

# Students' Motivational Profiles in the high education of Kazakhstan in the context of self-determination theory: Big Data application

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**Abstract** — The intention of this paper is to raise some question about the student perspectives of their employability in terms of a conceptual model of self-determination theory which holds that there is a positive and significant relationship between self-perception (supporting for an autonomy environment, relatedness, autonomy, competence) and the types of motivation according to the self-determination theory in high education using data of PISA survey. Study results indicate that the prevalence of extrinsic motivation among students is more than internal, and extrinsic motivation, applied by parents is the stronger feature for the students of Kazakhstan, which could influence their decision-making ability<sup>1</sup>. This work directly includes the existing literature about Self-determination theory and Big data application.

**Keywords**—*Self-determination theory, higher education, youth unemployment*

## I. INTRODUCTION

Higher education has changed and needs restructuring under the influence of economic and non-economic trends associated with globalization, competitiveness, and the transition to a knowledge-based economy. Globalization and the transition to a knowledge-based economy have required politicians and universities to expand students competencies in hard and soft skills, as well as to form attitudes towards knowledge and dispositions [1]. McArthur concludes that it is noticed tends to "re-design" and "re-brand" in higher education to satisfy governments' views about the economic role of higher education [2].

From such a standpoint, the transition phase for students to work-life is not the well-defined way, and it follows some difficulties connected with the reality of employment and the challenges of life [3]. Seen in this way, Barrie indicated main attributes of graduate, which are: (i) assimilation of important elements for students, (ii) university learning outcomes, (iii) graduate contribution to society is identical to the worker and citizen, (iv) playing the role of a conductor of social change in a dynamic and unstable world [4].

Reputation with employers is one of the QS World University Rankings criteria, which is included in the Global Innovation Index (GII) evaluation. Overwhelmingly, it is a widely used composite indicator, and compared country performance is widely used as a suitable tool in policy analysis and public communication. Benchmarking analysis of the individual GII was used to assess the status of Kazakhstan's human capital & research results relative to neighboring countries taking into account economic and political interaction. In addition to that, one of the key countries was chosen from the post-Soviet period and EAEU customs union – the Russian Federation and Belarus, and neighboring countries – China and Azerbaijan. According to the Global Innovation Index 2018 Rankings (table 1), China, Russian Federation, and Belarus show a higher rate in the Human capital & research and Education criteria, despite the Belarus rate in QS university ranking and Global Innovation Index is worse than in Kazakhstan. Overall, Kazakhstan is in the middle of the GII among these countries.

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TABLE 1. BENCHMARKING THE LEVEL OF GII AND HUMAN CAPITAL & RESEARCH

Country	Azerbaijan	Belarus	China	Kazakhstan	Russian Federation
QS university ranking	64	86	5	36	22
Human capital & research	100	34	23	71	22
Education	119	20	13	77	27
Global Innovation Index	82	86	17	74	46

Source:[5]

Youth unemployment (those aged 15–24) is a global issue, with this segment of the workforce exhibiting three times the unemployment than that of adults [6]. Looking at the data in figure 1, due to the dynamics of the Employment-to-population ratio (those aged 15–24) from 2010 until 2017 it is seen, that it is more difficult to find a job with basic education compared with advanced and intermediate education. In this case, it is noticeable growth of the demand to the education level among the employees.

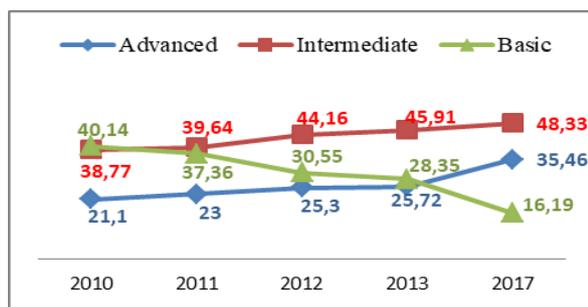


Figure 1. Dynamics of Employment – to – population ratio for age 15-24. Source: knoema.com

Regarding the data in figure 2, It is noticeable that the percentage of the youth unemployment rate (those aged 15–24) steadily decreased over the period from 2015 to 2019, whereas the share of youth among unemployed due to lack of work after graduation grew up from 48% to 58% during the period in one year. Moreover, the share of unemployed youth with high education got the rate more than 30% for the last two years, while the government has been implementing the program "Youth Practice" since 2009, which is designed specifically for the unemployed from among graduates of educational institutions in the profession (specialty) received, who completed their studies in for 3 years, and not older than twenty-nine years. Reputation with employers is 10% according to the Analytical report "Implementation of the principles of the Bologna Process in the Republic of Kazakhstan"[7].

