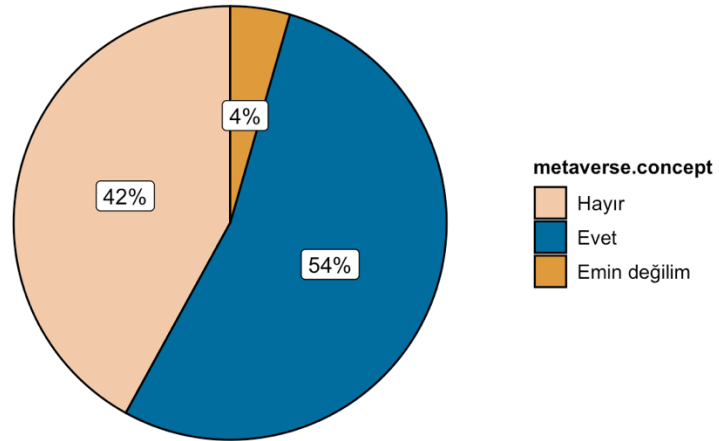


Figure 1

According to figure 1, 54% of the participants have heard about metaverse before. On the contrary, 42% of the participants are not familiar with the metaverse concept. Moreover, 4% of participants are unsure whether they have heard about the concept.

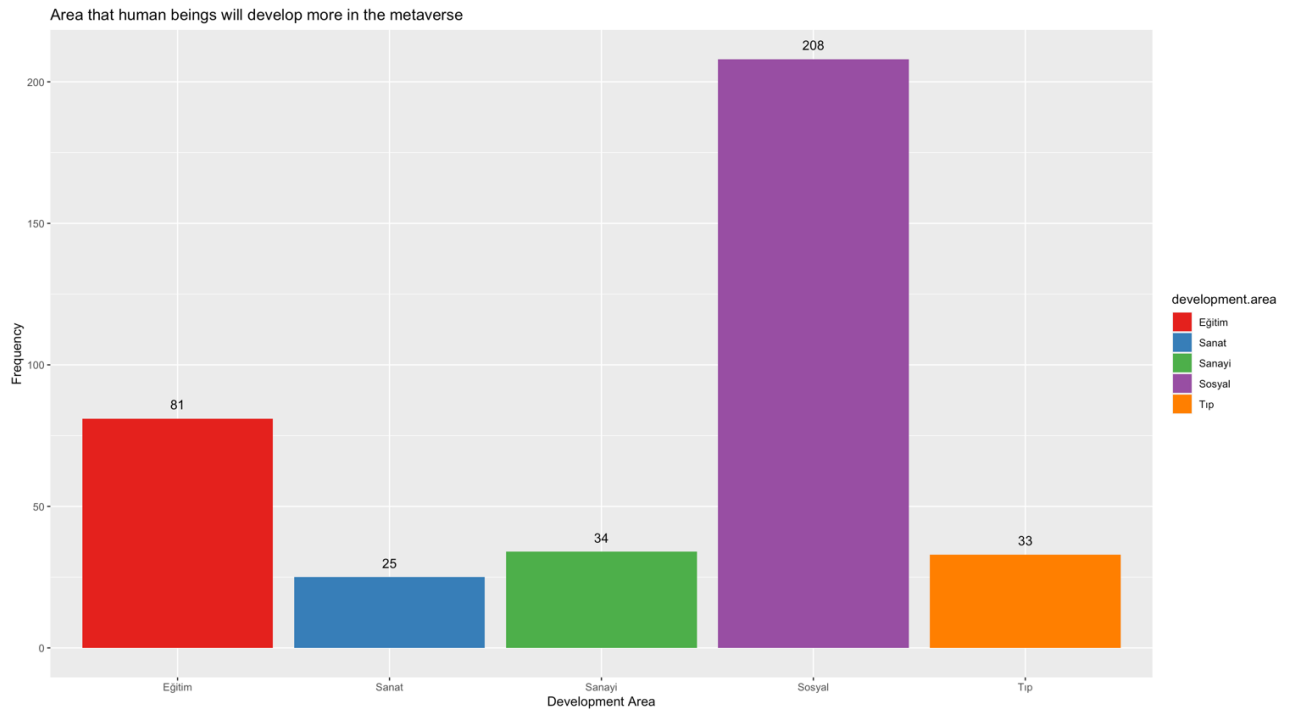


Figure 2

According to figure 2, most participants think that metaverse will improve our lives most in the social area. In contrast, they believe that the metaverse will develop an art area.

