Effectiveness of Students' Motivation Factors in the Competency-Based Approach: A Case Study of Universities in Russia and Indonesia

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Abstract

The study aimed to explore the influence of motivation factors on the development of professional competencies using Russian and Indonesian institutions of higher education as case studies. In pursuit of this objective, quantitative survey methodology was incorporated, and surveys were conducted during November and April of the 2018/2019 to 2021/2022 school years. The questionnaire was developed with a 10-point rating scale, aimed at addressing the development of students' professional competencies and the factors that motivate learning and competency development. Using the questionnaire, the level of professional competency development of students in Russian and Indonesian universities has been empirically analysed. The results of the study supported the spiral nature of students' professional competencies development, showing that the development of professional competencies follows a progressive and non-linear nature of component development. These results confirm that the process of professional competency development is structurally divided into separate, relatively independent stages reflecting sequential and gradual progression. The positive character of the influence of the balanced development level of intrinsic and extrinsic motivation factors on the formation of students' professional competencies has been established. The results of the research may prove useful for educational institutions and public administration bodies for the development of effective mechanisms for students' motivation within the framework of competency-based approach implementation in higher education.

1- Introduction

In modern conditions humanity faces such global problems as energy crisis and re-source exhaustion; the need for food security and reducing poverty; the need for expanding the physical boundaries of habitat and developing human

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social conditions; environmental degradation and rapid increase in the human population; pandemics and health problems; political strife and information transformation, and so on [1]. The amount of information in the modern world is increasing at a great rate (Figure 1); only until 2025 the amount of data will increase by more than 180 zettabytes [2, 3]. New professions, knowledge, and skills are constantly emerging that need to be mastered not only for a career but also for mere existence in the world.
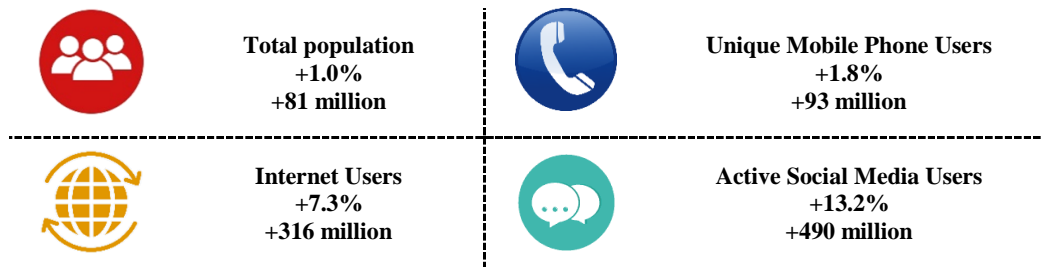
Total population
+1.0%
+81 million

Unique Mobile Phone Users
+1.8%
+93 million

Internet Users
+7.3%
+316 million

Active Social Media Users
+13.2%
+490 million

Figure 1. Global Digital Growth, January 2021 vs. January 2020

Scientists and experts have long concluded that the key to solving all of the emerging problems of the 21st century is knowledge, which is based on continuous education. The distinguishing feature of such an education, as opposed to a traditional school or university education, is that an individual guides himself or herself in acquiring knowledge and finds his or her own unique path [4]. However, in this case, traditional institutions acquire special importance in the development of special competencies of students as an intermediate step in determining the direction of curiosity and personal interest [5]. One can say that there is a gradual detachment of the conditions under which the current educational system was formed, which is followed by its transformation into a new educational environment, the purpose of which is not to master a certain amount of knowledge, but to develop a free, competent individual motivated to a continuous search for new knowledge and adaptation to the constantly changing social environment. New social conditions declare the principles of creating digital educational environments where students of educational institutions are not objects of learning but become subjects that independently determine the direction of their development [6]. This requires constant updating of educational programs and integration into the global educational space.

The experience of different countries' educational systems has shown that the competency-based orientation of educational programs seems to be the best way to solve current problems. Therefore, the problems associated with competency-based education are in the focus of well-known international organizations such as UNESCO, UNICEF, United Nations Development Programme, Council of Europe, Organization for Economic Cooperation and Development, International Organization for Standardization, etc. [7-9]. The competency-based approach causes reorientation of the educational paradigm to create conditions for the development of professional competencies that contributes to the graduate's ability to survive and sustain life in the modern multifactorial socio-political, market-economic, information and communication-saturated space. This, in its turn, makes it possible to define general criteria for comparison, analysis, and evaluation of the effectiveness and quality of educational activities, their competitiveness and compliance with current labor market needs.

The competency-based approach in education is related to personality-centered and action-based approaches to the learning process because it concerns the student's personality and could be implemented only in the process of a particular student performing a certain set of actions and solving certain tasks [10]. Different students may have different meanings attached to the same learning activity, which is determined in general terms by their motivation to learn. Motivation is the process of encouraging someone (an individual or a group of people) to engage in goal-directed activities [11]. Motivation to develop professional competencies is a distinctive feature of competent behavior (as opposed to incompetent behavior). There exists a consensus on the fact that the motivation factor is the leading one in the regulation of human activity and behavior, therefore, pedagogical interaction in the educational process for the development of professional competencies will be effective only if the features of the motivational basis of learning activity, i.e., students' personal motivation (a set of drivers that motivate a person to implement actions in certain conditions and with a certain purpose) are taken into account [12]. As motivation is one of the central problems in educational psychology, this reflects the need for the analysis of the factors affecting students' motivation for the competency-based approach.

The competency-based approach in education is related to personality-centered and action-based approaches to the learning process because it concerns the student's personality and can be implemented only in the process of a particular student performing a certain set of actions and solving certain tasks [10]. Different students may have different meanings attached to the same learning activity, which is determined in general terms by their motivation to learn. Motivation is the process of encouraging someone (an individual or a group of people) to engage in goal-directed activities [11]. Motivation to develop professional competencies is a distinctive feature of competent behavior (as opposed to incompetent behavior). There exists a consensus on the fact that the motivation factor is the leading one in the regulation of human activity and behavior. Therefore, pedagogical interaction in the educational process for the development of professional competencies will be effective only if the features of the motivational basis of learning activity, i.e.,

students' personal motivation (a set of drivers that motivate a person to implement actions in certain conditions and with a certain purpose), are taken into account [12]. As motivation is one of the central problems in educational psychology, this reflects the need for analysis of the factors affecting students' motivation for the competency-based approach.

In this regard, the paper argues that in order to ensure the effectiveness of the competency-based approach in education, it is necessary to reliably identify the sources of low or no motivation and determine the factors that motivate interest in learning. The paper emphasizes the need to develop motivational content as a systematic process of designing the learning process: regular goal-setting (identifying motivation problems), developing strategies to achieve goals (solving motivation problems), and evaluating the effectiveness of achieving results in the development of professional competencies. The contribution of the paper is twofold. The results of the paper will add preliminary findings to the literature pertinent to the growing field of inquiry into motivational factors and their role in the professional development of students. Moreover, awareness about the factors that motivate students' interest in the development of professional competencies can assist teachers, educational institutions, and public administration in developing and implementing effective mechanisms for encouraging students within the framework of a competency-based approach.

In particular, the present paper aims to investigate the peculiarities of the dynamic characteristics of students' professional competencies using Russian and Indonesian universities as an example. It will study the stages of professional competencies development and identify the specific influence of motivation factors depending on the level of skills and competencies boosting.

2- Literature Review

2-1- Structural Aspects of the Professional Competency

The development of the competency-based approach in education was established in 1996 when Jacques Delors identified four global competencies: "learning to know, learning to do, learning to live together, and learning to live" [15]. More recent work has focused on the study of competencies in terms of their content, functional affiliation, and classification of their structure [16-19]. Most scholars consider professional competency as an integral result of mastering the content of a particular educational program, which manifests itself in the application of formed skills and acquired knowledge by students both in professional activities and in certain life situations. Competencies have an elastic structure, determining the trends of socio-economic development; the competency content reflects a certain order of society for the training of its citizens [20]. The structure of competency, according to the majority of opinions of scientists, is characterized by the unity of three components [18, 19]:

- Knowledge, underlying the choice of the way of carrying out the professional activity (a cognitive component of the competency);

- Ability, experience (skill) of successful implementation of necessary actions on the basis of available knowledge (behavioral component);

- Attitude to the content and result of the activity (value-semantic aspect).

The competency-based approach is not limited to knowledge or skills (this structure of competency is more appropriate for the traditional education system, characterized by the fact that students receive ready-made knowledge and their task was to reproduce this knowledge) [21]. As competency reflects the personal attitude not only to the development of knowledge and skills but also to their practical embodiment. Here we are talking explicitly about the practical component of competency because of education. Practical competency as evidenced by the analysis of scientific-educational literature, for most scholars is the result of practical implementation of skills, that is, the ability to implement the accumulated knowledge in life [22]. Yet it should be noted that within the behavioral component of practical competency, attention should be focused on the ability or readiness of students to implement the acquired knowledge and skills in practical professional activities. From the point of view of the personality-activity approach, readiness (positive motivation) is considered in the interrelation of individual, personal and subjective properties and qualities of a person [23]. Regarding professional competencies, readiness is manifested in interest in professional activities and obtaining results (motivational characteristics of the individual); understanding of functional responsibilities (cognitive characteristics of the individual); a sense of professional and social responsibility and others [24].

Without the readiness skill, professional competency can only be realized within the cognitive component. Therefore, the competency approach also implies the development of students' readiness competency for practical implementation of the generated knowledge and skills, aspiration, ability to implement personal qualities, skills, knowledge, experience to achieve the productivity of professional activity [22, 24]. In this sense, it is important to form and consolidate such psychological qualities as responsibility, confidence, adaptability and others on the cognitive level in students [25]. The motivational basis of professional competency is an axiological component, including the awareness of the social significance and personal responsibility for the results of their activity, its permanent development and improvement [26]. Therefore, one of the most important components of professional self-determination is also the value and meaning

aspect [27]. In the conditions of informational transformation of socio-economic development, more and more scientists emphasize the anticipatory function of education aimed at the development of competencies to solve prospective problems of future professional activity [28]. The choice of future professional activity is connected with the choice of real-life values; these values are the basis of professional motivation.

