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Article

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CHANGES IN INNOVATIVENESS AFTER COVID-19 PANDEMIC

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Abstract
COVID-19 pandemic continues to produce substantial effects in various spheres of life in the world. This process is expected to change the attitude and behavior of the society especially by forcing to adopt some technologies, digital means that have not been used before, to keep the social distance and not to enter public areas. The aim of this study is to analyze the changes in innovativeness of people after COVID-19. In this study, to measure the innovativeness of participants, the Innovativeness Scale which was developed by H. Thomas Hurt and others in 1977 was used. The developed questionnaire was distributed via social media and in total data were obtained from 425 participants. The findings of the study revealed that there is a dramatic decrease in the percentage of laggards and there is also a significant increase in innovators, similar changes were seen in other categories as well.

Keywords: COVID-19, diffusion of innovations, innovativeness, S-curve.

JEL classification: O32, M19, L22

INTRODUCTION

After globalization and the changes created in competition, innovation has become one of the most important tools providing competitive advantage.The most important criterion that makes this tool successful is that consumers adopt these innovations. For this reason, businesses need to know the process of adopting innovations by their target audiences and the factors affecting this process. One of these factors is undoubtedly the innovativeness level of the consumers. For this reason "Customer innovativeness" has been the subject of many studies, especially because of its important role in the adoption, diffusion of innovations and consumer behavior.

In 2020, COVID-19 pandemic produced substantial effects in all spheres of the life especially on the structures of societies and individual characteristics. The Covid-19 pandemic continues to have significant effects in various living areas of the world.In this process, it is expected to change the attitude and behavior of the society, especially by forcing most of us to adopt certain technologies and digital tools that we have not used before, to maintain social distance and not to enter public spaces.We think that there has been a change in innovativeness of people after Covid-19. Identifying such changes will enable businesses to take appropriate action.The aim of this study is to analyze the changes in innovativeness of people after Covid-19. In our study, to

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measure the innovativeness of participants, we prepare a survey basing on the Innovativeness Scale which developed byHurt, Joseph & Cook in 1977.

Our article explains the methodology and data used after the literature review on innovation and scale, includes the analysis of those contacted, and the summary and interpretation of the study results.

1. LITERATURE REVIEW

Innovativeness, was explained on the basis of willingness and tendency(Braak 2001; Hurt, Joseph & Cook, 1977; Hirschman 1980) and reaction or adaption (Rogers, 2003; Goldsmith ve Foxall 2003) to innovations, to what is new. Also innovativeness was evaluated on three aspectsas a personality trait, (“innate innovativeness”, II), as interest-specific personality approaches(“domain-specific innovativeness”, DSI), and as actualized behavior ("innovative behavior" IB) (Bartels &Reinder, 2011; Goldsmith&Foxall, 2003).

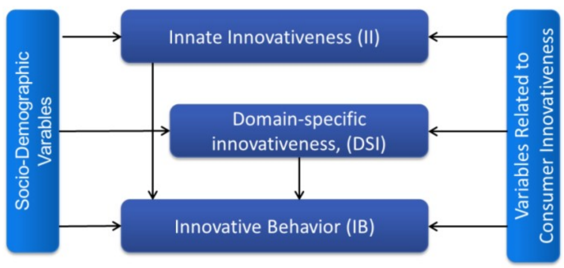


Figure 1. Consumer Innovativeness Model
Source: Akdoğan&Karaarslan (2013)

The process by which “an innovation is communicated through certain channels over time among the members of a social system” is defined asdiffusion. The first studies on the diffusion of innovations were made by the French sociologist Gabriel Tarde in the early 1900s. Tarde, who uses the concept of "imitation" to explain the adoption of innovation, tried to reveal the reasons for the spread of the innovations in his book 'The Laws of Imitation' (Rogers 2003).Tarde (1903), presented in his study the S-Curve, which shows the change in the number of people who adopt innovation over time.

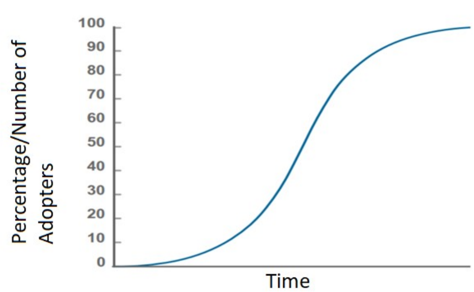


Figure 2. Diffusion S-Curve
Source: Rogers (2003)

According to the S-curve, where time is specified on the horizontal axis and the number / ratio of imitators (adopters) on the vertical axis. This is a cumulative curve on which its height represents the total percentage/number of people who have adopted at that time.Primarily, a very small part of the society adopts innovations and then increasingly accepted by a large number of people over time and finally the adoption rate decreases.Later on many researches were held about diffusion in different scientific disciplines like anthropology, early sociology, rural sociology, education, medical sociology, communication, marketing, geography, and general sociology.