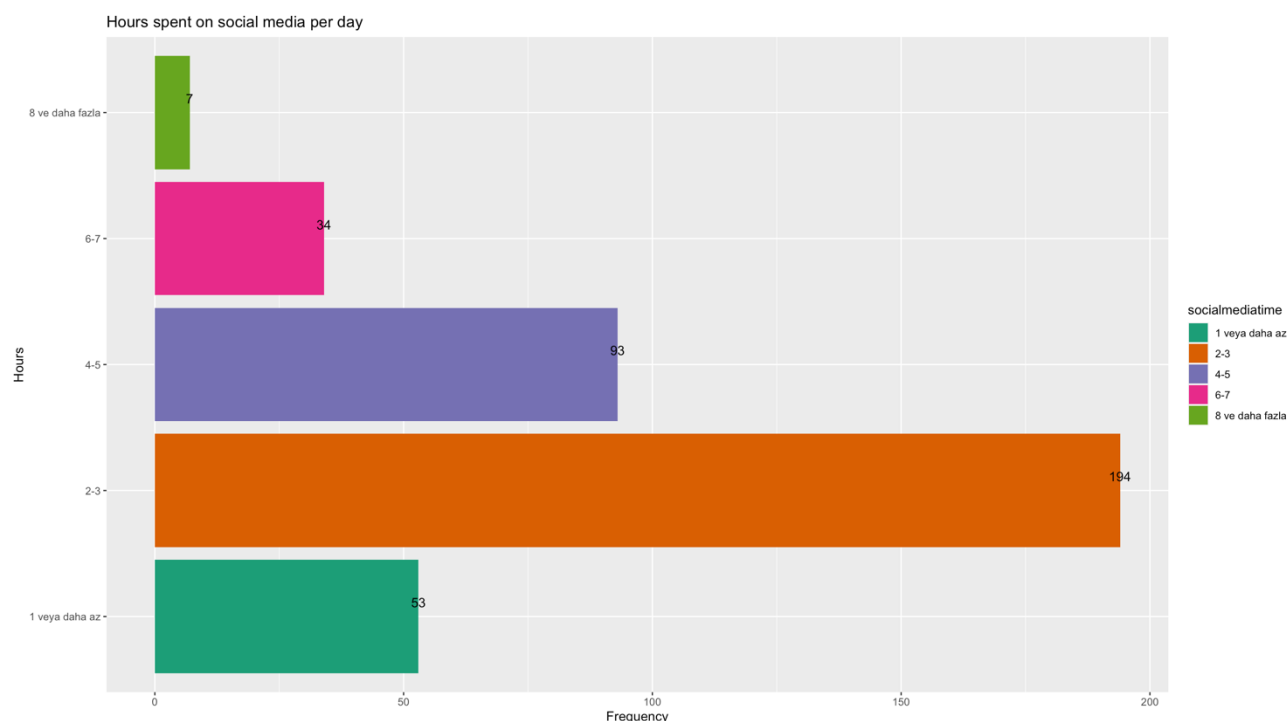


Figure 3

According to figure 3, most participants spend 2-3 hours on social media per day. This is followed by spending 4-5 hours on social media. In addition to these, very few participants spend more than 8 hours on social media per day.

3.2 MINOR OBJECTIVE

- 1- Investigating whether the level of fear of negativities that may occur in the metaverse differs by the student's gender identity.
- 2- Analyzing the time spent on social media affects the willingness to spend most of the time in the metaverse.

- 3- Investigating whether there is a connection between the student's choice of the creator of the laws in the metaverse and the student's thoughts about the positive change in the laws & human rights & economy.
- 4- Investigating whether there is a relationship between the scare of something bad that may happen in metaverse and thoughts about suffering from cyber syndrome in the metaverse.

4. SURVEY METHODOLOGY

4.1 SURVEY DESIGN

4.1.1 SAMPLE DESIGN

A total of 398 responses were obtained via Google forms for this study. The questionnaire was created in both Turkish and English languages. Then, all of the responses are converted into Turkish since the number of Turkish responses is higher than the English ones. The sample size was initially 398, but after some clarification, cleaning, and data arrangement, it was reduced to 381.

4.1.2 DATA COLLECTION

The survey study was administered online for better time management and due to the Covid-19 problem. The target group was university students from undergraduate, graduate, and doctorate levels. Through snowball sampling, one responder shares the questionnaire with another respondent.

It is designed to process and present answers composed of metaverse concept ideas belonging to university students from the answers supplied to the questions. The study and analysis were conducted using R programming.

