

# Stablishing A Model For Commercialization Of Universities Based On Knowledge Management. Case Study Of Georgian Universities

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## ABSTRACT

The commercialization of the university means that the mechanism of the administration of the university institution is the same as the mechanism of the administration of the enterprise. In the commercialization of the university, we face enterprise. That is, the logic of university administration is undergoing a transformation. Commercialization is the process by which ideas and products from academic activities are transformed into marketable products and services. Given the wide range of commercialization from idea to product, it is important to find a university position in this field. The purpose of this study is to present a model of commercialization of universities based on knowledge management. The present study is an applied research and exploratory in terms of data type. The statistical population in the qualitative section (interview section), 15 experts and specialists, and experts were familiar with the topics of this project in the academic section, which were selected by purposive sampling method and taking into account the saturation law. The statistical population includes a small number of administrators, deputies and decision makers of several selected universities in Georgia, numbering 360 people. Using Cochran's formula and available sampling method, the sample size was 186 people. After conducting interviews and receiving experts' opinions and coding, a 25-question questionnaire was used in the quantitative section. In relation to validity, CVR test was used and in relation to reliability, Cronbach's alpha test was used. Next, k-s test, exploratory factor analysis test was used to identify the components in the first questionnaire. Based on this, the four dimensions were determined: the strategic dimensions of knowledge, the individual-organizational dimensions, the intra-organizational dimensions and the extra-organizational dimensions of knowledge. Then, the second questionnaire was designed based on the existing and desirable situation to examine these dimensions through paired t-test. SPSS software was used and the results showed that there is a significant difference between the current and desired situation. The findings of this research indicates that these universities should deal more with internal issues and radically reform internal process management in the direction of commercialization and making their system flexible and innovative (to attract ideas) and reducing administrative bureaucracy, diversifying income to use more external income sources. Also universities have to design and continuously improve the organizational culture that is preserved in strategic plan and redesign the work process based on knowledge and culture and stakeholders long term benefits.

**Keywords:** University commercialization model, knowledge management, Strategic Dimensions of knowledge.

## Introduction

Competitiveness and high speed of production and utilization of knowledge in today's world, how to turn it into a stream of economic returns for researchers, owners and investors of knowledge has become a major management challenge. In other words, the solution must be sought in the process of commercialization and how to take advantage of opportunities. Deciding to choose the right way to take advantage of an opportunity plays an important role in the success of a business. The commercialization of knowledge and technology is an important part of the innovation process, and no technology or product can enter the market successfully without this process (Wake et al., 2018). Commercialization is an effort to profit from innovation by transforming new technologies into new products, processes, and services and selling them in a market environment. For many new technologies, commercialization implies an increase in scale from prototype to mass production and access to more resources. Commercialization strategies include different ways of exploiting technologies and research that researchers and start-ups need to transfer knowledge from concept to market. On the other hand, the decision to commercialize a new technology is closely related to the characteristics of the innovative system in which the company operates. For successful commercialization, choosing the right model and strategy is inevitable (Yadollahi Farsi and Kalathai, 2012). Research findings play an important role in improving the quality of human life and developing the welfare of society and economic developments but These findings will not be of significant importance until they are applied and marketed or made available to practical actions and performances. Knowledge is the driving force of development, and attention to it will play an increasing role in the growth of organizations and communities. In order to present a picture of organizations and societies that are most used and benefited by knowledge, in its complete cycle,

the terms of inclusive organization and on a larger scale, inclusive society and inclusive nation are used.

There are many researches to improve and enhance management and administration of the schools and universities for clear purposes including students' satisfaction (Moghimi and Dastouri, 2022) and the effect of different management strategies on students' satisfaction (Moghimi et al., 2022). Commercialization of university research achievements is a complex activity and complements the chain of turning ideas into technology and leads to commercial value, and also to effective entrepreneurship and financial independence of universities (Mir et al., 1397). In the commercialization of the universities, we face the concept of an enterprise. That is, the logic of university administration undergoing a radical transformation (Novickis, 2017). As a result, here we identify commercialization as the process by which ideas and products from academic activities are transformed into marketable products and services for different social and strategic purposes and goals. Given the wide range of commercialization from idea to product, it is important to find a validated model customized for the university (Wu et al., 2015).