Beal and Bohlen (1956) indicated that people do not adopt new ideas at the same time, but on the same complex process steps as Awareness, Interest, Evaluation, Trial and Adoption. And by comparing the characteristics of the adopters they categorized the people in 5 groups as; Innovators, EarlyAdapters, EarlyMajority, Majority, Non-Adapters.

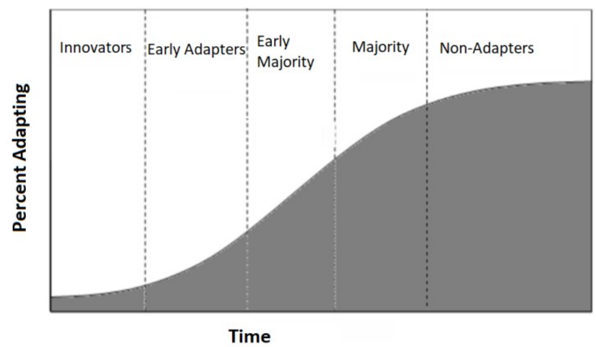
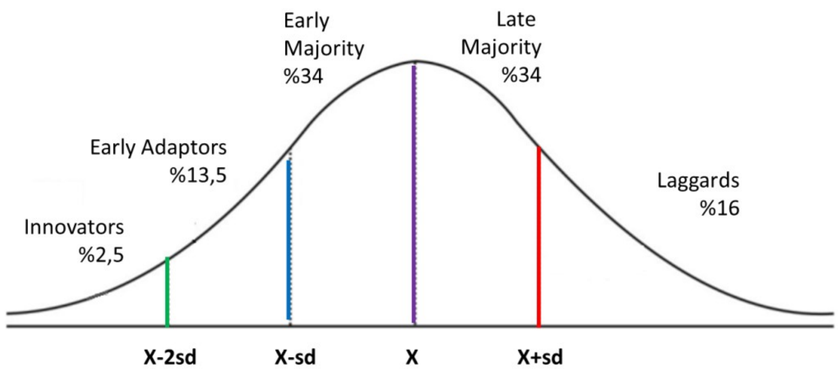


Figure 3. Adaption Curve& Time Categories
Source: Beal and Bohlen (1956)

In 1962, Rogers introduced the "Diffusion of Innovations" model, which explains the adoption process of innovations. He defined the innovativeness, as measured by the time at which an individual adopts innovation(s) and adopter distributions closely approach normality. He used the several characteristics of normal frequency distribution in classifying adopters and partitioned innovativeness variable into five adopter categories by laying off standard deviation (sd) from the average time of adoption as Innovators, Early Adopters, Early Majority, Late Majority, Laggards(Rogers 2003).

- Innovators: They are very eager to try new ideas. This interest leads them out of a local circle of peer networks and into more cosmopolite social relationships.
- Early Adopters: They are more integrated part of the local social system. They have the greatest degree of opinion leadership. Potential adopters look to them for advice and information
- Early Majority: They interact frequently with their peers, but seldom hold leadership positions. Their unique position between the early and late to adopt makes them an important link.
- Late Majority: They adopt new ideas just after the average member of a social system. Adoption may be both an economic necessity and the answer to increasing network pressures.

- Laggards: They possess almost no opinion leadership. They are the most localite in their outlook of all adopter categories; many are near isolates in social networks.



Adopter Categories	Percentage Adopting	Time Interval	Spects.
Innovators	2,5%	0 and X-2sd	Venturesome
Early Adaptors	13,5%	X-2sd and X-sd	Respectable
Early Majority	34,0%	X-sd and X	Deliberate
Late Majority	34,0%	X and X+sd	Skeptical
Laggards	16,0%	Over X+sd	Traditional

Figure 4. Innovativeness Categories
Source: Rogers (2003)

Rogers (2003) used the mean (x) and the standard deviation (sd), to divide a normal adopter distribution into categories.

- Standard deviations include the first 2.5 percent of the individuals to adopt an innovation—the innovators.
- The next 13.5 percent to adopt the new idea are included in the area between the mean minus one standard deviation and the mean minus two standard deviations; they are labeled early adopters.
- The next 34 percent of the adopters, called early majority, are included in the area between the mean date of adoption and minus one standard deviation.
- Between the mean and one standard deviation to the right of the mean are located the next 34 percent to adopt the new idea, the late majority.
- The last 16 percent are called laggards

The same 5 group categorization was used by others like Parasuraman& Colby (2001) in their study about Technology Readiness Index (TRI) with category names as Explorers, Pioneers, Skeptics, Paranoids and Laggards.