The constituents of the value and meaning components of the competency are represented by values, meanings, and motives, which are non-autonomous and characterized by the system-structural and dynamic organization [27]. They are invariably subordinated to the significance of what is important and valuable for a person in life, in future professional activity. The psychological mechanism of development is based on constant reflection and adjustment of values, motives and meaning in accordance with constantly changing requirements of the external environment and established standards of social norms and behavior [29]. Therefore, the ability to structure activities is impossible without self-regulation skills of one's own state of mind [30].

Emotional-volitional self-regulation is manifested in the skills of an individual to adapt to the conditions of life and function effectively, including in professional activity through regulation of own states and actions of an individual depending on the necessary situation; conscious influence to change the situation if necessary; constant activation of volitional adaptive activity to ensure the balance of conscious self-regulation processes and others [31]. However, the implementation of conscious action (self-regulation) requires the formation and development of a set of components of professional competencies, namely cognitive, behavioral, value and meaning component and positive motivation. This together reflects the integral structure of professional competency, the joint development of which leads to the result and awareness of students as subjects of professional activity.

Competency development is a process of achieving a certain result [32]. Consequently, while an outcome or goal is related to the "*what*" question, competencies are related to the "*how*" this outcome was achieved. The formation and development of professional competencies is a long process. As a rule, it takes several years (for example, 12 years at school, and 5 years at university). As for the improvement of skills and competencies, this takes place in general throughout a person's life. In the process of developing professional competencies, students go through certain stages. Therefore, assessment and observation of competencies development in the educational system are one of the most important tasks for teachers in order to understand what stage of formation the student is at, what problems exist, what methods of influence and motivation need to be applied, etc.

The analysis of relevant scholarly literature has testified to the fact that the formation of educational results has not been adequately studied within the educational environment of educational institutions. Noel Burch originally proposed the most famous approach, which reflects the dynamic characteristics of professional competencies, but it was aimed at demonstrating the development of competencies of companies' employees. It includes four stages of competency development (Figure 2) [33].
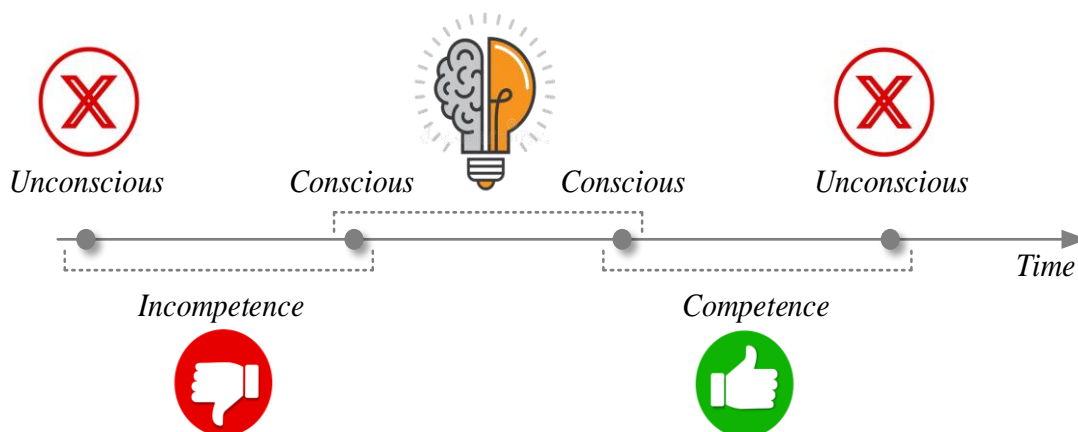

Figure 2. The classical model of professional competency development: Unconscious (one doesn't know that he/she doesn't have this skill or that he/she needs to acquire it); Conscious (one is aware that he/she doesn't have this skill); Conscious (one is aware that he/she has this skill); Unconscious (one doesn't know that he/she has this skill, as it seems easy and is done automatically).

Careful consideration of these stages of professional competency development, famously described by Noel Burch, leads to the following important conclusions. Firstly, this concept is based on changes in the psychological state of an individual, with developmental stages considered in relation to the notion of awareness of competency itself. This conclusion immediately imposes limitations on the applicability of the model in the field of education, where, as already presented, the structure of competency also includes, in addition to the affective component, the cognitive and behavioral ones. Secondly, the conventional model of development describes the stages of awareness development, which also

limits its imperative character, since the qualitative transformations of professional competency development reflect a linear relationship and the incompleteness of the cycle. The question arises: How does the last stage of evolution end? As experience accumulates, knowledge and skills are internalized, which brings the performance of the relevant action or decision making to automatism [33]. That is, formed competency is modified into unconscious one, so, according to Burch's theory, unconscious competency is the final point of professional skill development. As time passes, the conditions of internal and external environment functioning change, and, consequently, the quality criteria of formed competencies are modified, which might be sudden and unnoticed by the possessor of the competency himself. In addition, at a certain point, if we refer to the classical model of professional competency development, the level of skill formation is annulled, i.e. it shifts from "*Unconscious Competency*" to "Unconscious Non-Competency". This phase of development is a complete lack of skills and knowledge in a certain area, which is abundantly compensated only by self-confidence and motivation, clearly exceeding one's abilities.

Certainly, it can be argued that the formation of the competency cannot have a linear character of development, as the skills of a person are transformed and developed in-depth [33], rather than disappearing at the transition from one stage to another. Therefore, if we refer to the character of professional competency development, we can suggest the character of an unfolding spiral (*Hypothesis 1*), reflecting each phase as a new depth of awareness in the development of each component of professional competency (Figure 3).
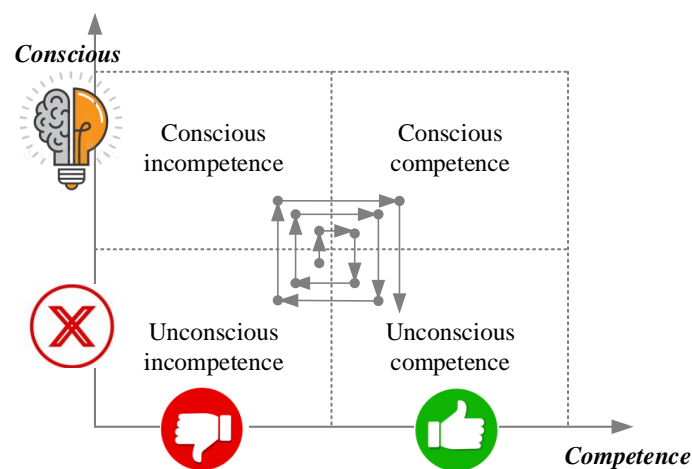

Figure 3. Four-link spiral of professional competency development

Another perspective suggests a five-stage process for developing competencies in any field [34]: 1) novice (forming a general idea of professional competencies); 2) advanced novice (approaching a basic knowledge set to master knowledge and skills of the future profession); 3) competent (forming ideas about principles applicable in different situations and to solve some problems); 4) experienced, and 5) expert. At the "experienced" stage, the person easily identifies the system of tasks, can intuitively understand how and most expediently to achieve its solution, based already on the experience. At the "expert" stage, the development of professional competency reaches its peak, when a person can solve more tasks simultaneously, process larger amounts of information, and do this without cognitive overload, based on the formed experience.

Yet it should be noted that the five-stage framework of development reflects primarily the development of knowledge and skills, while the affective components of professional competency, such as readiness and self-regulation, are not taken into account. For them most of the listed five stages are irrelevant. Moreover, if we consider the competency-based approach in the conditions of the educational system, then the practical application of this perspective is limited because the last two stages of professional competency development ("experienced" and "expert") are directly implemented in the process of professional activity of future university graduates, i.e. after graduation.

2-2- Motivation as a Dynamic Characteristic in the Development of Professional Competencies

Goal setting is a major mechanism of motivation in education and is also the end result of a certain stage of professional competency development [35]. Goal-orientation in the process of competency development implies differentiation of factors (motives) generating interest in their achievement. Motivation factors for the development of professional competencies have long been of interest to numerous educational scholars and are reflected in numerous cognitive and social theories of motivation. One of the most well-known perspectives is the Expectancy-value theory, which is based on the assumption that the main predictors of competency development are the expectation of success and belief in the value of the task. Researchers have proven that these motives have a direct effect on goal attainment in the development of professional competencies [36].

Self-efficacy theory proposed by Albert Bandura highlights self-efficacy as the most powerful driver of motivation, justifying the statement by the fact that students who are confident in their own abilities and ready to perform tasks are characterized by greater motivation to learn and vice versa [37]. In this sense, it could be argued that self-efficacy theory is similar to the expectation-of-success factors argued by the Expectancy-value theory. The only difference is that self-efficacy conceptually explains the development of competencies while performing a specific task [38], whereas expectation of success suggests a broader horizon of skill development, namely a specific subject area [39].

Attribution theory is based on awareness of the reasons (so-called attributions) for successes and failures in the development of professional competencies [40]. At the heart of the Attributional Theory the conceptual differentiation of motivation attributions within three dimensions: location (internal or external cause of success or failure); controllability (a person's ability to reflect on the cause and influence it); and stability (assessment of the permanence of the attributive cause of success and failure).

Self-determination theory developed by American scientists Ryan and Deci (2000) hold similar positions in the aspect of determining the motives of professional competency development; it substantiates different guidelines of students' motivation by the degree of involvement in the learning process [41]. The provisions of this theory and Attribution theory formed the basis for classifying motivation into intrinsic and extrinsic [42]. Researchers have revealed the existing pattern that successful students are differentiated not by their IQ level, but by the characteristics of motivation. For weaker students, extrinsic motivation (motives that lie outside the plane of the learning process as such) is characteristic for the development of professional competencies. The need for personal well-being and social status in the future, unwillingness to be inferior to others and simply as a life necessity act as incentives. Whereas more successful students operate to a greater extent with intrinsic motivation (independent of the external environment), characterized with the very content of the activity and associated with the prospective development of the personality, with the mastery of deep knowledge of the future profession the desire to learn new things and so on [43].

