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Public acceptance of robots: drivers and barriers

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About the Author

Valentina is a researcher at the Institute for Statistical Studies and Economics of Knowledge, the HSE University –in Moscow, Russia.

Her academic interests include sociological studies of innovation behaviour of population, public understanding of science and technology, social transformations driven by digital technologies and issues related to the human enhancement technologies.

Current Projects:

International Research Laboratory of Economics of Innovation

– Monitoring Survey of Innovative Behavior of the Population
https://www.hse.ru/en/monitoring/innpeople/
https://www.hse.ru/monitoring/innpeople/

Human Capital Multidisciplinary Research Center https://ncmu.hse.ru/en/about
– Study of Social Transformations Driven by Digital Technologies (2020-2025)
– Society and Open Innovation (2020-2025)

Problem Description

Society and Robots

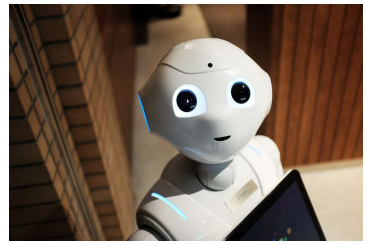
The global robot market is growing

19,6% average annual growth rate of expenses on robotic systems and drones in 2017–2022.

19% average annual growth rate of industrial robot installations in 2013–2018.

36,6% average annual growth rate of the artificial intelligence market in 2018–2025.

53% the average annual growth rate of the artificial intelligence chat bots market in 2018–2024.



Photos from: https://stock.adobe.com/ru and https://www.pexels.com/

Factors linked to the development of robotisation

There are increasing reliance on sophisticated technological tools.

Robotisation furthers the aim of minimising production and labour costs.

Robotisation reduces dangers to which workers are exposed.

Growing demand for service robots, caused by an aging population.

Source: Digital Economy Indicators in the Russian Federation https://www.hse.ru/data/2019/06/25/1490054019/ice2019.pdf

Ambivalence of social attitudes towards robots
The Frankenstein Syndrome, Frederic Kaplan (2004)

54%

Robots and artificial intelligence are a good thing for society

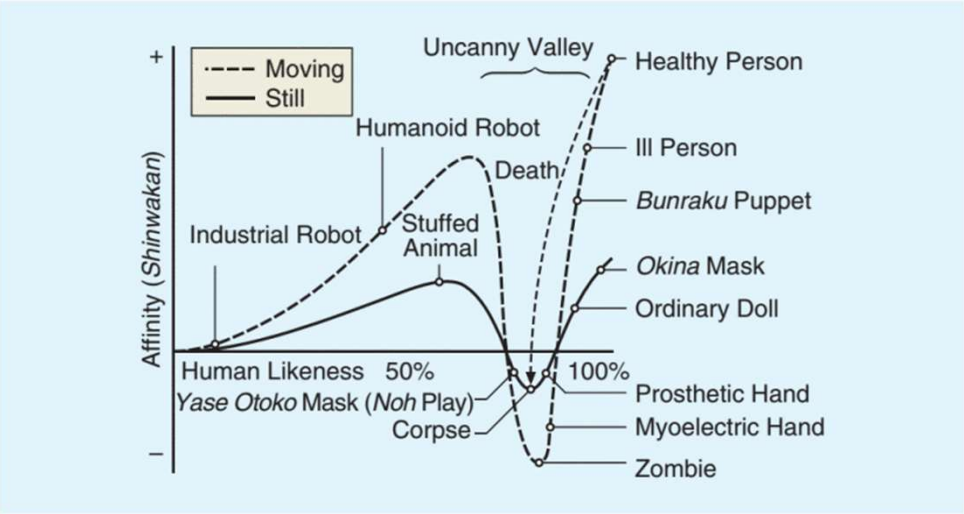
Sources: https://screencrush.com/which-terminator-better/

63%

Widespread use of robots may endanger human security

The Problem of Human Likeness of Robots
The Uncanny Valley, Masahiro Mori (1970)

A technological object that looks or acts almost like a person repel the observer.