4.2 METHODS OF ANALYSIS

Statistical approaches included descriptive statistics, and statistical tests were used. Graphical methods such as frequency tables and pie charts were used for visualizations and analysis. The Fisher Exact test was used because all of the variables are categorical. In addition, the logistic regression method will be used to create the model with the target variables of interest.

4.2.1 DESCRIPTIVE STATISTICS

Frequencies: Frequency distributions are visual representations of frequency counts that organize and show them in a way that makes them understandable. Absolute or relative frequencies, such as proportions or percentages, can be shown in frequency distributions. A table or graph can display a frequency distribution of data. Frequency tables, histograms, and bar charts are standard ways to display frequency distributions.

Graphs:

Pie Chart: A pie chart is a circular statistical graphic divided into slices representing numerical proportions. The represented quantities in a pie chart are proportional to each slice's arc length (and thus its central angle and area).

Grouped Bar Chart: Multiple data series are displayed in clustered horizontal columns in a clustered bar graph. Horizontal bars are grouped by category because each data series has the same axis labels. Clustered bars allow for direct comparison of many series within a category, however, comparing the same data series across categories is more challenging for the human eye.

Bar Chart: A bar chart or bar graph is a graph that uses rectangular bars with heights or lengths proportional to the values they represent to illustrate categorical data.

Cross-Table: The crosstable is a two-way table with rows and columns on both sides. Crosstables can also be used to assess whether or not a relationship exists between the row and column variables.

4.2.2 STATISTICAL TESTS

Fisher Exact Test: Fisher's exact test is a statistical significance test for contingency table analysis. Although it is commonly used with small sample sizes, it applies to all sample sizes.

Ordinal Logistic Regression: Ordinal regression is a type of regression analysis used in statistics to predict an ordinal variable, i.e. a variable that value exists on an arbitrary scale and only the relative ordering between different values is crucial.

5. DATA ANALYSIS, FINDINGS, AND DISCUSSIONS

5.1 Does the level of fear of negativities that may occur in the metaverse differ by the student's gender identity?

The following is the result obtained from the findings obtained after the study: Using statistical analysis (Fisher Exact test). It was aimed to observe whether the level of fear of negativities that may occur in the metaverse differ by the student's gender identity. As a result of the test, it was observed that gender identity has a considerable effect on the level of fear of negativities that may occur in the metaverse.