In addition to changing the face of the university, commercialization can also change its spirit; because of financial, managerial and legal mechanisms, structural reform, education and research, as well as process design and implementation. Today, the commercialization of research is very important because of its ability to promote economic growth and its role as an investment in the future, so it is considered one of the ways in which science can be tied to wealth production (Fadaei et al. 2019)

One of the main reasons for the rapid development of knowledge and technology in developed countries is Su and Shen (2017) that conducted a study entitled "Towards a successful commercialization of university technology"

which was conducted at the University of Taiwan as a basis for research. This study has used the important factors affecting the technology transfer performance of the university by Delphi fuzzy method, interpretive structural modeling, and analytical network process to infer the relative importance of different functions, respectively. The study states that the transfer of university technology to industry involves many mechanisms, including: joint research, contract research, consulting services, technology licensing, postgraduate education, advanced training for company employees, exchange of research staff, and Other official forms or transfer of official information. Galshko (2014) conducted a study entitled "Commercialization of University Research in Canada: What We Can Do." This article discusses the efforts of the Canadian government and universities to promote the commercialization of academic research, and the results of the study are obtained from interviews with faculty members. The results show that various government initiatives have strengthened cooperation between university and industry researchers, and the shift to applied research, far from emphasizing the involvement of university scientists with the private sector, has significantly weakened the higher education sector's ability to generate new ideas. Is. In a study, Fulgier Rey and Sweiler (2011) categorized the main factors influencing the transfer of academic technology in terms of CEO support, organizational structure, financial resources, human resources, creativity development, risk-taking, risk reduction, and commercialization strategy. Dibaker et al. (2005) in a comparative study entitled "The role of technology transfer organizations in expanding the circle of science and technology", have analyzed the developments in the effective mechanisms of technology transfer from university to industry. They explained how decentralized organizational practices and incentives that enable research groups to actively participate in exploiting research results, in

combination with private enterprises, provide intellectual property management and support for subsidiaries. Mohammadpour et al. (1398) studied the underlying factors affecting the commercialization of technological research achievements and a case study of a technical and professional university. Based on the results, the factors of expanding and promoting the culture of commercialization and entrepreneurship, creating innovation and competitive advantage in the market, speed of action, development of technology parks and national growth centers and laboratories and finally risk-taking have the greatest impact on commercialization of technology research in are. Karpi et al. (2015) presented a local model of knowledge commercialization in the field of health at the University of Medical Sciences in Tehran. The results indicate that all the variables calculated in the form of the mentioned levels were approved as variables that should be considered in designing the optimal model.

Mir et al. (2015) studied the effective components of knowledge commercialization based on knowledge management. Interview information was categorized and analyzed using coding. Statistical tests such as t-test and Friedman test were used to analyze quantitative data. The research results showed the impact of knowledge commercialization factors including government forces, economic forces, education system, macro rules and regulations, technological advances, competitors and competitiveness, customer orientation and other factors in the commercialization of research results. Salamati et al. (2016) studied the design of the commercialization model and the presentation of the proposed algorithm of commercialization of knowledge for higher education. This research by designing a comprehensive model and addressing the main role of basic research, an algorithm suitable for the research environment in the country and supervising innovative companies (with special emphasis on academic innovations) and more suitable for ideas from academic

research and Ideal for use in academic corporations, incubators and growth centers. Yadollahi Farsi and Kalathai (2012) studied the position of commercialization in innovation management and the introduction of major commercialization models in the field of advanced industries. Studies have shown that increasing attention to the issue of commercialization and the importance of choosing the appropriate model and strategy is important because gaining the ability to turn market-based research ideas into codified technical-economic technologies, a third world country selling raw materials to a country Advanced seller to convert technical-economic knowledge. Moghimi, Bahman (2021) measured the impact of Talent Management on Knowledge Sharing by Mediating Organizational Citizenship Behavior and evaluated a successful model for knowledge management. Hassan gholipour et al. (2010) studied the requirements, necessities and mechanisms of knowledge commercialization in management schools. The results of the interviews are categorized in the form of three categories, necessities, barriers and requirements of knowledge commercialization, and at the end, the mechanism of knowledge commercialization is presented. Pakzad and Taghavi (2009) examined the process and models of commercialization of research findings of universities and research centers. This study describes the common models and strategies used by universities and research centers at the international level to commercialize research findings. Hashemnia et al. (2009) studied commercialization methods in higher education and its challenges. The results showed that those involved in industry relations evaluated the role of these offices in the commercialization process compared to more basic professors and 78% of the interviewees attributed the success of commercialization to the dynamic and effective interaction of these Industry-offices with relevant units in the university. Priority of research commercialization methods from the

respondents' point of view, respectively: joint research contracts (41%), formation of commercial companies (27%), and patents (22%). So the main gap here is to propose a reliable model for knowledge-based commercialization at universities.