It seems obvious that intrinsic motivation contributes to learning, but most learning activities are not intrinsically interesting to students [42]. Students are often motivated to participate in an activity because it contributes to some outcome separate from the activity itself, which is a sign of extrinsic motivation. Thus, one can assume that the dominant form of motivation is still an extrinsic one (*Hypothesis 2*). From this point of view, certain studies [42, 44], which have empirically proved the positive influence on the development of professional competencies of simultaneous maintenance of both internal motivations of the student and extrinsic factors of its manifestation, are of great relevance. However, since the basis for the development of cognitive, attributive, and behavioral components of professional competencies is balance [44, 45], it can be assumed that maintaining a balance between students' intrinsic and extrinsic motivations has a positive impact on the development of professional competencies (*Hypothesis 3*). The balance is understood as the equivalent level of development of intrinsic and extrinsic motivation factors.

As it was substantiated earlier, the development of professional competencies is a dynamic process, which is characterized by a subordinate cycle of its development. The development process may be divided into certain phases of its development. That is, at each stage of professional competency development a certain goal in professional competency development is achieved. In addition, each of the stages of professional competency development determines the requirements for learning content, lecturers' competencies, and educational technologies, which might be of interest to students. Earlier stages of competency development impose less significant requirements for these components [16]. Later stages of competency development, which correspond to higher levels of competencies, require higher competencies of teachers and a more in-depth interdisciplinary approach to the formation of learning content [46]. If competency development slows down, student interest, a vision of value, and learning perspectives are factors that are more significant. Consequently, based on the differentiation of motivation targets presented in the theories of motivation we analyzed, we can assume that motivation factors also depend and differentiate on the stage of professional competencies development (*Hypothesis 4*).

3- Research Methodology

The following flowchart (Figure 4) summarizes the methodology for the present study:

3-1- Assessment of the Awareness of Professional Competencies Formation and Learning Motives among Students

The survey was conducted during the November and April of the 2018/2019 to 2021/2022 school years: one questionnaire each academic semester. The study period is based on the duration of students' study in undergraduate programs at institutions of higher education. The survey was conducted remotely using Google Forms [47], was voluntary and anonymous.

The questionnaire was aimed at assessing students' awareness in the formation of professional competencies through self-assessment of their competencies, as well as to determine the motivation factors contributing to the development of competencies.

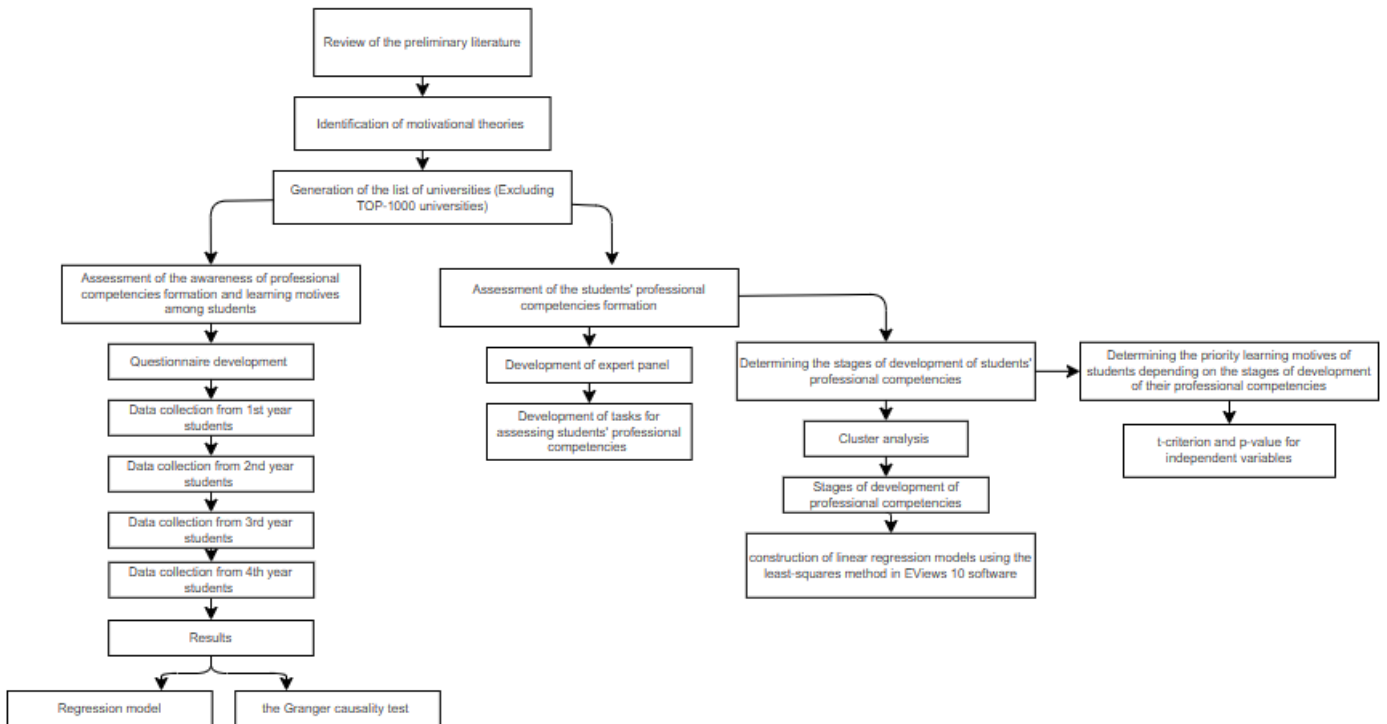The number of students participating in the survey is shown in Table 1.

Figure 4. Research Methodology

Table 1. Number of students at universities in Russia and Indonesia participating in the survey.

Indicator	1 year		2 year		3 year		4 year
	1 semester 2018/2019	2 semester 2018/2019	1 semester 2019/2020	2 semester 2019/2020	1 semester 2020/2021	2 semester 2020/2021	1 semester 2021/2022
Universities in Russia							
Number of respondents	1593	1547	1507	1469	1410	1338	1275
Universities in Indonesia							
Number of respondents	1325	1299	1283	1205	1185	1103	1063

1,593 Russian and 1,325 Indonesian 1st-year students participated in the first survey, which was conducted during November 2018. The list of universities was randomly generated from those universities that were not included in the TOP-1000 World University Rankings 2018 [48]. TOP-1000 universities are excluded as the higher developmental competencies of the students who attend them do not reflect the national average. Here is the list of universities: the Volga Region State University of Physical Culture, Sports and Tourism; Moscow Financial and Legal University; St. Petersburg State University of Economics; Nizhny Novgorod State University of Engineering and Economics; Udmurt State University; Irkutsk National Research Technical University; Moscow Aviation Institute (Russia); UIN Maulana Malik Ibrahim Malang, Indonesian Computer University, Diponegoro University, Indonesia International Institute for Life Sciences, IPMI International Business School, Batam International University, Universitas Pendidikan Ganesha, Brawijaya University Indonesia).

The same students were interviewed during the next 2019-2021 to assess the dynamics of their professional competencies. The decrease in the number of respondents comes from the fact that some students could not be re-contacted and some students were expelled from the universities. The number of respondents in both countries is sufficient [49], the universities studied have different specializations, territorial location, forms of ownership, which indicates the representativeness of the sample. The questionnaire involved a 10-point rating; the questions addressed the development of students' professional competencies and the factors that motivate learning and competency development. The more the respondent agreed with the question, the score increased from "0" to "10". A score of "0" meant disagreement with the question, "10" meant absolute agreement. The questionnaire is given at the link [47].

The list of questions for assessing the level of professional competencies was formed on the basis of the component composition we argued: knowledge, experience, value and meaningful content of learning, emotional and volitional regulation, readiness. The list of questions to assess the factors motivating learning and competency development is formed:

1) Based on the theory of goal achievement and human needs. These theories were used because the motives of activity are determined by its goals and human needs [44]. According to the goal attainment theory a distinction is made between mastery-oriented goals when the main motive of learning for the student is the desire to improve, self-development, and result-oriented goals: future employment, the opportunity to participate in international student exchange programs, recognition [11]. The content of these two groups of motives is defined in more detail according to the hierarchy of needs [50].

2) Based on the division of motivation into intrinsic, which is determined by the desire to learn, interest in learning, and extrinsic, according to which the sources of learning motives are outside the learning process [44].

The reliability of the questionnaire was checked by calculating the Cronbach's alpha coefficient [51] based on the scores of the survey questions in *Statistica* 12.0 software:

- 0.85 for Russia and 0.79 for Indonesia on questions assessing students' professional competencies;

- On the evaluation of motivation factors for the development of professional competencies 0.88 for Russia and 0.82 for Indonesia.

The values of the coefficients testify to the reliability of the questionnaire, as they are in the interval *[0.7; 0.9]* [51].

3-2- Assessment of the Students' Professional Competencies Formation

To assess the formation of students' professional competencies in each of the universities under study, expert groups consisting of the Vice-Rector for Scientific and Pedagogical Affairs, members of the methodological commission of universities, members of the methodological commission of faculties (research centers) of universities, and heads of departments, were formed. The number of expert groups was 40 people for each university. These expert groups developed tasks for assessing students' professional competencies by components: knowledge (theoretical training), experience (practical training), value and meaning, emotional and volitional regulation, readiness (mobility, adaptability) and task assessment criteria. Using these tasks, the development of students' professional competencies was assessed separately according to the indicated components. Each component of professional competency development was assessed from "0" to "10" points, as in the self-assessment. The students performed the tasks developed by the expert groups in the same period as the self-assessment of professional competencies, and the procedure is described in 3.1. The students who took part in the questionnaire and who completed the tasks are the same. The same composition of competencies, the same range of assessments in self-assessment of competencies by students and assessment by the expert group provided a possibility to compare the results obtained and to determine the students' awareness of the formed competencies.