The diffusion of innovations and innovativeness concepts have been and remain an important topic in marketing management and consumer behavior because of the importance of new products and innovations on the competitive advantage and survival of companies. As consumers make their individual adoption decisions, these aggregate to produce the timing and pattern of diffusion. Thus, adoption is an individual or micro decision process, while diffusion is a social or macro process.

Diffusion and success of innovations depends on knowing the target audience that has the potential to use it and correctly identifying the needs to be answered. Innovative customers are more important in terms of marketing discipline than other consumers because they are fond of innovations, adopt innovations more quickly and easily, and introduce innovations to those around them. Innovators directly affect the success and diffusion of new products and are important in determining the target audience in marketing activities and determining the activities to be carried out (Dobre, Dragomir ve Preda 2009). For this reason, measuring consumer innovativeness has gained importance and has been the subject of many studies.

In our study, to measure the innovativeness of participants, we used the Innovativeness Scale (IS) which was developed byHurt, Joseph &Cookin 1977. It is a self-report measure tool. In the development of scale, 53 items were prepared reflecting the characteristics of the five innovativeness categories. It was applied to 231 university students in the first stage and 431 teachers in the second stage.After statistical and psychometric analyzes 20 items with a factor load greater than .50 were left in the scale.It has been tested by many researchers on different samples, its validity and reliability have been accepted It has been tested by Kılıçer and Odabaşı in 2010 and adapted to Turkish (Kılıçer ve Odabaşı 2010).

In the study of the Turkish adapted scale, that validity and reliability analysis were carried out on 343 undergraduate students. The scale was yielded four valid factors as resistance to change, intellectual leadership, openness to Experience and taking risk.
Adapted scales' internal reliability co-efficient was 0.82 and test-retest reliability co-efficient was 0.87. Kılıçer and Odabaşı (2010) confirmed that the adapted scale is suitable for Turkish academic studies and we used the adapted scale in our study.

In the Table 1, here you can see the percentages of innovativeness categories in these studies, supporting the results of Rogers (2003) studies.

Table 1. Change in the Distribution of Innovativeness

	1995		1977	2009
	Rogers			
InnovativenessCategories	Time Interval	%	Hurt, Joseph &Cook	Kılıçer & Odabaşı
Innovators,	Btw. 0 & t-2α	2,5%	1,5%	2,9%
EarlyAdopters,	Btw. t-2α & t-α	13,5%	13,5%	13,4%
EarlyMajority,	Btw. t-α & t	34,0%	34,9%	32,1%
LateMajority,	Btw. t& t+α	34,0%	34,9%	39,7%
Laggards	Over t+α	16,0%	15,6%	12,0%

Source: (Kılıçer ve Odabaşı 2010)

2. METHODOLOGY AND DATA

In our study we developed our questionnaire basing on Innovativeness Scale (Hurt et.al, 1977),plus demographic questions for on a web-based application (www.surveymonkey.com) and shared it on social media like Linkedin, Facebook, Whatsapp. The questionnaire was completed by 425 participants.

In our questionnaire, we use Likert 5 and calculate the innovativeness score with 3 steps as defined by Hurt and others (1977)

- Step 1: Add the scores for items 4, 6, 7, 10, 13, 15, 17, and 20.
- Step 2: Add the scores for items 1, 2, 3, 5, 8, 9, 11, 12, 14, 16, 18, and 19.
- Step 3: Complete the following formula:
  Innovativeness Score = 42 + Total score for Step 2 - Total score for Step 1.

After calculating the scores, we categorized the each participants according to the score intervals of categories as below

- >80 Innovators.
- 69-80 Early Adopters.
- 57-68 Early Majority.
- 46-56 Late Majority.
- 46> Laggards

3. ANALYSIS AND RESULTS

The questionnaire was completed by 425 Turkish participants over 20 years old in September/October 2020 after Covid-19 pandemic.

In our study, SPSS Version 22.0 program was used for data analysis. We found the mean and standard deviation of scores as below which are very close to the values found in the study of KılıçerveOdabaşı (2010)*

Mean (X) = **66.43** 66.86 *

Standard deviation (Ss)= **10.23** 8.94 *

It is found that scales' internal reliability co-efficient was 0.858 and showing the characteristic of normal distribution with Shapiro-Wilk test. In Appendix 2, you can find more details about normality.