### Research questions

- What are the indicators of a suitable model for the commercialization of universities based on knowledge management?
- Is there a significant difference between the current situation and the desired indicators of the appropriate commercialization model of universities based on knowledge management?
- How to prioritize the indicators of the appropriate model of university commercialization based on knowledge management?
- What is the appropriate model of university commercialization based on knowledge management?

### Methodology

The purpose of this study is to present a model of commercialization of universities based on knowledge management. The present study is an applied research and exploratory in terms of data type. The statistical population is qualitative and in-depth Interview, 15 experts and specialists, that experts were familiar with the topics of this project in the academic atmosphere, which were selected by purposive sampling method and taking into account the saturation law. The statistical population includes a small number of administrators, deputies and decision makers of five selected universities in Georgia (names are preserved), numbering 360 people and the research is done during June to September 2022. Using Cochran's formula and available sampling method, the sample size was 186 people. After interviewing and receiving expert opinions and coding, a 25-item questionnaire was used for quantitative use. CVR test was used for validity

and Cronbach's alpha test was used for reliability with a rate of 0.840. Is. Then, k-s test, exploratory factor analysis test were used to identify the components in the first questionnaire, paired t-test and Friedman test was used using SPSS software.

### Data analysis

What are the appropriate models for commercialization of university based on knowledge management?

**Table 1: The components identified through interviews with experts**

Identified components through interviews with experts	expert interviewees code														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
The process of Discovering and Sharing New Knowledge		*		*	*	*	*				*	*	*		*
Motivational Scheme for Reward and Recognition for Staff & Professors	*	*		*	*			*	*	*		*			
Publishing Papers in magazines and sharing in the university blogs	*	*	*	*	*		*	*			*				*
Number of subscribers of the knowledge-based Social networks		*		*	*		*				*	*			*
University financial credit for knowledge discovering and sharing	*		*	*	*			*		*	*		*	*	
Priority to adoptability and Openness		*		*	*	*	*	*	*						*
State of transferring knowledge from the university to the society and Industry and vise-versa	*	*	*	*	*		*	*			*		*		*
having a strategic plan for effective transferring of knowledge from university to industry	*	*	*			*				*					
The State of technology transfer for expanding the circle of science and industry			*		*		*	*	*						*
Commercialization of knowledge as a Strategic Organizational Value			*		*		*	*	*			*	*		*
President and Rector Presence and Support for Knowledge Creation and Sharing in the Organization		*	*	*		*			*		*	*			

Use of student thesis in the Industry			*	*	*		*		*
Generating revenue by offering expert advice to executive knowledge.	*		*		*		*		*
Continuous Staff and Lecturers Training and Evaluation		*	*	*		*	*	*	*
Ease of use of IT in the University		*	*	*		*	*	*	*
Integrating Knowledge Management with Core-Business Values of the University		*		*	*	*		*	*
Understanding the necessity of Commercialization and privatization		*		*	*	*		*	*
University Quality Development	*	*		*	*	*	*	*	*
The state budget of the knowledge development and sharing in the university strategic plan				*	*	*	*		*
Students Satisfaction Improvement	*			*	*			*	*
State of Students Satisfaction Improvement-Document in the University Strategic-Plan	*			*	*		*	*	*
Weaknesses in intellectual property laws and regulations	*	*	*			*		*	*
Staff and Professors Possibility to be a part of knowledge system	*	*	*		*	*			
The University Ability to absorb knowledge via all faculties	*	*				*	*	*	
HRM Strategic Plan for Improvement of Organizational Culture and Talent		*	*	*	*	*	*		*

**Table 2: kmo and bartlett**

keyser - mayer		.787
Bartlet	k.	1.322E4
	degree of freedom	332
	significance level	.000

Based on the test results in Table 2, the KMO test result, which is equal to .787, indicates that the relevant data can be reduced to a number of underlying factors. Also, the Bartlett test result is 1.322E4. Which is significant at the error level of 0.01, indicates that the correlation matrix between the items is not a single matrix. That is, on the one hand, there is a high correlation between the items within each factor, and on the other hand, there is no correlation between the items of one factor and other items. Therefore, it can be concluded that there is a significant relationship between the items of this variable

and it is possible to discover a new structure of the data.