The tasks for students' competencies assessment by the expert group were developed by professors and university representatives who are engaged in the organization of the educational process, have relevant experience and competencies, which ensured the objectivity of the results of students' competencies assessment.

3-3- Integral Assessment of the Development of Professional Competencies of Students Based on the Results of Self-Assessment

The necessity of integral assessment is caused by the fact that professional competency, as it was justified above, represents an integral value. To determine the integral indicator of professional competencies development according to the results of self-assessment, additive convolution was used, weight coefficients of particular indicators were determined by the expert group described above. The expert assessment was anonymous.

Before the weight coefficients were determined, partial indicators (scores on the questionnaire questions) were checked for the interrelation between them using correlation analysis in *Statistica* 12.0 program. This check was carried out to avoid multicollinearity in the integral model. In each group of particular indicators, between which there was a statistically significant relationship, for the integral model we used 1 indicator, which according to experts are the most significant.

The ranking determines the weight coefficients of individual indicators. The rank "1" corresponds to the most significant indicator when assessing the professional competency of students. The ranks given by an individual respondent were not duplicated. The consistency of the experts' opinions was ensured by using the Delphi method [52]. Consistency is evident from a concordance coefficient of 0.77 [53]. The weigh coefficients of the indicators were determined according to Fishburn's rule [54]. The integral model of students' professional competency assessment has the following form:

$$Comp_j = \sum_{i=1}^{n} \frac{2 \times (n - r_i + 1)}{n \times (n+1)} \times b_{ij} \qquad (1)$$

where *Comp_j* is an integral indicator of the development of professional competencies of the *j*-th student; r_i is a

significance rank of the i-st indicator (component) of the development of professional competencies of students; b_{ij} is a development score of the i-st component of professional competencies for the j-th student; n is a number of components of students' professional competencies.

The tasks for assessing students' professional competencies by the expert group and their assessment criteria differed depending on the specialty, curriculum, and educational programs. Therefore, there is no unified formula for calculating the integral indicator for these tasks. The way of calculating the integral assessment of professional competencies development was determined by the expert group taking into account the fact that the range of integral indicator values is from "0" to "10" points.

3-4- Determining the Stages of Development of Students' Professional Competencies

Cluster analysis was used to determine the stages of professional competencies development, namely the method of hierarchical clustering and k-means in *Statistica* 12.0 software. The clustering was carried out based on assessments of professional competencies components development according to expert group evaluation results. The indicators having statistically significant clustering ability were determined by the results of the analysis of variance. These indicators, for which inter-group variance exceeds intra-group variance, empirical values of F-criterion are higher than critical ones, error level (*signif. p*) does not exceed 0.05. Fulfillment of these criteria for all indicators, based on which cluster analysis was carried out, testifies to its adequacy. The sample for clustering included all student evaluations for 2018-2021.

Based on the cluster analysis, the number, composition of clusters (students with certain indicators of development of professional competencies) and characteristics of these clusters were determined. The cluster data formed the basis for the possibility of diversifying the stages of development of professional competencies. The sample for the analysis presents students' scores, which are minimum ("0" points) and maximum ("10" points) possible, on certain tasks. In this regard, it can be stated that the clusters formed by the results of the analysis reflect all the stages of students' professional competencies development.

3-5- Determining the Priority Learning Motives Of Students Depending on the Stages of Development of Their Professional Competencies

Russia and Indonesia are representatives of different levels of education quality in terms of the characteristics of national education systems that reflect the degree of compliance of the actual achieved educational results with regulatory requirements, social and personal expectations. The TOP-1000 World University Rankings 2022 [55] includes 18 Russian universities with a country's population of 144.1 million in 2020 and one Indonesian university with a population 1.9 times larger (273.52 million) [56]. These countries are characterized by different deficiencies in the functioning of the education system [57, 58] and cultural characteristics [59]. The assessments obtained from the questionnaire results were used as 2 data sets, separately for Russia and Indonesia, when building regression models to assess the impact of motivation factors on students' professional competencies.

Using the Granger causality test [60] in *EViews 10* software, the presence of causal relationships between motivation factors and competencies was checked to determine the priority of the influence of motivation factors on the development of professional competencies. The application of the Granger test was made possible because of the stationarity of the data, verified by the extended Dickey-Fuller test, or bringing the data to a stationary form [60].

Diversification of students' learning motives depending on the stages of their professional competency development involved the construction of linear regression models using the least-squares method in *EViews* 10 software. The dependent variable was the integral indicator of students' professional competencies development according to the results of expert group assessment, the independent variables were the motivation indicators (scores based on questions regarding the factors motivating learning and competency development). The models were built according to each stage of professional competency development. The construction of linear models was possible due to the normal law distribution of variables and the absence of outliers (tested by Dixon's criterion) [61].

Priority of motivation factors was determined based on t-criterion and p-value for independent variables. Adequacy of the constructed models is ensured by exceeding the empirical values of F-criterion and t-criterion modulo over the critical ones at significance level 0.05, p-value not exceeding 0.05, normal law of residuals distribution (Normality Test Prob. above 0.05), the correct choice of regression model type (Ramsey Test Prob. above 0.05), absence of heteroscedasticity in the models (Heteroskedasticity Test Prob. above 0.05) [62, 63].

To test *Hypothesis 2* a synthetic indicator of imbalance between the development of intrinsic and extrinsic factors was calculated for each respondent. In case the development of intrinsic motivation factors exceeds the development of extrinsic factors Imb_i is the ratio of the average point estimate of the development of intrinsic factors for the respondent to the average point estimate of the development of extrinsic factors. In case the development of extrinsic factors exceeds the development of intrinsic factors Imb_e is the ratio of the average development score of extrinsic factors to the average development score of intrinsic factors. Regression models are used to estimate the impact of imbalance indicators on

the integral indicator of professional competencies development, calculated according to the results of the expert group assessment.

4- Results

4-1- Development of Professional Competencies of Students as Assessed By the Expert Group

The results of the assessment of professional competencies development by the expert group testified that in Russia the development of professional competencies for the 4th year students is close to the potential level ("10" points) taking into account the fact that the survey was conducted in the 1st academic semester, that is there is still a potential for the growth of competency indicators by the end of the 4th year (Table 2).

Table 2. Assessment of the students' professional competencies development of Russian and Indonesian universities by the expert group (points)

Components of professional competency	1 year		2 year		3 year		4 year
	1 semester 2018/2019	2 semester 2018/2019	1 semester 2019/2020	2 semester 2019/2020	1 semester 2020/2021	2 semester 2020/2021	1 semester 2021/2022
Universities in Russia							
Knowledge (theoretical training)	1.4	2.5	3.5	3.8	6.1	7.8	8.3
Experience (practical training)	1.0	2.0	2.4	2.5	5.1	6.5	7.4
Value and meaning component	2.9	4.4	5.2	5.4	8.0	8.2	8.5
Emotional and volitional regulation	1.4	2.2	2.4	2.9	5.9	7.6	8.1
Readiness (mobility, adaptiveness)	1.4	2.6	2.6	2.9	5.5	7.5	8.2
Integral indicator of professional competency development	1.5	2.6	3.2	3.5	5.9	7.4	7.9
Universities in Indonesia							
Knowledge (theoretical training)	0.6	1.3	1.5	1.5	2.8	3.9	4.5
Experience (practical training)	0.6	1.0	1.0	1.0	1.7	1.9	2.0
Value and meaning component	2.4	3.7	4.4	4.5	6.3	6.5	6.7
Emotional and volitional regulation	1.1	2.0	2.5	2.6	5.2	5.6	6.0
Readiness (mobility, adaptiveness)	1.2	1.9	2.3	2.5	4.5	5.9	6.3
Integral indicator of professional competency development	0.9	1.6	1.8	1.9	3.2	3.9	4.3

This means that professional training in the Russian universities, which were used as the base of the study, is at a high level. According to the components of professional competencies, the value and meaning component is the most developed during all the courses. This competency reflects students' interest in learning, awareness and comprehension of value and importance of learning. Learning turns out to be not formal in nature and does not pursue the main goal of getting a diploma of higher education, but is aimed at obtaining knowledge, skills, nurturing other characteristics necessary for professional fulfillment. The indicators of theoretical training, emotional-volitional regulation, and readiness also exceed "8" for the 4th year students. These groups of competencies indicate that Russian universities provide a high level of theoretical training. Training contributes to the development of emotional-volitional regulation, which is the ability to control your emotions and the whole course of the working discussion, the ability to shift the emphasis of communication in your favor. A high level of readiness indicates professional flexibility of future specialists, readiness to communicate on different topics that are included in their competence, speed of response to changing conditions of the working environment. The lowest level of development on the practical training component is "2" points for 1st-year students, "7.4" points for 4th-year students. This is a component, which is responsible for the practical training of students and, as the results of the expert evaluation showed, is the most significant in professional implementation. In this regard, it is necessary to implement a more practice-oriented approach to the organization of the educational process: more practices at real objects, in real conditions, more simulations aimed at simulating the behavior of students in conditions close to the real ones.

In Indonesia, all components of professional competencies are at a lower level. For 4th year students, the level of knowledge is 1.8 times lower in comparison to Russian universities, the level of development of the value and meaning component, emotional-volitional regulation and readiness is 1.3-1.4 times lower. The most significant gap between the countries is observed in the formation of practical competencies. This component of competencies for 4th-year students in Indonesia is 3.7 times less developed than in Russia. The results obtained can be interpreted by the fact that in Indonesia the level of professional training of teachers is low, theoretical material is usually detached from practical realities, teaching procedure is focused on rote learning, and innovative teaching methods are not used.