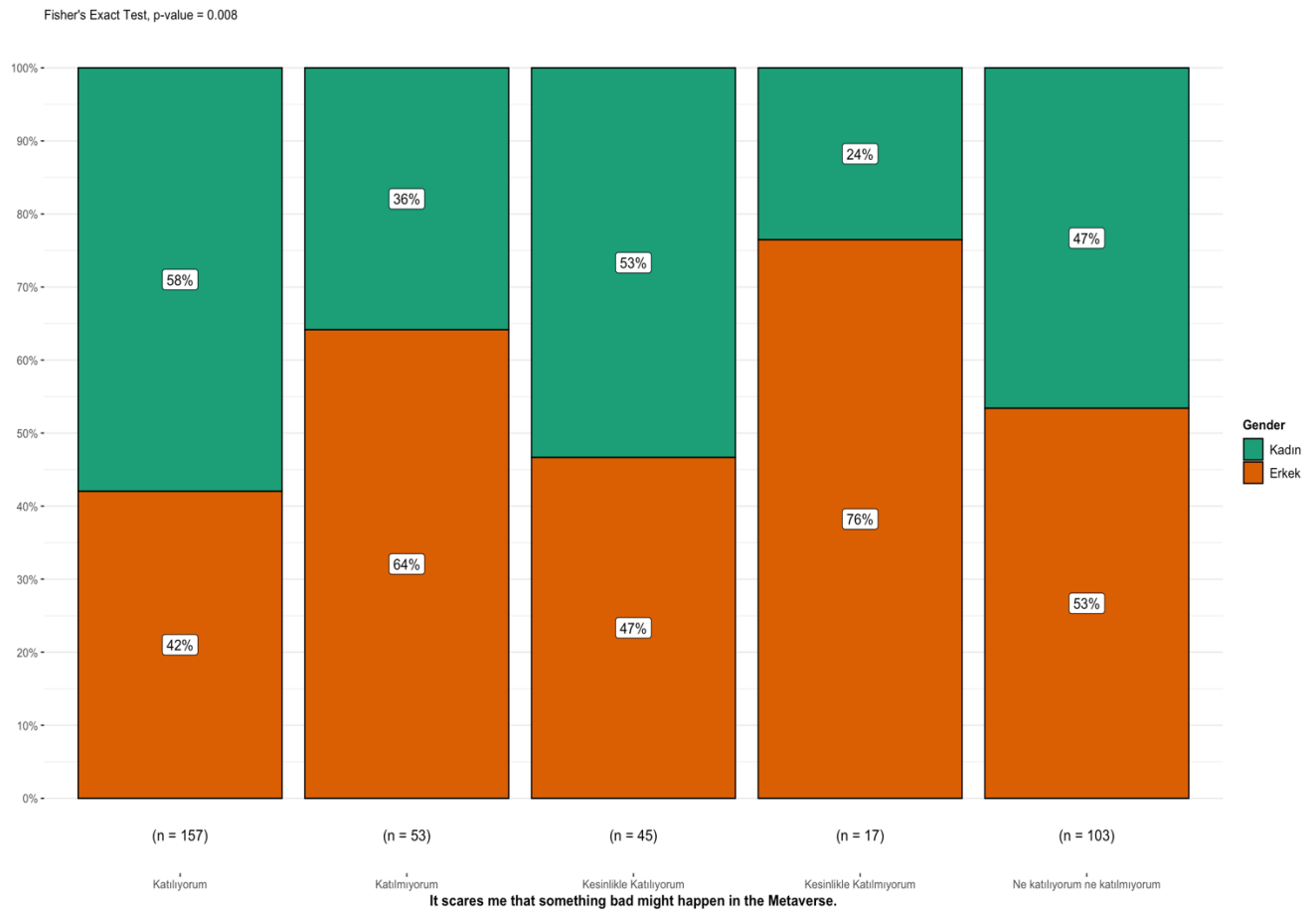


Figure 4

As can be seen from the grouped bar chart above, 76% of the participants who responded as strongly disagree for this question are male who is very high compared to the female respondents. On the other hand, Most of the respondents who answered I agree and strongly agree to the question are female. Moreover, Fisher's Exact test p-value is significantly lower

than the alpha value. This indicates that gender identity has an important effect on the fear of negativities that may occur in the metaverse.

5.2 Does the time spent on social media affect the willingness of participants to spend most of their time in the metaverse?

<i>socialmediatime</i>	<i>spend.my.time</i>					Total
	Katılıyorum	Katılmıyorum	Kesinlikle Katılıyorum	Kesinlikle Katılmıyorum	Ne katılıyorum ne katılmıyorum	
1 veya daha az	3 5.7 %	16 30.2 %	1 1.9 %	24 45.3 %	9 17 %	53 100 %
2-3	11 5.7 %	63 32.5 %	5 2.6 %	55 28.4 %	60 30.9 %	194 100 %
4-5	3 3.2 %	36 38.7 %	5 5.4 %	25 26.9 %	24 25.8 %	93 100 %
6-7	4 11.8 %	10 29.4 %	1 2.9 %	7 20.6 %	12 35.3 %	34 100 %
8 ve daha fazla	0 0 %	4 57.1 %	0 0 %	1 14.3 %	2 28.6 %	7 100 %
Total	21 5.5 %	129 33.9 %	12 3.1 %	112 29.4 %	107 28.1 %	381 100 %

$$\chi^2=18.087 \cdot df=16 \cdot \text{Cramer's } V=0.109 \cdot \text{Fisher's } p=0.326$$

observed values

% within socialmediatime

Figure 5

As can be seen from the cross table, 75% of people who spend one or fewer hours on social media do not want to spend most of their time in the metaverse. Also, 71.5 of people who spend eight or more hours on social media do not want to spend most of their time in the metaverse in the same way. Thus, it seems that there is no relationship between time spent on social media and willingness to spend most of their time in the metaverse.

From the summary statistics part, we can see that Fisher's p-value is bigger than the alpha value. This indicates that there is no relationship between the time spent on social media and participants' willingness to spend most of their time in the metaverse. Fisher's Exact test verifies that the claim is appropriate.

5.3 Is there a connection between the student's choice of the creator of the laws in the metaverse and the student's thoughts about the positive change in the laws & human rights & economy?