In general, a factor can be extracted from all the variables we have in the research structure. According to the Kaiser criterion, only factors whose specific value is more than one are considered as significant factors and the rest are left out. As can be seen in Table 3, the sum of the squares of the extracted factor loads (specific value) for 4 factors is higher than one, so in this study there are 4 main factors.

**Table 3: The total variance explained**

total variance explained									
questions	First vector			extract rotation			Square		
	general	difference percentage	cumulative percent	total amount	difference percentage	cumulative percent	total	Percentage of dispute	cumulative percent
1	5.513	22.052	22.052	5.513	22.052	22.052	5.304	21.215	21.215
2	4.811	19.243	41.295	4.811	19.243	41.295	4.835	19.342	40.557
3	4.213	16.853	58.148	4.213	16.853	58.148	4.171	16.682	57.240
4	3.139	12.557	70.705	3.139	12.557	70.705	2.846	11.383	68.623
5	2.611	10.445	81.150	1.093	.387	89.967	1.554	6.94	89.652
6	1.479	5.914	87.064	1.087	.365	89.999	1.493	6.91	89.578
7	1.409	4.634	88.698						
8	1.379	4.514	88.915						
9	1.342	4.003	89.580						
10	1.234	3.184	89.597						
11	1.145	2.850	89.599						
12	1.098	2.710	89.672						
13	.895	2.418	89.754						
14	.826	2.233	89.810						
15	.752	2.033	89.855						
16	.693	1.873	89.878						
17	.672	1.816	89.882						
18	.643	1.738	89.887						
19	.613	1.658	89.890						
20	.569	1.539	89.893						
21	.558	1.509	89.895						
22	46	.068	.254						
23	47	.066	.233						
24	48	.036	.149						
25	49	.031	.138						

In total, all 4 factors with eigenvalues higher than one were able to explain 89,672 of the variance of 25 items related to the questionnaire.

C) Significance of factor loads and classification of items:

To interpret the factors, it must be specified which of the factor loads should be considered as

significant values. As can be seen in Table 4, the factor loads of 25 items are considered to be higher than 5 /. Which indicates that all items are meaningful. In addition, according to this table, items can be categorized and identified based on the concept and name of the questions in the column for each factor.