Table 2. Reliability and Normality Statistics

		ReliabilityStatistics
Cronbach's Alpha	Cronbach's Alpha Based on StandardizedItems	N of Items
,858	,865	20

		Test of Normality
	Shapiro-Wilk	
Statistic	df	Sig.
,994	425	,095

In Table 3 we present the numberandpercentage of participants in eachinnovativenesscategoriesobtained fromoursurveybasing on demograficcategories, gender, age, education, income and oocupational status.

Table 3. Distribution of Innovativeness Categories by Demographic Data

CATEGORY	INNOVATORS	EARLY ADOPTERS	EARLY MAJORITY	LATE MAJORITY	LAGGARDS	TOTAL
Total	**40**	**142**	**178**	**59**	**6**	**425**
GENDER						
Male	27	86	109	35	2	**259**
	68%	**61%**	**61%**	**59%**	**33%**	**61%**
Female	13	56	69	24	4	**166**
	33%	**39%**	**39%**	**41%**	**67%**	**39%**
AGE						
20-29	4	10	20	11		**45**
	10%	**7%**	**11%**	**19%**	**0%**	**11%**
30-39	6	33	43	14	3	**99**
	15%	**23%**	**24%**	**24%**	**50%**	**23%**
40-49	19	65	86	24	3	**197**
	48%	**46%**	**48%**	**41%**	**50%**	**46%**
50-59	10	25	19	5		**59**
	25%	**18%**	**11%**	**8%**	**0%**	**14%**
OVER 60	1	9	10	5		**25**
	3%	**6%**	**6%**	**8%**	**0%**	**6%**
EDUCATION						
Primamry & Secondary	5	11	16	10	1	**43**
	13%	**8%**	**9%**	**17%**	**17%**	**10%**
Associate Degree & Undergraduate	26	77	111	33	2	**249**
	65%	**54%**	**62%**	**56%**	**33%**	**59%**
Master & PhD	9	54	51	16	3	**133**
	23%	**38%**	**29%**	**27%**	**50%**	**31%**
INCOME						
Under 5.000 TL	8	30	52	24		**114**
	20%	**21%**	**29%**	**41%**	**0%**	**27%**
5.001 TL - 10.000 TL	14	53	75	18	5	**165**
	35%	**37%**	**42%**	**31%**	**83%**	**39%**
10.001 TL - 15.000 TL	6	24	27	9	1	**67**
	15%	**17%**	**15%**	**15%**	**17%**	**16%**
15.001 TL - 20.000 TL	4	13	11	4		**32**
	10%	**9%**	**6%**	**7%**	**0%**	**8%**
Over 20.000 TL	8	17	9	3		**37**
	20%	**12%**	**5%**	**5%**	**0%**	**9%**
Not Declared		5	4	1		**10**
	0%	**4%**	**2%**	**2%**	**0%**	**2%**
OCCUPATIONAL STATUS						
Employed in private sector	23	74	93	27	2	**219**
	58%	**52%**	**52%**	**46%**	**33%**	**52%**
Employed in government institutions	5	23	35	10	2	**75**
	13%	**16%**	**20%**	**17%**	**33%**	**18%**
Self-Employed	10	25	22	7	1	**65**
	25%	**18%**	**12%**	**12%**	**17%**	**15%**
Unemployed & Retired	1	16	21	8	1	**47**
	3%	**11%**	**12%**	**14%**	**17%**	**11%**
Student	1	4	7	7		**19**
	3%	**3%**	**4%**	**12%**	**0%**	**4%**

Toseethechange in innovativeness of peopleafter Covid-19 pandemic, in Table4,a comparison is preparedbyusingtheresults of ourstudy, withscaledevelopment of Hurt et al. (1977), andTurkishadoption of InnovativenessScalebyKılıçer & Odabaşı (2009) basing on Rogers' foundings.

Table 4. Comparison of Innovativeness Categories Percentages

Categories	1962 Rogers' Innovativeness Categories	1977 Hurt, Joseph &Cook (Scale Development)	2009 Kılıçer & Odabaşı (Adopting Scale)	2020 CurrentResearch	Percentage Difference
Innovators (INV)	2,5%	1,5%	2,9%	9,4%	+7%
EarlyAdopters (EA)	13,5%	13,5%	13,4%	33,4%	+20%
EarlyMajority (EM)	34,0%	34,9%	32,1%	41,9%	+7%
LateMajority (LM)	34,0%	34,9%	39,7%	13,9%	-20%
Laggards (LG)	16,0%	15,6%	12,0%	1,4%	-14%

Here we conceptualized the shifts in the border-lines of cathegories on the normal distribution of innovativeness scores, comparing with the Rogers' Innovation Diffusion Model.