Source: M. Mori, K. F. MacDorman and N. Kageki, "The Uncanny Valley [From the Field]," in IEEE Robotics & Automation Magazine, vol. 19, no. 2, pp. 98-100, 2012.

Bill Stoneham, 1972. Hands Resist Him

Technology as Actants or What's Hiding in the Black Box

Moral obligations

Rituals

Scripts

Social relations

Values

Controversies

Research Question

How attitudes toward science and technology in general, social bonds and other individual socio-demographic characteristics influence on the public acceptance of robots?

Sources: https://www.bbc.com/russian/other-news-44081953

Methodology

Empirical Base and Methods

The module of questions was integrated in the questionnaire the 27th of **The Russian Longitudinal Monitoring Survey** (a series of nationally representative surveys designed to monitor the effects of Russian reforms on the health and economic welfare of households and individuals in the Russian Federation). More information: https://www.hse.ru/en/rlms/

Method: face-to-face interviews.
Fieldwork: December 2018 – January 2019.
General sample: 7584 respondents aged 18-65.

Step 1. The comparison of the public acceptance of robots in different roles. Situations were differentiated by the type of tasks (functional and social) and by the strength of influence on the user (assistance or dependence).

Step 2. Integration into the database of respondents' answers on attitudes towards S&T development from the previous wave of the survey (through IDs).

Step 3. To identify factors that influence on acceptance of robot we used binary regression. Five situations were used for the analysis

Individual samples for regression models of 5 roles of robots:

1. Assistance at home, n=4022
2. Delivery, n=3988
3. Driverless car, n=3965
4. Elderly care (parents), n=3957
5. Surgeon, n=3958

Groups of Factors Included in Regression

The model of this study is based on the conception of public acceptance of technologies, that is defined as the readiness to use a technology to solve tasks assigned to it.

Socio-demographics

Innovativeness

Well-being

Digitalisation

Health

Public Acceptance of Robots

Attitudes to S&T

Social trust

Attitudes to robots

Loneliness

Family ties

Results

Public Acceptance of Robots

The most accepted – technical roles

66% Assistance at home
62% Delivery (drones)
53% Legal advice

Mixed attitude – social roles/decision-making

44% Assistance at work
38% Companion for conversation
35% Decision-making on granting a credit

The least accepted roles – out of personal control

21% Driverless car
19% Care of your elderly parents
14% Performing a medical operation on you
10% Care of your children at kindergarten

** The share of respondents, who feel comfortable about these situations.*
*** Situations were personalized.*

Regression Coefficients Part 1. Socio-demographics and Well-being

	1. Assistance at home, (B)	2. Delivery, (B)	3. Driverless car, (B)	4. Elderly care, (B)	5. Surgeon, (B)
Constant	,395	,647	-2,378***	-1,544**	-1,372**
Gender (1 = Female)	-,200*	-,349***	-,066	-,165**	-,182
Age	,001	-,007	-,010*	-,002	-,007
Type of town (Moscow and St. Petersburg)					
Large city (over 500 thousand.)	,455*	,253	-,145	,112	-,521**
City (from 100 to 500 thousand.)	-,116	,235	,207	-,217	,383*
Small town (up to 100 thousand people)	-,685***	-,557**	-,219	-,370*	-,421*
Urban and rural areas	-,551**	-,502**	,224	-,308	-,358*
Self placement on 9-point ladder of wealth	-,083*	-,102**	-,144***	-,053	-,096*
Self placement on 9-point ladder of power	,045	,063*	,094**	,085*	,155***
Health estimation (r.g. – good or very good)					
Moderate health (not good, but not bad either)	,138	,220*	,028	,003	-,097
Poor or very poor	,363*	,373*	,295	,107	,017