Among the students of Indonesian universities, the most developed is the value and meaning component, which is estimated at an average of "6.7" points for 4th-year students. However, the development of this component of competency is not the merit of the higher education system, but a consequence of the mental and religious characteristics of the nation, which implies gratitude and the ability to appreciate what is.

The values of the integral indicator of the development of professional competencies according to the results of the expert group assessment testified that for Russian 4th-year students' professional competencies reach "7.9" points from possible "10", for Indonesian students they reach "4.3" points (Table 2). The gap between the actual and potential levels indicates the need to improve the quality of education in the universities of both countries, especially with regard to the development of practical skills in students.

4-2- Differentiation of Stages of Development of Students' Professional Competencies

Integral and partial indicators of professional competencies development (Table 2) on average for Russia and Indonesia have ascending dynamics, which indicates a constant development of students' professional competencies (Figure 4, trajectory "A"). However, the analysis of individual respondents' assessments has shown that the development of competencies has wave-like dynamics: growth and stagnation (in some cases, decline) stages alternate along with trajectory "B" (Figure 4), which is reflected through the stages of professional competency development.

When determining the stages of professional competency development in the process of clustering, the values of the indicators of students' professional competency component development were used (Table 3), determined by the results of expert group assessment. The clustering ability of these indicators is confirmed by the data in Table 3.

Table 3. Indicators used for clustering to determine the stages of students' professional competencies development and their statistical significance

Indicator (competency component)	Indicators of clustering ability of indicators			
	Intergroup variance	Intra-group variance	F-criterion (empirical)*	signif. p
Knowledge (theoretical training)	93.63	30.52	5.84	0.00
Experience (practical training)	46.25	11.54	25.63	0.00
Value and meaning component	13.24	9.62	9.43	0.00
Emotional and volitional regulation	19.64	10.05	4.34	0.01

* Critical value of F-criterion at a significance level of 0.05 was 2.60 [62]

Inter-group dispersion by indicators exceeds intra-group dispersion; empirical values of F-criterion exceed the critical one; error level is lower than 5%. This indicates the adequacy of the cluster analysis, which statistically confirmed the existence of stages of students' professional competency development on the example of universities in Russia and Indonesia. The use of cluster analysis allowed us to identify and substantiate the existence of stages between which there are statistically significant differences in the levels of development of professional competencies (Figure 5).
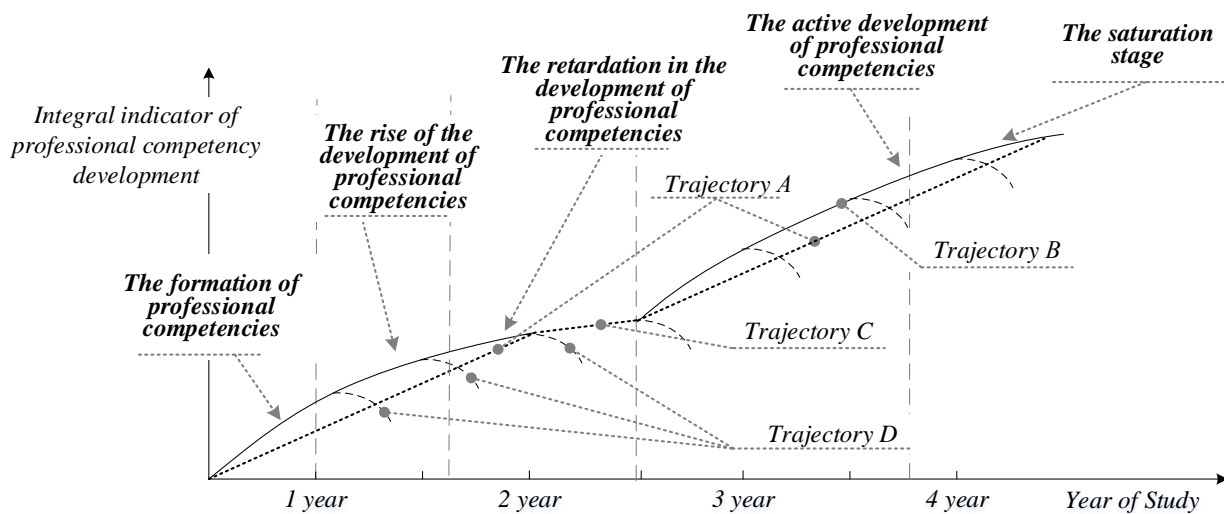

Figure 5. Stages of professional competency development among Russian and Indonesian university students: Trajectory A - general upward dynamics of students' professional competency development; Trajectory B - individual dynamics of students' professional competency development; Trajectory C - dynamics of students' professional competency development under the influence of COVID-19 pandemic; Trajectory D - descending dynamics of professional competency development for students expelled from universities.

Based on the findings the following stages of students' professional competency development might be differentiated:

- The formation of professional competencies. This stage is characterized by low indicators of professional competencies development and is typical mainly for the 1st year students in the 1st semester. This stage is the starting point in the development of professional competencies. The values of the integral indicator of professional competencies development at this stage do not exceed "1.7" in Russia and "1.1" in Indonesia;

- The rise of the development of professional competencies is typical mainly for the 1st year students of the 2nd semester with the level of the integral indicator of professional competencies development *[2.0; 2.7]* for Russia, *[1.3; 1.6]* for Indonesia. This stage is characterized by higher growth rates of professional competencies in comparison with the previous stage;

- The *retardation* in the development of professional competencies. This stage is typical for the 1st semester of the 2nd year. The value of the integral indicator of professional competencies for this stage is *[3.1; 3.3]* for Russian university students and *[1.7; 1.9]* for Indonesia. This pattern is caused by the slowdown in the level of theoretical and practical training, as well as the value and meaning component, which may be explained by the fact that the first-year students study mostly general disciplines, which contribute more to the development of general competencies, rather than professional ones. As a consequence, the interest in learning is reduced, which slows down the growth of the value and meaning component;

- The *active development* of professional competencies. This stage is characterized by significantly higher indicators of professional competencies development and a significant increase in the level of competencies. It is typical for the 3rd year students with the level of the integral indicator of professional competencies development *[5.1; 7.2]* in Russia, and *[2.4; 3.7]* in Indonesia;

- The *saturation* stage. This stage is typical mainly for 4th year students. It is characterized by a slowdown in the development of professional competencies. The value of the integral indicator of professional competencies for this stage is *[7.7; 8.0]* for Russia and *[4.1; 4.5]* for Indonesia. The slowdown in the development of professional competencies in the fourth year is caused by the fact that students already possess a considerable volume of knowledge, skills, and in this connection, the interest in study decreases and the development of professional competencies slows down.

The highlighted ranges of integral indicator values are generalized and reflect the general trend, but can also be used to assess the development of professional competencies for each individual student.

Some students stick to the "D" trajectory (Figure 5). These are students who were expelled from universities, for whom the development of professional competencies within the university has been stopped. The results of the cluster analysis did not reflect those students who were expelled (Figure 4, trajectory "D"), because they did not participate in the survey. For these students' professional competencies stop developing, are at the same level for an insignificant period, then degrade, provided that these students do not re-enroll in the university, do not take courses, training to improve the level of competencies, etc. These changes are not reflected as a stage of professional competencies development, as they occur outside the educational process.

The results of the evaluation in the 2nd semester of the 2nd year testified to a very insignificant increase in the indicators of professional competencies in comparison to the 1st semester (see trajectory "C"; Figure 5). For Russian universities, the increase was 3-7% for the components of theoretical, practical training, value and meaning component. The indicators of emotional-volitional regulation grew by 18%, and readiness grew by 11%. For Indonesian universities, the increase does not exceed 6%, and for the component of practical training it is close to "0". The slowdown in competency development is due to the negative impact of the COVID-19 pandemic on the educational process. Universities switched to distance learning and time was needed to make changes in the educational process, to adapt students and teachers to the new form of education.

The stage of the most significant growth retardation, which corresponds to trajectory C (Figure 5), as a stage of professional competencies development is not highlighted because changes in the dynamics of competencies development are caused by force majeure circumstances.

4-3- Integral Indicator of Awareness of the Development of Professional Competencies (Based on Self-Assessment)

The method of expert evaluation determined that the most significant indicators of the development of the students' professional competencies according to the results of self-assessment are the following:

- The ability to use the skills learned as a result of training in the course of work (weighting factor value 0.158);

- Continuous development of practical skills (weighting factor value 0.148).

- Practical skills are followed by theoretical training in terms of importance in the formation of professional competencies:

- The conformity of the knowledge provided by universities with the requirements of the labor market (weighting factor value 0.098);

- The importance and usefulness of the acquired knowledge, satisfaction with the amount of knowledge received at the university, and its sufficiency for professional implementation (the value of the weight coefficients is 0.088).

Other components of students' professional competencies are less significant and are given in Appendix I.

The calculated values of the integral indicator of students' professional competencies development according to the results of self-assessment are shown in Table 4.