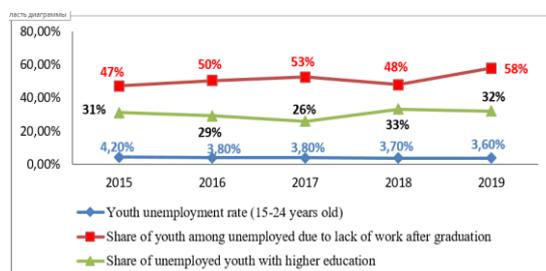


Figure 2. Dynamics of Employment-to-population ratio for age 15-24. Source: stat.gov.kz

Employers do not prefer to spend their time training young specialists in the conditions of hard competition in the labor market because the majority of the companies imagine having a "portrait" of a potential employee: work experience, the ability to apply theoretical knowledge in practice, the ability to make decisions, focus on results, the availability of higher education, etc. Higher education in itself does not guarantee successful employment. In this case, it makes sense to research a portrait of student behavior, what incentives motivate them in the context of self-determination theory. Furthermore, it is interesting to research the application of SDT in high education: students show a better performance in school being intrinsically motivated to get important competence or being extrinsically motivated by teachers, parents, or the grades.

## II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

In the 1980s, Edward L. Deci and Richard M. Ryan proposed a motivation theory named Self-Determination Theory, which includes two main types of motivation – intrinsic and extrinsic, both of them explain our behavior and who we are [8]. In this case, Sheldon and Krieger's (2007) emphasize all human beings must contain experience of autonomy, competence, and relatedness to get an improvement of positive motivation [9]. Consequently, people must understand what they can do successfully (competence); feel their preference and enjoy something (autonomy), and can interact with other people (relatedness).

The basic assumption of the self-definition structure is that the nature of the social context can be strongly affected by the individual's motivation, well-being, and performance [10]. Deci and Ryan approached the autonomy-supportive environments (i.e., social contexts) as opposed to controlling environments facilitate self-determined motivation, healthy development, and optimal psychological functioning [11, 12].

Actually, autonomous or intrinsic motivation means voluntarily engaging in activities based on self-interest for the purpose of obtaining pleasure without coercion and control. In turn, the performance of certain actions under control and with the help of coercion, this is called controlled or extrinsic motivation [13]. Therefore, we can conclude that the internal force that prompts action is intrinsic, the external pressure leading to a certain action is extrinsic. At the same time, positive feelings have a positive effect on intrinsic motivation, while negative feelings harm motivation.

Standage M. et al have provided external regulation, in which actions that are carried out to gain an external reward and/or avoid punishment [10]. The current study follows the view each self-perception could directly influence self-determined motivation which is included intrinsic and extrinsic, as Figure 3 shows:

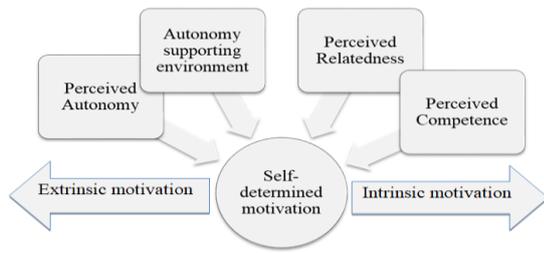


Figure 3. Conceptual framework of the impact of self-perception of students on self-determined motivation

As noted by Deci and Ryan, extrinsic motivation is behavior based on external sources to obtain a reward. These sources include rating systems, employee appraisals, awards and praise, and the respect and admiration of others [13]. So, extrinsic motivation will be considered from the side of parental motivation, teacher, and self-endorsed (i.e., personally controlled motivation to attain the desired consequence.

As shown in Figure 3, it is reasonable to hypothesize that:

H1: Extrinsic motivation would be facilitated by an autonomy-supportive environment, perceived relatedness, perceived autonomy, perceived competence.

At the same time, intrinsic motivation appears based on internal motives and behavior based on our values, interests, and sense of morality. According to research, intrinsic motivation (IM) could derive from several sources. For instance, some scholars [14,15] distinguished between experience stimulation and knowledge, which are focused on motivation by feeling pleasant sensations and the desire to explore and learn new things, when they aim at improving themselves. As shown in Figure 3, It appears possible that:

H2: Satisfied needs for the autonomy-supportive environment, perceived relatedness, perceived autonomy, perceived competence lead to intrinsic motivation.

### III. METHODOLOGY

The research methodology of this work includes a quantitative method and statistical analysis using the PISA database with the full set of responses from individual students, school principals and parents, which was conducted in 2018. The dataset covers 13 597 students, which range from schools of Kazakhstan.