	Agree	Strongly Agree	Disagree	Strongly Disagree	Neither agree nor disagree	Row Total
Government	14 (15.6%)	1 (1.1%)	17 (18.9%)	18 (20%)	40 (44.4%)	90 (100%)
Companies	13 (17.8%)	6 (8.2%)	14 (19.2%)	3 (4.1%)	37 (50.7%)	73 (100%)
Both of them	41 (24.6%)	7 (4.2%)	30 (18%)	10 (6%)	79 (47.3%)	167 (100%)
None of them	6 (13.6%)	2 (4.5%)	10 (22.7%)	7 (15.9%)	19 (43.2%)	44 (100%)
<i>Fisher Exact Test</i>						
<i>$\chi^2=24.878 \cdot df=12 \cdot \text{Cramer's } V=0.149 \cdot \text{Fisher's } p=0.0015$</i>						

Figure 6

In this table, the student's choice of the creator of the laws in the metaverse and the student's thoughts about the positive change in the laws & human rights & economy variables can be seen. The Fisher Exact test is used to measure variables are related or not. The test showed a relationship between those variables since Fisher's p-value is less than 0.05. Most participants want rules and laws to be created collectively by both companies and governments.

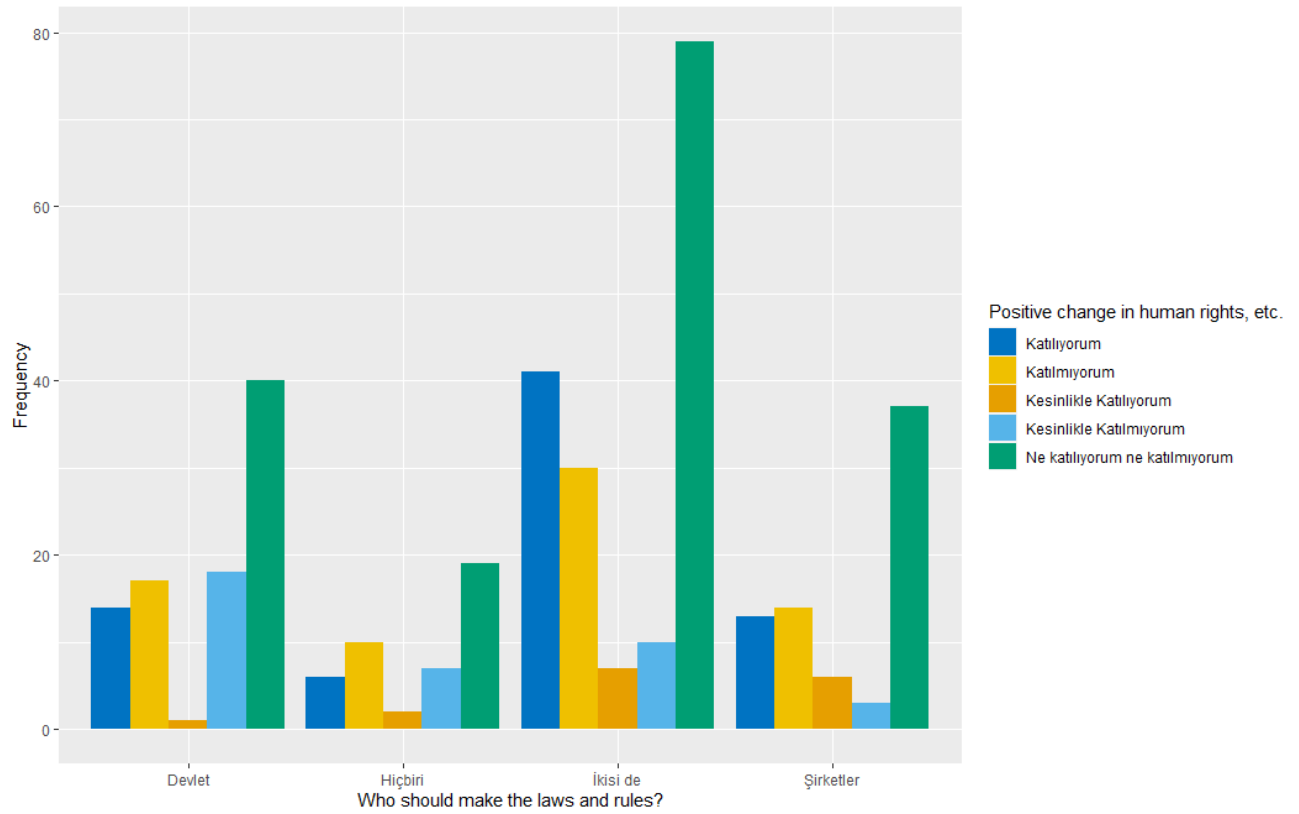


Figure 7

As shown from Figure 7, many students responded as “neither agree nor disagree” for the student's thoughts about the positive change in the laws & human rights & economy, regardless of their choice of law and rule creators. Also, students who think that both companies and governments should make the rules believe that there will be a positive change in human rights, and the economy in the metaverse.