Table 4. Indicators of professional competencies development of students in Russian and Indonesian Universities

Indicator	1 year		2 year		3 year		4 year
	1 semester 2018/19	2 semester 2018/19	1 semester 2019/20	2 semester 2019/20	1 semester 2018/19	2 semester 2018/19	1 semester 2019/20
Universities in Russia							
Integral indicator of professional competencies development according to the results of expert group assessment (points).	1.5	2.6	3.2	3.5	5.9	7.4	7.9
Integral indicator of professional competencies development according to the results of self-assessment (points).	2.6	3.2	3.4	3.4	5.7	7.2	6.4
Deviation of values of the integral indicator calculated according to the results of self-assessment from the indicator calculated by the expert group (%).	73.3	23.1	6.2	-2.9	-3.4	-2.7	-19.0
Universities in Indonesia							
Integral indicator of professional competencies development according to the results of expert group assessment (points).	0.9	1.6	1.8	1.9	3.2	3.9	4.3
Integral indicator of professional competencies development according to the results of self-assessment (points).	1.9	2.3	2.1	1.9	3.3	3.8	3.8
Deviation of values of the integral indicator calculated according to the results of self-assessment from the indicator calculated by the expert group (%).	111.1	43.8	16.7	0.0	3.1	-2.6	-11.6

Integral indicators of professional competencies development according to the results of expert group assessment and self-assessment results are measured in the same range and are aimed at assessing the competencies of the same students on the same components. This made it possible to ensure the comparability of indicators. The results showed that for the students of the countries under study, during the 1st year and in the 1st semester of the 2nd year, there is an overestimation of self-assessment of professional competencies. In the 2nd semester of the 2nd year and during the 3rd year the deviation of the integral indicator does not exceed 3.4%. Differences in the values of integral indicators of professional competencies development, calculated based on self-assessment and expert group, are statistically insignificant according to t-criterion [62]. This is indicative of students' unbiased self-assessment. During the 4th year, students' self-assessment of their competencies level is underestimated. An explanation for the results obtained can be found in Noel Burch's classical model of professional competencies development or the four-link spiral of professional competencies development. The development begins with unawareness of incompetence, which is expressed in students' overestimation of their competencies (1st year, 1st semester of 2nd year). This is followed by an awareness of incompetence and competence, which corresponds to the period from the 2nd semester of the 2nd year to the end of the 3rd year. At the beginning of this interval, the level of students' competencies development is at a lower level ("3.5" for Russia and "1.9" for Indonesia). It is possible to draw an analogy with "incompetence" according to Noel Burch's classical model or the four-link spiral of professional competence development. At the end of the awareness period, professional competency is at a higher level (7.4 points for Russia and 3.9 for Indonesia), which corresponds to realized competency. Awareness is replaced by non-conscious competence, which is characterized by underestimation of students' self-assessment of professional competencies in the 4th year of study.

The obtained results indicate a consistent change in the stages of "unconscious incompetence", "conscious incompetence", "conscious competence", and "unconscious competence". The study of the stages of professional competencies development testified to the presence of general ascending dynamics of students' professional competencies development. This indicates the nature of the unfolding spiral in the development of professional competencies, which confirms *Hypothesis 1*.

4-4- Motivation Factors for the Development of Students' Professional Competencies

The assessment of motivation factors for the development of professional competencies of Russian and Indonesian university students showed a higher level of intrinsic motivation for Russia and a higher level of extrinsic motivation for Indonesia (Appendix I).

- For Russian students the most significant intrinsic motivators are:

- Desire to develop professional abilities in the process of learning. The average value of the strength of this motive for a sample of Russian students for 4 years of study is estimated at "8.4" points;

- Aspiration to achieve high results in studies is estimated at "8.2" points;

- Striving to develop thinking, creativity, to increase their intellectual level is "7.8" scores;

- Desire to learn something new is "7.5" points;

- Interest in the learning process itself is"7.2"points.

Motivation factors, which characterize pleasure in the learning process, in solving difficult tasks, are lower developed for Russian students ("4.9" and "5.6" scores, respectively). The established priority of motivation factors development indicates that Russian university students are characterized by the result-oriented approach to learning, whereby they are more focused on getting the result than on the process itself. Throughout the period of learning, there is a dynamics of increasing the importance of result-oriented motivation factors. The reason for this is the growth of students' awareness of the chosen qualification, as well as the understanding of its significance and value of competencies obtained in the process of learning. The values of the factors, which characterize interest in the learning process, taking pleasure in it and in solving difficult tasks, decreased during the period between 2nd semester of the 1st year and the 2nd semester of the 2nd year. Then that they began to increase during the 3rd and 4th courses.

Calculated by intrinsic motivation factors, the average score for the sample of Russian university students has a growth dynamics (from "6.8" points in the 1st year to "7.7" in the 4th year), which indicates an increase in the level of students' motivation in the learning process.

For students in Indonesia among the internal motives the more developed are:

- Desire to achieve high results in studies ("7.4" score on a sample of students for the whole period of study);

- Striving to learn something new ("7.1" points);

- Development of thinking, creativity, increase of intellectual level ("6.8" points);

- Interest in the learning process ("6.6" points);

- Taking pleasure in the learning process ("6.6" points);

- Desire to develop professional abilities ("6.5" points).

The significance of the pleasure taken in solving difficult tasks as a factor of motivation was estimated on average at "4.4" points. The obtained results indicate that in Indonesia students have a more balanced position in relation to the intrinsic motivation of learning: the highest priorities have motivation factors, which include the orientation to the result and the process itself. The average indicator of intrinsic motivation development, like in Russia, has an ascending tendency: from "6.2" score in the 1st semester of the 1st year to "6.9" in the 1st semester of the 4th year.

The priority of extrinsic motives intersects with the priority of intrinsic ones. According to the result-oriented approach, the more significant factors of extrinsic motivation for Russian university students are:

- Need to study in order to support oneself financially ("7" points);

- Opportunity for self-realization as a student ("6.6" points);

- Opportunity to occupy a worthy place in society ("6.4" points);

- Opportunity to get respect and recognition ("6.4" points);

- Pressure from parents, friends, environment ("6" points).

For students in Indonesia, the main extrinsic motive, far ahead of the others, is faith. The highest scores were obtained for the following questions:

- "Do you believe that faith motivates you to do your assignments conscientiously, to be diligent and thereby develop professional competencies?" ("9.6" points);

- "Is it your conscience that prevents you from doing your assignments in bad faith, from violating the rules of academic integrity?" ("9.4" points).

Less significant motives are an opportunity to receive praise, awards, recognition ("8.8" points), fear to be reprimanded, to be shamed ("8.6" points), an opportunity to self-fulfilment as a student ("7.2" points).

The intrinsic factors of motivation for the researched countries are mostly identical only with different priorities. The extrinsic factors differ dramatically, which is related, first, to different religious beliefs. The dynamics of development of extrinsic motivation factors in the countries under study has an upward trend: for Russia the growth of the average indicator of extrinsic motivation development from "4.6" points in the 1st semester of the 1st year to "5.1" points in the 1st semester of the 4th year, for Indonesia the growth is from "6.3" to "6.9" points. The results of the causal relationship test between motivation factors and the indicator of professional competencies development are presented in Table 5. The table shows statistically significant causal relationships between the indicators.

Table 5. Significant causal relationships between motivation factors and integral indicators of professional competencies development according to Granger's test

Cause and effect relationship	Probability*	Cause and effect relationship	Probability*	Cause and effect relationship	Probability*
		Russia			
Prof → Mat	0.00	Intel → Self	0.02	Res → Respect	0.01
Res → Mat	0.01	Prof → Soc	0.00	Intel → Respect	0.01
Intel → Mat	0.00	Res → Soc	0.02	New → Self	0.01
Prof → Self	0.02	Intel → Soc	0.00	Inter → Self	0.04
Res → Self	0.01	Prof → Respect	0.00	Inter → Intel	0.04
		Indonesia			
Rel → Inter	0.04	Cons → Res	0.01	Award → Intel	0.00
Cons → Inter	0.03	Rel → Prof	0.01	Fear → Res	0.02
Rel → New	0.00	Cons → Prof	0.01	Fear → New	0.00
Cons → New	0.00	Rel → Intel	0.04	Fear → Intel	0.00
Rel → Pleas	0.00	Cons → Intel	0.00	Pleas → Intel	0.04
Cons → Pleas	0.00	Award → Res	0.00	Inter → Intel	0.02
Rel → Res	0.02	Award → New	0.00		

* probability that the causal relationships between the indicators are statistically insignificant; Prof is an aspiration to develop professional abilities in the process of learning; Res is an aspiration to achieve high results in learning; Intel is an aspiration to develop thinking, creativity, increase their intellectual level; New is a desire to learn something new; Inter is an interest in the learning process; Pleas is an aspiration to enjoy the learning process; Rel is faith (religion); Cons is conscience; Mat is an opportunity to provide financially; Self is an opportunity for self-actualization.

Table 6 presents the regression model for the influence of motivation factors on the development of professional competencies of university students in Russia and Indonesia. The regression model for the relationship between motivation factors and the development of professional competencies is presented for each of the five stages of professional competency development. Since there exists a significant relationship between intrinsic and extrinsic motivation factors, which can lead to multicollinearity of the models, the models are built separately for assessing intrinsic and extrinsic motivations.