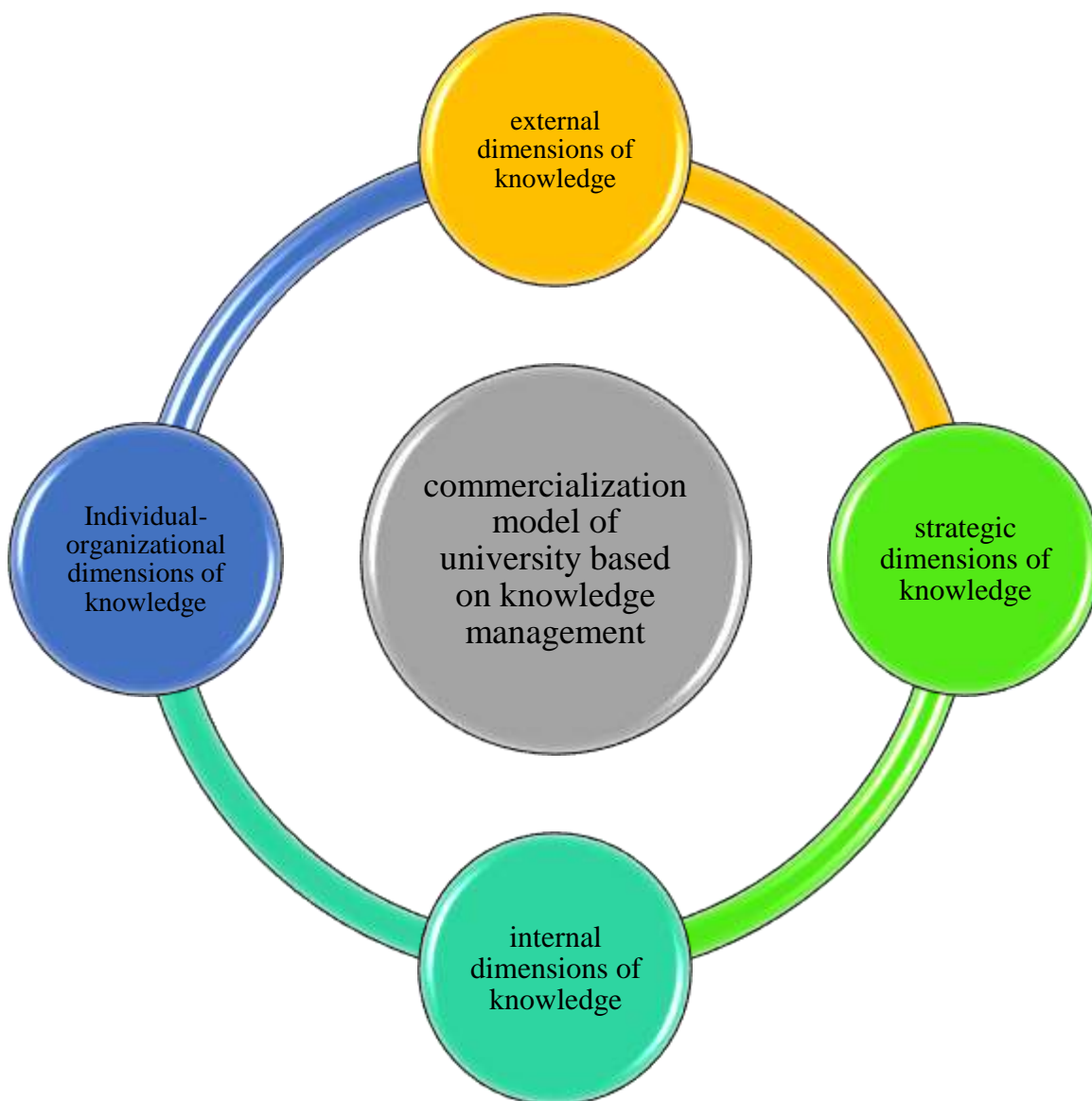
**Table 4 : number of rotation elements**

	1	2	3	4
1.		.787		
2.		.566		
3.		.612		
4.				.719
5.			.786	
6.		.761		
7.				.804
8.				.834
9.				.843
10.			.722	
11.			.784	
12.	.768			
13.				.775
14.				.703
15.			.665	
16.			.598	
17.				.781
18.				.687
19.				.705
20.	.769			
21.	.812			
22.			.802	
23.		.785		
24.				.733
25.			.722	

Based on the rotated matrix, the classification was obtained based on 25 sub-indices and 4 factors. Now, according to the nature of these 25 questions, which are categorized in the form of 4 factors, we name these 4 indicators, which include strategic dimensions of knowledge, Individual-organizational dimensions of

knowledge management, internal dimensions of knowledge and external dimensions of knowledge. This (the following diagram) shall be the answer to the main research question.

Answer to the first research question



To answer the second question, we use the T - test.

Is there a significant difference between the status quo and the optimal model of the appropriate model of commercialization of universities based on knowledge management?

Hypothesis $H_0$ : there is no significant gap between the present and optimal conditions.

Hypothesis $H_1$ : there is a significant gap between the status quo and the optimum.

The statistical hypotheses are as follows:

$$\begin{cases} H_0: \mu \leq 3 \\ H_1: \mu > 3 \end{cases}$$

Paired t - test is used to perform this test .

**Table 5: T statistics table**

		average	number of questions	Standard deviation	standard error mean
married couple	status quo	2.3505	186	1.06107	.10773
	favorable conditions	4.0722	186	.86900	.08823

**Table 6: t - test table**

		difference					amount of t	degree of freedom	even meaningful level
		average	standard deviation	mean standard error	95 % of confidence level				
					bottom	top			
paired	current status - optimal status	-1.72314	1.25998	.12786	-1.96447	-1.45617	-14.017	185	.000

Table 7 data shows that using paired t - test (dependent) test the error level of 5 % has been calculated to compare the existing and desirable status. Since p - value is 5 % , the null hypothesis is rejected , and in other words , it can be concluded that with certainty . / 95 is the successor to the study. In other words; there is a significant gap between existing and desirable status by 95 percent.