The survey has been conducted with the help of a structured questionnaire designed on the following evaluation: "strongly agree", "agree", "disagree", and "strongly disagree". It was selected suitable questions for testing the motivation profile of the students. In the first step, an extensive literature review helped to conceptualize and identify the determinants of self-determination theory motivation and its corresponding items. Next, a rigorous questionnaire validation exercise helped in ascertaining key determinants of self-determined motivation. Table 2 depicts the definitions of variables selected for the study.

TABLE 2. DEFINITIONS OF VARIABLES SELECTED FOR STUDY

Variable	Definition
Autonomy supporting environment	The teacher's positive behavior in the student's learning (AS1) Teacher's attention in the student's doing

	well (AS2) My parents encourage me to be confident (AS3)
Perceived Autonomy	Your intelligence is something about you that you can't change very much (PA1) My life has clear meaning or purpose (PA2) I feel awkward and out of place in my school (PA3) I feel proud that I have accomplished things (PA4)
Perceived Competence	Student's desire to keep struggling to master and working hard (PC1) When I'm in a difficult situation, I can usually find my way out of it (PC2)
Perceived Relatedness	Positive relationship with friends (PR1) Students feel that they are encouraged to cooperate with others (PR2) Students feel that they are being compared with others (PR3)
Extrinsic motivation	Worries of students related to external opinion, during the process of failing (EM1) My parents support my educational efforts and achievements (EM2) The teacher poses questions that motivate students to participate actively (EM3) Trying hard at school is important and helps get a good job (IM1)
Intrinsic Motivation	I have discovered a satisfactory meaning in life (IM2) Overall, how satisfied are you with your life as a whole these days (IM3) The enthusiasm of the teacher inspired me (IM4)

Source: Compiled by a researcher from the review of literature and data of PISA survey

In this way, every scale of variables was validated by factor analysis, which has shown belonging to one factor of some questions. Then was calculated average of such questions which fit into one factor. However, taking into account the concept of extrinsic motivation, which could be appeared by teachers, parents, or the grading system and failing situation it was used other variables outside the factor.

### IV. EMPIRICAL RESULTS AND DISCUSSIONS

It was run the following ordinary least square regressions to achieve the objectives of the paper. Table 3 provides the summary descriptive statistics:

TABLE 3. DESCRIPTIVE STATISTICS FOR THE SELECTED VARIABLES

Variables	Mean	Std. Dev.	Skew	Kurtosis
AS1	1.71	0.74	0.96	0.37
AS2	2.87	0.85	-0.79	0.07
AS3	3.21	0.84	-1.06	0.76
PA1	2.27	0.92	0.23	-0.80
PA2	3.16	0.79	-0.93	0.79
PA3	2.98	0.80	-0.68	0.29
PA4	2.75	0.80	-0.23	-0.38
PC1	2.95	0.71	-0.78	0.89
PC2	3.08	0.66	-0.70	1.43

PR1	3.08	0.66	-0.70	1.43
PR2	2.87	0.80	-0.51	0.01
PR3	2.54	0.91	-0.14	-0.78
EM1	2.33	0.72	0.06	-0.15
EM2	3.27	0.86	-1.25	1.14
EM3	1.88	0.86	0.96	0.35
IM1	1.88	0.86	0.96	0.35
IM2	2.89	0.82	-0.43	-0.28
IM3	8.47	2.14	-1.62	2.28
IM4	2.95	0.84	-0.67	0.09

Model 1 represents a multiple regression model in which each determinant is specified to be directly associated with extrinsic motivation.

The dependent variable extrinsic motivation, which is a type of self-determined motivation, was obtained the external regulation information from the PISA survey selected questions where the student was asked about the particular question «Worries of student-related to external opinion, during the process of failing (EM1)», «My parents support my educational efforts and achievements (EM2)», «The teacher poses questions that motivate students to participate actively (EM3)». These questions reflect the major role of social agents as teachers, parents, and the fare of external opinion in influencing students' motivation.

To test the hypotheses H1, we arranged the variables according to self-perception (Autonomy supporting, Perceived Relatedness, Perceived Autonomy, and Perceived Competence. Autonomy supporting is examined through the questions of the PISA survey, which are provided in table 4.