Table 6. Regression models of assessing the influence of motivation factors on the development of professional competencies of university students in Russia and Indonesia

Model	Indicators of model adequacy			
	F-statistic	Normality Test Prob.	Heteroskedasticity Test Prob.	Ramsey Test Prob.
		Russia		
		The stage of professional competencies formation		
Compi =0.82×New+0.66×Intel-8.84 (4.63)*(3.35)	5.73	0.56	0.82	0.36
Compe = 0.85×Par-4.51 (4.92)	6.03	0.72	0.44	0.78
		Stage of rise in the development of professional competencies		
Compi = 0.34×Res+0.26×New+0.13×Intel-2.93 (3.58) (3.11) (3.04)	5.57	0.93	0.68	0.75
Compe =0.24×Par +0.19×Self-0.22 (3.63) (3.36)	8.63	0.84	0.74	0.83
		The stage of retardation in the development of professional competencies		
Compi = 0.33×Inter + 0.12×New+0.10 (4.64) (3.03)	9.10	0.44	0.84	0.68
Compe = 0.35×Self + 0.20×Respect-0.22 (4.82) (3.57)	11.45	0.47	0.79	0.90

Compb = -0.33×Imbi + 3.65 (-3.25)	5.83	0.84	0.86	0.68
Compb = -0.28×Imbe +3.45 (-3.01)	7.23	0.45	0.63	0.55
Stage of active development of professional competencies				
Compi = 0.39×Prof+0.23×Res+0.21×Intel-0.38 (3.56) (3.21) (3.09)	14.62	0.74	0.88	0.85
Compe = 0.40×Mat+0.30×Self +0.24×Soc-0.12 (4.70) (3.72) (3.11)	7.21	0.59	0.50	0.89
The stage of saturation of the level of professional competencies				
Compi = 0.36×Inter + 0.30×New + 0.27×Prof+0.13 (4.04) (3.36) (2.98)	8.72	0.94	0.70	0.62
Compe = 0.65×Self +0.52×Respect-0.23 (4.95) (4.11)	9.09	0.69	0.71	0.75
Compb = -0.26×Imbi +8.27 (-3.11)	11.64	0.66	0.89	0.33
Compb = -0.19×Imbe +8.09 (-2.89)	9.03	0.74	0.45	0.84
Indonesia				
The stage of professional competencies formation				
Compi = 0.44×New + 0.42×Intel-4.75 (3.94) (3.75)	7.02	0.88	0.71	0.32
Compe = 0.88×Rel+0.83×Cons-14.64 (4.17) (3.95)	15.62	0.50	0.84	0.48
Stage of rise in the development of professional competencies				
Compi = 0.52×Res+0.41×Intel-4.75 (3.82) (2.98)	11.63	0.93	0.72	0.43
Compe = 0.42×Rel+0.40×Cons+0.18×Award-7.54 (5.79) (5.25) (3.00)	73.25	0.62	0.90	0.84
The stage of retardation in the development of professional competencies				
Compi =0.35×Inter +0.31×Pleas+0.22×New-3.28 (4.06) (3.70) (3.16)	50.52	0.66	0.72	0.52
Compe=0.35×Rel+0.30×Cons+0.20×Self+0.11×Award-6.64 (4.15) (3.96) (3.13) (2.99)	44.60	0.94	0.70	0.55
Compb = -0.21×Imbi +2.04 (-3.48)	10.42	0.82	0.94	0.90
Compb = -0.73×Imbe +2.54 (-6.05)	11.07	0.67	0.88	0.84
Stage of active development of professional competencies				
Compi =0.36×Res+0.31×Prof+0.24×Intel-3.02 (4.01) (3.85) (3.05)	28.47	0.78	0.92	0.84
Compe=0.35×Rel+0.31×Cons+0.19×Award+0.15×Fear-5.83 (4.00) (3.77) (3.29) (3.06)	10.65	0.50	0.83	0.88
The stage of saturation of the level of professional competencies				
Compi=0.31×Inter+0.29×Pleas+0.23×New+0.21×Prof-2.35 (4.28) (4.01) (3.70) (3.21)	29.69	0.73	0.70	0.94
Compe =0.34×Rel+0.29×Cons+0.23×Self+0.19×Fear-5.31 (3.67) (3.40) (3.11) (2.95)	17.33	0.60	0.83	0.69
Compb = -0.11×Imbi +4.39 (-3.03)	36.25	0.78	0.91	0.82
Compb = -0.34×Imbe +4.62 (-4.58)	22.84	0.67	0.85	0.90

* Parentheses contain the empirical values of the t-test of independent variables; critical values of t-test were 1.96-1.97, critical values of F-statistic were 2.38-3.89 at p=0.05 [62]; Compi is a model for assessing the influence of intrinsic motivation factors on the development of students' professional competencies; Compe is a model for assessing the impact of extrinsic motivation factors on the development of students' professional competencies; Compb is a model for assessing the impact of the balance between intrinsic and extrinsic motivation of students on the development of professional competencies; Intel is the desire to develop thinking, creativity, increase your intellectual level; New is the desire to learn something new; Par is pressure from parents, friends, environment; Res is the desire to achieve high results in studies; Self is an opportunity to fulfill oneself as a student; Inter is interest in the learning process; Respect is an opportunity to gain respect and recognition; Prof is the desire to develop professional abilities in the learning process; Mat is the ability to financially provide for oneself; Soc is the opportunity to take a worthy place in society; Rel is faith (religion); Cons is conscience; Award is praise, awards, recognition of results; Pleas is the desire to enjoy the learning process; Fear is fear of being reprimanded, of being put to shame; Imb is an indicator of imbalance in the development of intrinsic and extrinsic motivation factors: in the case of an excess of the development of intrinsic motivation factors over extrinsic ones (Imbi), in the case of an excess of the development of extrinsic factors over intrinsic ones (Imbe).

The following factors have been established for students studying at Russian universities that motivate students to develop their professional competencies:

- The stage of formation of professional competencies. Intrinsic, such as the desire to learn something new and the desire to develop thinking, creativity, increase their intellectual level. When listed the factors of motivation influencing the development of professional competencies are given in decreasing order of priority. Extrinsic: pressure from parents, friends, environment.

- The stage of rise in the development of professional competencies. Intrinsic: aspiration to achieve high results in studies, aspiration to learn something new, aspiration to develop thinking, creativity, to increase one's intellectual level. Extrinsic: pressure from parents, friends, surroundings, the possibility of self-actualization as a student.

- The stage of retardation of the development of professional competencies. Intrinsic: interest in the learning process, desire to learn something new. Extrinsic: an opportunity for self-actualization while being a student, an opportunity to gain respect and recognition.

- The stage of active development of professional competencies. Intrinsic: the desire to develop professional abilities in the process of learning, the desire to achieve high results in learning, the desire to develop thinking, creativity, increase the intellectual level. Extrinsic: the need to study to provide themselves financially, the possibility of self-fulfilment, the opportunity to take a worthy place in society.

- The stage of saturation of the level of professional competencies. Intrinsic: interest in the learning process, aspiration to learn something new, aspiration to develop professional abilities. Extrinsic: the possibility of self-realization, the opportunity to gain respect and recognition.

The factors of motivation to learn for university students in Indonesia according to the trajectory of development of professional competencies are as follows:

- The stage of formation of professional competencies. Intrinsic: the desire to learn something new, the desire to develop thinking, creativity, increase their intellectual level. Extrinsic: faith, conscience.

- The stage of ascent in the development of professional competencies. Intrinsic: aspiration to achieve high results in the study, aspiration to develop thinking, creativity, to increase the intellectual level. Extrinsic: faith, conscience, opportunity to receive praise, awards, recognition of results.

- The stage of the slow development of professional competencies. Intrinsic: interest in the learning process, getting pleasure from learning, striving to learn something new. Extrinsic: belief, conscience, the opportunity for self-actualization while being a student, opportunity to receive praise, awards, recognition of results.

- The stage of active development of professional competencies. Intrinsic: aspiration to achieve high results in the study, aspiration to develop professional abilities in the process of study, aspiration to develop thinking, creativity, to increase the intellectual level. Extrinsic: belief, conscience, possibility to receive praise, awards, recognition of results, fear to be reprimanded.

- The stage of saturation of the level of professional competency. Intrinsic: interest in the process of learning, getting pleasure from learning, aspiration to learn something new, aspiration to develop professional abilities. Extrinsic: faith, conscience, the possibility of self-fulfilment, fear of being reprimanded.

According to the regression models (Table 6), the balance between the development of intrinsic and extrinsic motivation factors has a statistically significant impact on the development of professional competencies of students of Russian and Indonesian universities at the stages of slowing down the development of professional competencies and saturation of professional competencies level. The given models of assessing the impact of the balance between the intrinsic and extrinsic motivation of students on the development of professional competencies testified the restraining effect on the development of students' competencies as an excess of intrinsic motivation factors development over extrinsic, as well as an excess of extrinsic over intrinsic.

5- Discussion

Within the framework of the competency-based approach, we substantiated the integrated structure of students' professional competency, which implies developing the following components everywhere in the process of educational activity: knowledge, experience, value, emotional-volitional regulation, readiness. The proposed structure reflects the integral nature of the formation of professional competencies in education, which agrees with such studies as [18, 19, 27], reflecting the multi-component professional and personal development of students. However, in contrast to the existing approaches to the justification of the structure of professional competencies, we singled out in the framework of personal development the competencies of readiness and self-regulation of students, as the basis that ensures the practical implementation of the formed skills and knowledge. This structure allows managing the formation and

development of professional competencies more effectively in view of the fact that it takes into account: the direction of students' development as a person and as a specialist in a particular area, inclination and needs, as well as self-assessment, self-presentation and self-perception. It allows the most accurate assessment of the development of professional competency within each of its components, which can significantly increase the effectiveness of the competency-based approach in education, changes the target orientations: from a knowledgeable student to a skilful one, from a prepared student to one who can learn.

The econometric assessment methods made it possible to substantiate the spiral nature of students' professional competencies development as there is a transition of quantitative changes (accumulation of knowledge, skills over time) into qualitative parameters of professional competencies (readiness for practical application of accumulated knowledge and skills) and vice versa. This allowed confirming *Hypothesis 1*. The process of professional competencies development is structurally divided into separate, relatively independent stages. We substantiated a five-fold model of professional competency development (formation, rise, retardation, active growth and saturation), reflecting the non-linear nature of knowledge and skills development in contrast to the conceptual theories presented in the relevant scholarly literature [33]. Each subsequent stage is related to the previous phase of competency development, as the necessary levels of development of all its components to move to a higher level of development. That is, the development of professional competencies has a progressive, and not only linear, nature of development, as it reflects a sequential and gradual progression forward, upwards, i.e. from simple to complex, from lower to higher. The deepening of development means increasing the potential of the student, multiplying the possibilities, the successful realization of which is development.

Of course, it also seems necessary to consider the relationship between the linear and non-linear nature of professional competency development within each stage. Since competencies in the process of formation and development can have different development characters: change in the level of mastering skills (non-linear character), change in the volume of content (linear character: extension of types of skill of one competency) our subsequent research works will be just devoted to these issues, which will significantly expand the conceptual framework of competency-based approach in the field of education.