Answer the third question

**Table 7 : friedman test**

significance level	degree of freedom	kai	Count	friedman test
0/000	24	8.216E3	186	

The sig value is obtained from the sig and since it is assumed that the null hypothesis is zero at the

What is the priority of appropriate model of commercialization of universities based on knowledge management?

in this stage , friedman test is used . the hypotheses of this test are as follows : :

h0 = sub - indices are of equal importance.

h1 = sub - indices are not of equal importance.

significance level of 95 % . Nevertheless, priorities and sub - indices are approved.

**Table 8: The following ranking of the research indices**

	average rank
Q1	37.29
Q2	24.03
Q3	11.40
Q4	29.55
Q5	34.44
Q6	39.28
Q7	7.37
Q8	38.93
Q9	25.76
Q10	15.10
Q11	36.85
Q12	35.99
Q13	14.96
Q14	25.91
Q15	24.31
Q16	24.91
Q17	24.80
Q18	24.15
Q19	23.61
Q20	23.12
Q21	24.83
Q22	24.76
Q23	11.23
Q24	24.81
Q25	19.21

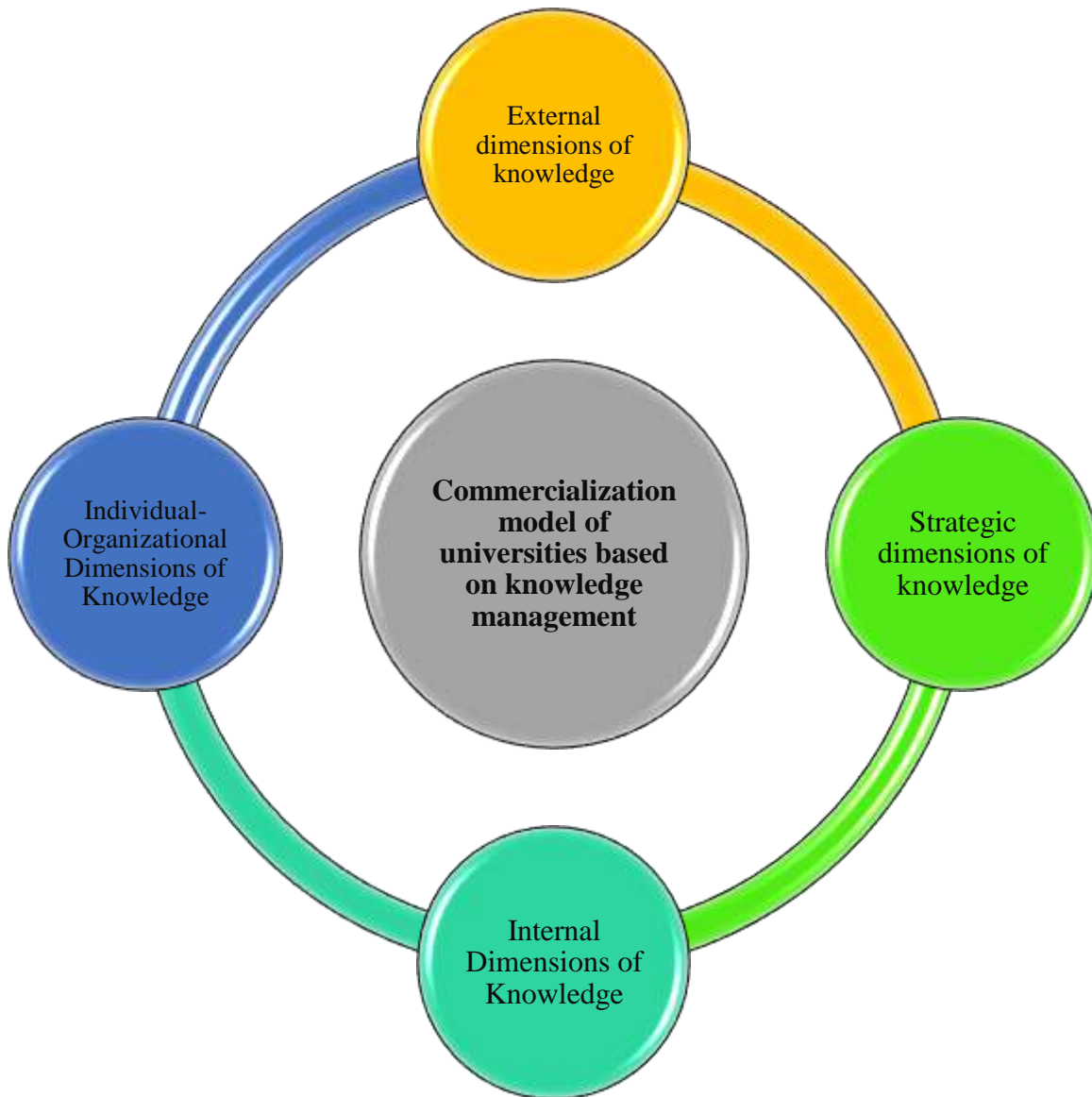
The most important questions are the questions 6, 8, 1, 11 and 12, respectively, to form knowledge firms, design a model for efficient transfer of knowledge from universities to industry, discovering new knowledge, commercialization of research results, and the use of these items for and by students.