TABLE 4. RESULTS OF THE REGRESSIONS EXTRINSIC MOTIVATION

Variables	EM1	EM2	EM3
AS1	(4.45)***	(1.14)	(-33.33)***
AS2	(2.11)*	(3.86)***	(19.7)***
AS3	(-2.12)*	(123.7)***	(4.5)***
PA1	(0.085)***	(3.6)***	(-1.8)
PA2	(-7.78)***	(4.88)***	(4.3)***
PA3	(-9.3)***	(3)**	(3.3)***
PA4	(18.01)***	(5.5)***	(3.65)***
PC1	(11.95)***	(4.8)***	(7.3)***
PC2	(-13.9)***	(2.13)*	(6.2)***
PR1	(12)***	(-1.4)	(-3.3)***
PR2	(2.8)**	(0.47)	(12.5)***
PR3	(9.4)***	(5.6)***	(-0.37)
(Intercept)	(29)***	(7.11)***	(32)***
Number of observations	13 597	13 597	13 597
R-squared (%)	0.096	0.6	0.203
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16

Note: Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

We present estimation results across students of Kazakhstan to understand self-determination theory. Table 4 presents the regression results for the full sample and we show results of extrinsic motivation. Concerning the results, the multiple regression model revealed the statistical significance of the created value according to p-value<0 for all variables of extrinsic motivation, however parents motivation showed the best result with the percentage of explained variance is 60% and the coefficient of AS2, AS3, PA1, PA2, PA4, PC1, and PR3 is statistically significant at 0 percent and positively

associated with our dependent variable which is "My parents support my educational efforts and achievements". In addition to that, such variables as PA3 are statistically significant at 0.1 percent and PC2 are statistically significant at 1 percent.

These data indicate that the model with dependent variable EM4 shows support for Hypothesis 1 stating that there was a positive association between parents support educational efforts and achievements and the likelihood that teacher's positive relationship in every student's doing well, parents encourage the student to be confident, opinion about changing intelligence, clear meaning or purpose of life, disagreement with feeling awkward and out of place in school, feeling proud that he/she has accomplished things, student's desire to keep struggling to master and working hard and students feeling that they are being compared with others.

TABLE 5. RESULTS OF THE REGRESSIONS INTRINSIC MOTIVATION

Variable	IM1	IM2	IM3	IM4
AS1	(8.37) ***	(-5.66) ***	(-11.4) ***	(-22.6) ***
AS2	(-2)*	(4.4) ***	(6.7) ***	(45.7) ***
AS3	(-4.9)***	(5)***	(8.3) ***	(6.7) ***
PA1	(-0.19)	(10)***	(8.17) ***	(4.9) ***
PA2	(-0.12)	(77.7)***	(22.4) ***	(6.94) ***
PA3	(-6.62)***	(1.82)	(9.5) ***	(-1.4)
PA4	(-1.34)	(-1.5)	(-8.5)	(-3.5)***
PC1	(2.03)*	(8.35)***	(0.25)	(9.6)***
PC2	(3.4)***	(9.1)***	(8.5)***	(4.8)***
PR1	(12) ***	(-2.5) *	(-9) ***	(-3.22) **
PR2	(-4.7)***	(2.88) **	(3.75)***	(8.7) ***
PR3	(5.1)***	(-0.86)	(-7.6) ***	(-1.31)
(Intercept )	(22.8)***	(5.4)***	(32.3)***	(22.4) ***
Number of observations	13 597	13 597	13 597	13 597
R-squared (%)	0.038	0.44	0.16	0.27
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16	< 2.2e-16

Note: Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Concerning the regression model of intrinsic motivation (Table 5), the highest proportion of variance was shown by discovering satisfactory meaning in life with R2 44%. It was found that the coefficient of AS1, AS2, AS3, PA1, PA2, PC1, PC2 are statistically significant at 0 percent, coefficient PR2 is statistically significant at 0.1 percent. However, variable PR1 is negatively associated with our dependent variable, which means that level of disagreement with the statement "Positive relationship with friends" negatively influences satisfactory meaning in the life of the student. The evidence favors the conclusion that hypothesis 2 does not seem plausible.

## V. CONCLUSIONS

With a sample of participants of the PISA survey, this study investigates the relationship between elements of self-determination theory and self-perception. We try to find out, step by step, the interrelationship among four elements of perception factors and how they influence self-determined motivation. The use of this kind of Big Data analysis has allowed managers to make decisions according to the strategy development in the country and

choose appropriate mechanism of funding in appliance with the specific of the economy [16, 17]. The results show that the relationship between extrinsic motivation and self-perceptions (Autonomy support, Perceived Autonomy, Perceived Competence, and Perceived Relatedness) is stronger, which determined that powerful forces in shaping students of Kazakhstan and their behavior are extrinsic motivation in the face of parents influence. In this way, it takes place a lack of competence, which is connected with self-development and the need for autonomy in the way of stimulating intrinsic motivation.

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