** Sig of B coefficients 0.1.*
*** Sig of B coefficients 0.01.*
**** Sig of B coefficients 0.001.*

Regression Coefficients Part 2. Social Ties and Religion

	1. Assistance at home	2. Delivery	3. Driverless car	4. Elderly care	5. Surgeon
Trust (r.g. – careful in your relations with people)					
It depends on person and situation	,388***	,249**	,158	-,272**	-,249*
Trust most people	-,442***	-,245*	-,103	,130	-,261
Frequency of feeling lonely (r.g. – almost never)					
Rarely	,185*	,177*	,169	,138	-,052
Often or almost always	,051	-,286*	-,149	,275	-,589**
Household size	1,008	-,001	,015	,105***	-,070*
Support for parents				-,290*	
Religious	-,086	,127	-,014	-,308**	-,082

Regression Coefficients Part 3. Innovativeness and S&T attitudes

	1. Assistance at home	2. Delivery	3. Driverless car	4. Elderly care	5. Surgeon
Digital skills	,099***	,094***	,033**	,011	,046**
Innovativeness	,278	,175	,281	,232	,361*
Technical innovation consumption (r.g. – rational consumption)					
Early majority (buy the first or when some acquaintances have new products)	,208	,130	,212	,319*	,187
Late majority	,080	-,032	,151	,371**	,040
Almost not buy	-,172*	-,181*	,135	,123	,100
Science Engagement Index (0 – not engaged, 10 – strongly engaged)	,075**	,065*	,097***	,134***	,102**
Awareness of what is happening in the world of S&T	-,547***	-,698***	-,300**	-,347***	-,314**
Attitudes to S&T (1 = agree)					
Today people give too much believe in S&T and think little of spiritual life	-,240*	-,253*	,070	,179	-,150
S&T change our life too fast	-,107	-,019	-,119	-,300*	-,469**
The practical application of S&T may violate individual, political, and other human rights	-,233*	-,193*	,174	-,073	,197
S&T achievements can be used by offender	,284*	,162	-,089	,053	,095
Attitudes to robots(1 = agree)					
Robots are a good thing for society	,954***	,813***	,891***	,733***	,730***
Soon robots will replace people in most jobs	,235**	,206*	,444***	,373***	,384***
Widespread use of robots may endanger human security	-,428***	-,565***	-,336***	-,434***	-,409***
Correct predictions	74.9%	72.6%	77.5%	78.9%	85.4%

Main findings

GENERAL FACTORS

- **General drivers** of public acceptance of robots are confidence in one's own power and ability to influence the state of affairs, digital skills (as an indicator of digital adoption), engagement with science, positive attitudes to robots and belief in the robotisation of human labor.
- **General barriers** are science awareness and expectation of a threat from robots (lack of trust).

SITUATION-SPECIFIC FACTORS

Robots for assistance at home and delivery

- **Drivers:** the need for assistance because of health problems and personal situations that lead to moderate loneliness, as well as a limited social trust (selective trust).
- **Barriers:** technology rejection, a high value of social ties, living in low urbanized areas. Women demonstrate a more suspicious attitude than men.

Robots for Elderly care

- **Drivers:** disposition to follow consumer trends.
- **Barriers:** resistance to technological advances, traditional family values of cohesion and mutual assistance and religiosity. As in the previous case, women demonstrate a more negative attitude than men.

Robot-surgeon

- **Drivers:** experience of innovation generation, living in advanced cities.
- **Barriers:** resistance to technological advances.

Driverless car

- **Barriers:** older generation conservatism.

Conclusion

Concluding Remarks

- Technocentrism as characteristic of modern civilization is an important prerequisite in the formation of society's readiness for autonomous technologies. Active interest in scientific and technological progress positively influence on public acceptance of robots. At the same time, involvement in the agenda has the opposite effect - the development of critical reflection on the consequences of the introduction of new technologies in the conditions of growing science awareness and resistance to progress.

- At the current stage in the development of digital culture, society accepts only the idea of automating (human-controlled) certain processes with digital technology, but is not ready for fully autonomous digital technology.

- Individuals look at the digital environment as an artificial phenomenon, depriving the life of the real sense or acting as a poor substitute for it.

- Important barrier is the social bonds between people, trust, patterns and norms of relationships. Commitment to traditional family values of cohesion and mutual assistance, having close relationships with other people are at odds with the idea of using robots for elderly care, as it is perceived as exclusion.

Thanks!

- Does anyone have any questions?

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