5.4 Is there a relationship between the scare of something bad in the metaverse and thoughts about suffering from cyber-syndrome in the metaverse?

The result of a model established for between the scare of something bad that may happen in metaverse and thoughts about suffering from cybercyndrome in the metaverse is as follows: According to the Fisher's Exact Test result, the p-value is smaller than the alpha value that indicates there is a relationship between these two variables. After this process, a logistic regression model was built, and the intercept value of the model was examined. The number indicates that the odds of a participant's thought of suffering from cyber-syndrome decreased by 5% if there is no predictor variable.

6. CONCLUSION AND RECOMMENDATIONS

Although the metaverse is not a new concept, implementations of the metaverse applications are still at the design stage. As can be seen from this research study, participants are still not used to this new concept or have many question marks in their minds. It can also be considered that this universe will not be an independent universe model since it will consist of funds from companies. The question of who will lead the metaverse, which arises in the articles and whose answer cannot be found clearly, has not reached a definite conclusion in our research either. On the other hand, although many students spend too much time on social media today, and it has been confirmed by this study that these people are not that willing to spend time in the metaverse. Socialization is the most considerable effect of why university students use metaverse. Therefore, it is obvious that companies that take over socialization in the real world will also compete greedily in the metaverse world. Another question that comes to mind is about the ethical values of this universe. There are still a lot of problems like theft, sexual harassment, fraud, etc., in the real world. These actions will become even easier than in the real world if adequate precautions are not taken about such problems in the metaverse since it will be an online universe. In addition to all these pros and cons, it is doubtless and intriguing that metaverse will start a new era in the information age of the 21st century, when all fields from economy to education can be conducted online.

7. REFERENCES

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- Duan, H., Li, J., Fan, S., Lin, Z., Wu, X., & Cai, W. (2021, October). Metaverse for social good: A university campus prototype. In Proceedings of the 29th ACM International Conference on Multimedia (pp. 153-161).

https://www.researchgate.net/publication/354065789_Metaverse_for_Social_Good_A_University_Campus_Prototype

- Lee, L. H., Braud, T., Zhou, P., Wang, L., Xu, D., Lin, Z., ... & Hui, P. (2021). All one needs to know about metaverse: A complete survey on technological singularity, virtual ecosystem, and research agenda.

<https://arxiv.org/abs/2110.05352>

8. APPENDIX

8.1 SURVEY QUESTIONNAIRE

1-What is your current gender identity?

- a) Male
- b) Female
- c) Other Sciences
- d) Prefer not to say

3- Which faculty does your department belong to?

- a-) Faculty of Architecture
- b-) Faculty of Arts and Science
- c-) Faculty of Economic and Administrative Sciences
- d-) Faculty of Education
- e-) Faculty of Engineering
- f-) Faculty of Law
- g-) School of Foreign Languages
- h-) Other

2-What is your current level of education?

- a) Bachelor's
- b) Master's
- c) Doctorate

4- If you are using social media, please choose the applications that you use. (You can choose more than one)

- a) Facebook
- b) Youtube
- c) Whatsapp
- d) Instagram
- e) Twitter
- f) Telegram
- g) Tiktok
- h) Linkedin
- i) Snapchat
- j) Other

5- How many hours do you spend on social media per day?

- ☐ 1 or less
- ☐ 2-3
- ☐ 4-5
- ☐ 6-7
- ☐ 8 or more

6- Have you heard about Metaverse concept before?

- ☐ Yes
- ☐ No
- ☐ I'm not sure

7- Have you ever had virtual reality experience before (i.e VR headset)?

- ☐ Yes
- ☐ No

8- Which of the following describe your thoughts about Metaverse?

- ☐ I think Metaverse is a place that companies advertise their brands
- ☐ I would like to spend some time exploring the Metaverse
- ☐ I have no need for the Metaverse in my (real or virtual) life
- ☐ I still don't understand what the Metaverse is.
- ☐ Other

9- If the Metaverse spreads to the whole of our lives, in which areas do you believe human beings will develop more?

- ☐ Education
- ☐ Industry
- ☐ Art
- ☐ Medical
- ☐ Social

10- Which company that you want lead to Metaverse universe?

- ☐ Facebook
- ☐ Amazon
- ☐ Epic Games
- ☐ Disney
- ☐ Snapchat
- ☐ Microsoft
- ☐ Alibaba
- ☐ Sony
- ☐ Other

11 - In the framework of the Metaverse, should the government or companies make the laws and rules?