In the course of the study, we empirically determined the following tendency for students studying at Russian universities. Initially their parents, acquaintances, environment play a significant role in the motivation of students, but as the awareness grows, understanding of the need to learn, the interest in the learning process, getting the first positive results this factor becomes insignificant. At the stages of development (rise in development and active development), the significant factors are aspiration to achieve high results in learning, aspiration to develop thinking, creativity, to increase the intellectual level. From the stage of active development, the aspiration to develop professional abilities is significant. At the stages of retardation (when students do not see the importance of learning) and saturation (when students have accumulated certain baggage of knowledge and skills), the priority motives are interesting in the learning process, the opportunity to self-fulfil, the opportunity to gain respect and recognition.

We have also revealed that for the Russian university students the most significant are the intrinsic motivation factors. The aspiration to develop professional abilities in the process of learning, to achieve high results in studies, to develop thinking, creativity, to increase their intellectual level, are the basis for the formation of such external motives, as an opportunity to provide themselves financially, self-actualization, to take a worthy place in society, the opportunity to gain respect and recognition. The prerequisites of self-realization are also the desire to learn something new and interest in the learning process. The established connections are explained by the fact that an objective basis for the realization of the needs in self-realization, recognition, the satisfaction of material needs in the process of learning and after its completion are professional abilities, intellect and other professional competencies acquired in the process of learning. In the process of learning students form this understanding that for successful self-realization, recognition, material provision it is necessary for professional and personal development, which is reflected in the corresponding shift of priorities.

For students in Indonesia, the primary and more significant are external motives, which can probably be explained by the less developed system of education and its quality, the predominance of religious views in all spheres of life. The fundamental motives for the development of professional competencies are faith and conscience, which, according to the results, influence the manifestation of all significant internal motives. The desire to achieve high results in studies, to learn something new, to develop thinking, creativity, to increase intellectual level is also influenced by such external motives as an opportunity to receive praise, awards, recognition of results, fear to be reprimanded, to be shamed.

The obtained results give grounds to speak about differentiation and certain hierarchical structure of educational motivation factors in the process of professional competencies formation in accordance with the phases of their development and the form of motivation. This confirms the validity of *Hypothesis 4* but rejects *Hypothesis 2*. The obtained results allow us to conclude that it is possible that at the initial stage of professional compendium development students undoubtedly operate with external motivation (interest), but in the process of learning domination of motivation form as research shows depends more on factors of students' interaction environment: quality of education, social norms, level of socio-economic development, etc.

Differentiated influence of motivation factors allows one to form the strategy of development of professional competences more effectively in contrast to the provisions put forward in the theories [36, 37, 50] as it deepens understanding of the transcendence of motives of students in the educational process, to understand that at certain stages of the development of professional competencies, the influence of some motivation factors is not sufficient to ensure the continuous development of skills and knowledge, to prevent frustration in students, etc. The correct determination of the stage of development of the student's professional competency will allow us to influence the student's motivation more rationally to achieve the goals of a particular phase of development as well as select the most appropriate and effective mechanisms and tools to enhance students' motivation, determine the competency goals, and provide an individual approach.

Empirically, we found that during the retardation and saturation stages of professional competency development, the balance between the development of intrinsic and extrinsic motivation factors has a statistically significant impact on the development of professional competencies of students at Russian and Indonesian universities. The discouraging influence on the development of students' professional competencies is caused by the excess of intrinsic motivation factors over extrinsic ones and the excess of extrinsic over intrinsic ones. This suggests that *Hypothesis 3* is true. Motivation is the leading factor regulating the activities, behavior, and activities of an individual. Objectively, the same actions of students can have completely different reasons. Motivation sources for the same action can be different, so maintaining a balance between intrinsic and extrinsic motivation seems to be the most appropriate way to improve the effectiveness of the competency-based approach in education. Thus, approaches to student motivation within the competency-based approach should be flexible and change depending on clarification of goals, mission, and desired behavior of students according to a particular phase of professional competency development. Consideration of the differentiated nature of motivation factors' influence can contribute to the consistency of competency structure, motivational approaches, incentive systems, educational objectives, and information flows within the competency-based approach.

6- Conclusion

The study highlights the effectiveness of the motivation factors for university students in their professional competency development. The researcher directs attention towards the need to focus on the various extrinsic and intrinsic sources of motivation for the student to support their continued professional development. The findings of the study are relevant and unique as they provide an extensive substantiation of the dynamic characteristics of professional competencies and peculiarities of motivation factors in the field of education. The paper offers practical implications for teachers, educational institutions, and public administration by highlighting how the motivation of students can be tapped on to support the better development of their professional competencies. On the basis of the findings of the study, it is recommended that educational practitioners focus on the mechanisms to improve the motivation of their students towards learning and professional development rather than merely focusing on the technical content of their programs.

Since the researchers only focused on the case studies of universities in two countries, the study's ability to generate generalizable findings was limited. The results obtained from the study cannot be applied to the spheres of secondary vocational education, school education, as well as educational institutions in other countries. Besides, in spite of the wide range of questions which we investigated, we did not study a lot of questions, which could clarify the obtained results and many questions, for example, the influence of extrinsic and intrinsic factors on student motivation and its forms, the features of motivation when developing professional competencies of a student in conditions of their linear development, and others. These issues merit more in-depth investigation and will spur further scientific inquiry. Therefore, it is recommended for future researchers to conduct more comprehensive research in this context, involving data from various countries and various dimensions of students' motivation in the context of higher educational and professional development.

7- Declarations

7-1- Author Contributions

7-2- Data Availability Statement

7-3- Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

7-4- Informed Consent Statement

The following statement was shared with the study participants to obtain their informed consent. A copy of the signed and dated consent form was kept by the researcher and a copy was given to the participant.

"*I have read and understood the provided information about the purpose and objectives of this study, and I acknowledge that there are no potential risks to participating in this survey. It is my clear understanding that the study is being conducted to determine the influence of the motivational factors on the student's professional competency development. I understand that my participation in this study is voluntary and I am allowed to withdraw from the study at anytime. I voluntarily agreed to participate in this study by filling out the survey form provided to me and declaring that I was not coerced or pressurized in any way to participate in this study.*"

7-5- Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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Appendix I: Questionnaire

Motives for the development of students' professional competencies

Dear participants,

Please rate on a 10-point scale how much you agree with the following questions. The more you agree, the higher the score. "0" means not agreeing with the question, "10" means absolute agreement.

By completing the questionnaire, you give your consent to the publication of the results of the study. Your answers are anonymous.

General Questions

1. Your age _____
2. Gender:
   a. Male
   b. Female
3. The tear of studies
   a. 1st
   b. 2nd
   c. 3rd
   d. 4th
4. Future qualification _____
5. Name of the university _____
6. The country in which your university is located:
   a. Russia
   b. Indonesia

Professional Competencies Development

1. Do you rate at a high level the amount of knowledge you received at university?

2. Do you use the knowledge you acquired at university in your daily life and in your work (if any)?

3. The knowledge you gained at university might be useful in the future?

4. You do not take additional courses, trainings, because you think that the amount of knowledge received at the university is sufficient for successful professional fulfillment?

5. Does the knowledge you get at the university meet the current requirements of the labor market?

6. The knowledge received at the university reflects the current world trends of globalization, digitalization, and sustainable development?

7. The knowledge obtained at the university is supported by a high level of practical skills development?

8. Do you consider yourself well prepared practically in your field of study?

9. Do you use the skills that you have learned at university at work (if you work) or plan to use them (if you don't work yet)?

10. Is the mastery of certain basic professional operations (processes) brought to automatism?

11. Is learning at university important, valuable for you?

12. Do you take classes because it is interesting and important, and not because you need to get a degree?

13. Do you know how to stop a shop talk? (shop talk, or professional communication is the communication at work, study, which requires the use of professional knowledge and skills)

14. Can you adjust and direct the professional communication in the right direction?

15. Given the situation, can you recognize what is appropriate for the professional communication and what is not?

16. When participating in a professional discussion, do you control your emotions?

17. During the professional communication can you change the strategy of behavior to achieve the goal?

18. Unplanned change of the topic discussed in the class from the previously passed topic does not make you uncomfortable?

19. Are you ready to communicate on any of the passed topics of the discipline, to perform any tasks?

20. Can you easily switch from one area of professional activity to another?

Motivation Factors for the Development of Professional Competencies

Intrinsic:

1. Is the main motivation for learning for you an interest in the process of learning?

2. Are you motivated by the desire to learn something new, to understand the studied subject?

3. Do you enjoy the process of learning, and does this motivate you?

4. Does the desire to achieve high results in studies motivate you?

5. Are you motivated by the pleasure you get from solving difficult tasks in the process of learning?

6. Is the desire to develop your professional abilities in the process of learning a motivation for you?

7. Is the fact that in the process of learning your thinking, creativity, and intellectual level are developing a motivation for you?

Extrinsic:

1. Are you drawn to your training by the understanding that you will benefit society?

2. Does mastering professional competencies make you feel secure in the knowledge that you can support yourself financially?

3. Does your training allow you to fulfill yourself while still a student?

4. Does your education allow you to fulfill yourself after graduation?

5. Does being educated help you develop social relationships?

6. Is it a motive for you that a certain level of professional competencies and the level of general development, which are formed in the process of learning, will allow you to take a worthy place in society?

7. Is the possibility to get respect and recognition in the future a motive of learning for you?

8. Are you motivated to study by financial rewards for success in your studies?

9. Does praise, awards, recognition of the results of your studies constitute a motive for you to study?

10. Does the motive of learning for you is the opportunity to participate in international academic mobility programs?

11. Is the fear of getting a bad grade or dropping out among your main motivations for studying?

12. Is the fear of being reprimanded or shamed among your main motives for studying?

13. Do you believe that faith motivates you to do your assignments conscientiously, to be diligent and thereby develop professional competencies?

14. Is it your conscience that prevents you from doing your assignments in bad faith, from violating the rules of academic integrity?

15. Is the pressure from parents, friends, environment the main motive for you to study?