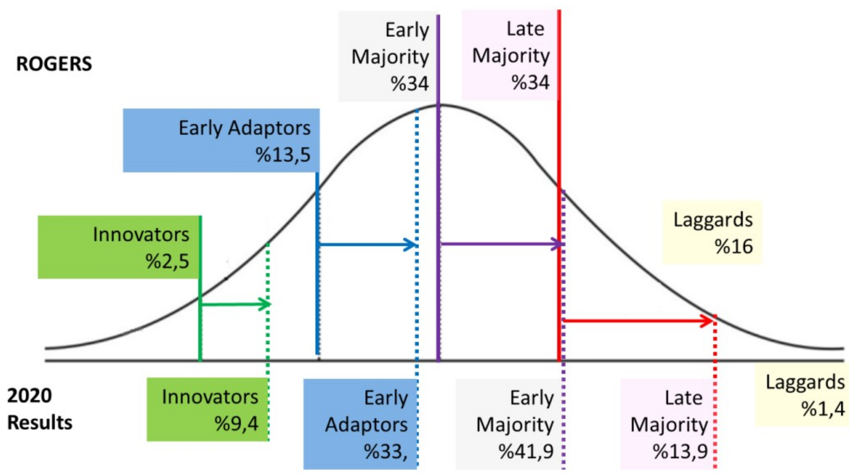
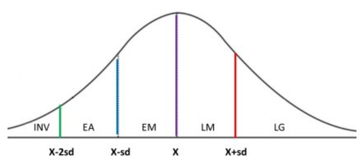


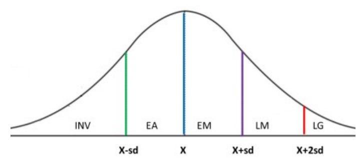
Figure 5. Shifts in Innovativeness Categories %

When we use the mean and standard deviation relation as Rogers did, to divide a normal adopter distribution into categories. we saw that if there is a small change in score interval of innovators, we see the same relation basing on the mean and standard deviation of scores is found. When we changed the score limit of innovators from 80 to 76, we see that the percentage of categories areshowing a division of normal adopter distribution into categories as seen in Table 5.

Table 5. Comparison of Innovativeness Categories Percentages with Manipulating the Score Intervals

	INNOVATIVENESS CATEGORIES	ROGERS' MODEL WITH INNOVATIVENESS SCALE			REVIZED DIFFUSION MODEL WITH IS & UPDATED SCORE INTERVALS		
		Time Interval	Score Interval	Percentage Adopting	Score Interval on Normal Dist.	Score Interval	Percentage Adopting
1	Innovators.	Btw. 0 & t-2α	>80	2,50%	Btw. 0 & X-α	**>76**	15,8%
2	Early Adopters.	Btw. t-2α & t-α	69-80	13,50%	Btw. X-α & t	**69-76**	34,1%
3	Early Majority.	Btw. t-α & t	57-68	34,00%	Btw. X & X+α	57-68	34,8%
4	Late Majority.	Btw. t & t+α	46-56	34,00%	Btw. X+α & X+2α	46-56	13,9%
5	Laggards	Over t+α	46>	16,00%	Over X+2α	46>	1,4%





In this study we didn't have the chance for checking the innovativeness of these participants according to this possible manipulation, but in future studies, it can be tested.

CONCLUSION & DISCUSSION

In 2020, COVID-19 pandemic produced substantial effects in all spheres of the life especially on the structures of societies and individual characteristics. The Covid-19 pandemic continues to have significant effects in various living areas of the world. In this process, it is expected to change the attitude and behavior of the society, especially by forcing most of us to adopt certain technologies and digital tools that we have not used before, to maintain social distance, reduce social interactions with others and not to enter public areas. The increase in e-commerce, e-learning, home-office practices, self-service technologies are supporting these changes.

To understand the possible effects on innovativeness of people after Covid-19, we compared the past studies about innovativeness with updated research on innovativeness in Turkey. Our findings show a dramatic decrease in the percentage of laggards and there has been a significant increase in innovators, similar change was seen in other categories also. This shows a significant shift in the border-lines of categories on the normal distribution of innovativeness scores. This change in innovativeness can be interpreted by one or more effect(s) below

- The result of social lockdown because of Covid-19 andreaction to sustain.
- The possible effects of rapid technological developments, digitalization and new developments in Industry 4.0, artificial intelligence etc.
- The possible changes in scoring of innovativeness scale by the time, meaning that the score intervals defined in 1977 may havebeen changed.
- The foundings of Rogers' diffusion of innovation modelcan not be generalizable

In future studies the possible reasons listed above can be tested to explain and confirm this change in innovativeness.

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