- ☐ Governments
- ☐ Companies
- ☐ Both of them
- ☐ None of them
- ☐ Other

12 - I think laws & human rights & economy etc. would change in the Metaverse positively.

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Neither agree nor disagree
- ☐ Agree
- ☐ Strongly agree

13-My achievements in the Metaverse world make me as happy and satisfied as in the real world.

○ Strongly disagree ○ Strongly agree ○ Disagree ○ Neither agree nor disagree ○ Agree
14-It scares me that something bad might happen in the Metaverse.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

15-I think the Metaverse concept is ethic.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

16-I would like to spend most of my time in Metaverse.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

17- I think that socio-economic factors will affect a person who wants to join to a Metaverse.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

18-If the world's leading companies create different Metaverses, I think that there will be compatibility issues(For example the equipments I use for Facebook Metaverse would not work well in Amazon Metaverse)

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

19- I think I would suffer from cyber-syndrome in long-term if I join a Metaverse. (Cyber-syndrome is the physical, social, and mental disorders that affect the human being due to the excessive interaction with the internet)

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly Agree

8.2 CODES

```
library(gmodels)
library(dplyr)
library(ggplot2)
library(tidyverse)
library(tidyr)
library(Hmisc)
library(magrittr)
library(ggstatsplot)
library(sjPlot)
library(readr)
library(caret)
library(wesanderson)
data <- read.csv("cleaningdata.csv", sep = ";", encoding = "UTF-8")
data$X <- NULL
data <- data %>% mutate_all(na_if, " ")
# Deleting the incomplete observations
data <- data %>%
  rownames_to_column() %>%
  na.omit(data)
data$rowname <- NULL
data$gender <- trimws(data$gender, which = c("both"))
data$gender <- factor(data$gender)
data$cybercendrommetaverse <- trimws(data$cybercendrommetaverse, which =
c("both"))
data$cybercendrommetaverse <- factor(data$cybercendrommetaverse)
data$compatibility.issues <- trimws(data$compatibility.issues, which = c("both"))
data$compatibility.issues <- factor(data$compatibility.issues)
data$metaversesocioeconomic <- trimws(data$metaversesocioeconomic, which =
c("both"))
data$metaversesocioeconomic <- factor(data$metaversesocioeconomic)
data$spend.my.time <- trimws(data$spend.my.time, which = c("both"))
data$spend.my.time <- factor(data$spend.my.time)
data$metaverseethic <- trimws(data$metaverseethic, which = c("both"))
data$metaverseethic <- factor(data$metaverseethic)
data$scars.me <- trimws(data$scars.me, which = c("both"))
data$scars.me <- factor(data$scars.me)
data$sachievementshappiness <- trimws(data$sachievementshappiness, which =
c("both"))
data$sachievementshappiness <- factor(data$sachievementshappiness)
data$human.rights.change <- trimws(data$human.rights.change, which = c("both"))
data$human.rights.change <- factor(data$human.rights.change)
data$education <- trimws(data$education, which = c("both"))
data$education <- factor(data$education)
data$faculty <- trimws(data$faculty, which = c("both"))
data$faculty <- factor(data$faculty)
data$virtualexperience <- trimws(data$virtualexperience, which = c("both"))
```

```

data$virtualexperience <- factor(data$virtualexperience)
data$Metaversethoughts <- trimws(data$Metaversethoughts, which = c("both"))
data$Metaversethoughts <- factor(data$Metaversethoughts)
#Correcting capitalization errors#
data[356, 5] <- "Hayır"
data$metaverse.concept <- trimws(data$metaverse.concept, which = c("both"))
data$metaverse.concept <- factor(data$metaverse.concept)
data$metaverseleader <- trimws(data$metaverseleader, which = c("both"))
data$metaverseleader <- factor(data$metaverseleader)
data$laws <- trimws(data$laws, which = c("both"))
data$laws <- factor(data$laws)
data$which.social.media <- trimws(data$which.social.media, which = c("both"))
data$which.social.media <- factor(data$which.social.media)
# 8 or more translated to Turkish
data[23, 12] <- "8 ve daha fazla"
data$socialmediatime <- trimws(data$socialmediatime, which = c("both"))
data$socialmediatime <- factor(data$socialmediatime)
#Development areas translated to Turkish
data[276, 8] <- "Sosyal"
data[81, 8] <- "Tıp"
data[c(36, 40, 352), 8] <- "Sanat"
data$development.area <- trimws(data$development.area, which = c("both"))
data$development.area <- factor(data$development.area)
ggpiestats(data, metaverse.concept,title = ("Have you heard about Metaverse concept
before?"),results.subtitle = FALSE,package = "wesanderson",palette = "Darjeeling2")
p <- ggplot(data , aes(development.area, ..count..)) + xlab("Development Area") +
ylab("Frequency") + ggtitle("Area that human beings will develop more in the
metaverse") + geom_bar(aes(fill = development.area), position = "dodge") +
scale_fill_brewer(palette = "Set1") + geom_text(stat='count', aes(label=..count..),
vjust=-1)
p + ggtitle("Area that human beings will develop more in the metaverse")
ggplot(data , aes(socialmediatime, ..count..)) + xlab("Hours") + ylab("Frequency") +
ggtitle("Hours spent on social media per day") +
geom_bar(aes(fill = socialmediatime), position = "dodge") +
scale_fill_brewer(palette = "Dark2") + geom_text(stat='count', aes(label=..count..),
vjust=-1) + coord_flip()
## Question_1
data_r2 <- data %>% slice(-c(66, 70, 81, 157, 319, 330))
r2_chisq <- chisq.test(data_r2$gender, data_r2$scares.me)
ggplot(data_r2, aes(data_r2$scares.me, ..count..)) + geom_bar(aes(fill =
data_r2$gender), position = "dodge") +
scale_color_manual(values = c("#0073C2FF", "#EFC000FF"))+
scale_fill_manual(values = c("#0073C2FF", "#EFC000FF"))
fisher_r2 <- fisher.test(data_r2$gender, data_r2$scares.me)
ggbarstats(data_r2, gender, scares.me,results.subtitle = FALSE,
xlab = "It scares me that something bad might happen in the Metaverse.",
legend.title = "Gender",
subtitle = paste0(
"Fisher's Exact Test", ", p-value = ",ifelse(fisher_r2$p.value < 0.001, "< 0.001",
round(fisher_r2$p.value, 3))))