Answer to the fourth question of research

What is the appropriate model for commercialization of universities based on knowledge management?

We already extracted the dimensions and proposed the model in previous discussions. Here

in this model we applied Radical Cycle that is used show the relationship to a central idea, emphasizes both the information in the center and how the information in the outer rings contribute to the inner idea. Here the inner idea is Commercialization model of universities based on knowledge management and the outer rings that are contributing were determined as External dimensions of knowledge, Strategic dimensions of knowledge, Internal Dimensions of Knowledge and Individual-Organizational Dimensions of Knowledge Management. The Inner lines to connect the outer circles to central ring is hidden that can contribute in different layouts to prioritize.



### Conclusion

The findings of this study indicate that this university should take more action on internal issues and reform internal management and relationship affairs toward the perspective of knowledge management in order to commercialize. Designing very flexible work process (to attract ideas) and reducing bureaucracy, diversifying revenues and lowering and reducing the share of dependence on government funding sources and making greater use of external revenue sources and seeing the

students as consumers that we need to build a life-long relationship with them and other stakeholders, and considering not only good financial incentives but also non-financial and internal and behavioral branding with faculty members are the immediate solutions. As we mentioned in the strategic dimensions of the knowledge management system, and to increase the efficiency of activities, we need a work culture carefully designed in university long-term strategic plan and designing and enhancing knowledge-based information systems and as a

result updating and reviewing policies in joint meetings with staff, professors and students to increase communication and awareness for and with all parties involved in universities value chain that are the main suggestions presented in this research based on the model.

It is worth mentioning that the current research is only trying to propose a model for commercialization of the universities based on knowledge management strategic perspective. We have not studied why the desired route of commercialization is this much different with KM discipline. This could have many strategic or cultural or systematic reasons and solutions that can be discussed in other scientific researches. However the fact that knowledge management is not preserved in the process of commercialization in (these) universities in Georgia almost not at all.

As every other knowledge-based organization, the universities need a clear strategic plan that is developed based on knowledge management discipline and perspectives for internal and external knowledge resources that means that education and training and culture and talent management and redesigning everything continuously based on society and students needs and wants must be preserved in that plan and also business analysts and managers of the technology transfer office and the licensing officer from people with business experience must be added to the team.

Since people and process are the non-technological elements of the knowledge management systems, continuous evaluation and improvement of the role and duties of the managers and decision makers and science and technology centers, parks and start-ups independently design and improving system of their competencies and exchange and convey these knowledges to university authorities in regular and disciplined online and offline systems to ensure the functionality of knowledge management system in the process of customer-based services of the universities will be highly

important and must be implemented and applied. These knowledge-based centers also shall have a suitable database of inventors, innovators, private sector investors and entrepreneurs interested in working on technological ideas coming from universities, as well as creating a suitable platform to facilitate their communication and interaction with each other and with professors and universities' rectors and founders shall help this commercialization and privatization very research-based and functional.

As we understand in the literature about the "individual-Organizational dimensions of knowledge"; In the process of commercialization, the knowledge-based organization (university) must also develop associations, forums, networks and other channels of communication between industry activists, academics, investors and all those involved in the knowledge commercialization process; and for business process reengineering of the system, the students and staff and employees of the universities will be the main target of enhancing organizational culture and continues improvement of academic and social life based on strategic plans and tactical steps.

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