```

```

data_2 <- data_r2 %>% select(gender, scares.me)
data_2$gender <- droplevels(data_2$gender)
data_2 %>%
  sjtab(fun = "xtab", var.labels=c("gender", "scares.me"),
        show.row.prc=T, show.col.prc=T, show.summary=T, show.exp=T,
        show.legend=T)
####QUESTION 2
data_3 <- data %>% select(socialmediatime, spend.my.time)
data_3 %>%
  sjtab(fun = "xtab", var.labels=c("socialmediatime", "spend.my.time"),
        show.row.prc=T, show.col.prc=F, show.summary=T, show.exp=F,
        show.legend=T)
###QUESTION3
data_r3 <- data %>% slice(-c(68,140,151,156,163,241,253))
data_r3 <- data_r3 %>% mutate_all(na_if, " ")
data_r3 <- data_r3 %>% mutate_all(na_if, "")
data_r3 <- data_r3 %>%
  na.omit(data_r3)
data_r3$human.rights.change <- trimws(data_r3$human.rights.change, which =
c("both"))
data_r3$human.rights.change <- factor(data_r3$human.rights.change)
data_r3 %>%
  sjtab(fun = "xtab", var.labels=c("laws", "human.rights.change"),
        show.row.prc=T, show.col.prc=F, show.summary=T, show.exp=F,
        show.legend=T)
ggplot(data_r3, aes(laws, ..count..)) +
  geom_bar(aes(fill = human.rights.change), position = "dodge") +
  xlab("Who should make the laws and rules?") +
  ylab("Frequency") +
  scale_color_manual(values = c("#0073C2FF", "#EFC000FF", "#E69F00",
"#56B4E9", "#009E73"))+
  scale_fill_manual(name = "I think laws & human rights & economy etc. would
change in the Metaverse positively.", values = c("#0073C2FF", "#EFC000FF",
"#E69F00", "#56B4E9", "#009E73")) + geom_text(stat='count', aes(label=..count..),
vjust=-1)
#QUESTION4
fisher.test(data$scares.me, data$cybercendrommetaverse, simulate.p.value = TRUE)
index <- createDataPartition(data$scares.me, p = .8, list = FALSE)
train <- data[index, ]
test <- data[-index, ]
# Training the model
logistic_model <- glm(scares.me ~ cybercendrommetaverse, family = binomial(),
train)
# Checking the model
summary(logistic_model)
exp(-0.0487)

```