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### Prioritizing Effective Factors of Third Generation Universities in Higher Education System (A Case Study in Mashhad University of Medical Sciences)

**Background:** The rise of third generation universities as an objective representation of industry-university relationships opens new horizons of job creation for university planners and managers. In our country, most universities are placed in second generation universities category, i.e. research-oriented universities which are not so active in commercialization of research findings. Therefore, the purpose of the present study is to prioritize the factors affecting third generation universities.

**Methods:** The present study is an applied research in term of purpose which was conducted through a mixed methods approach. The statistical population of the research included faculty members, managers, and deputy directors of Mashhad University of Medical sciences in the academic year 2019-2020 (N=1041). A sample of 212 individuals was selected through stratified sampling method. Delphi method was used to obtain the opinions of 30 experts. The research tool was a research-made questionnaire extracted from the qualitative section whose validity was confirmed by experts as well as its reliability was confirmed by Cronbach's alpha coefficient (0.9). The confirmed questionnaire with 7 factors and 25 components was administered and data were analyzed using SPSS 21 software.

**Results:** The results of the present study showed that the two factors of focus and attention of management to entrepreneurship, and reform of education and research system with emphasis on entrepreneurship had the most impact (0.97); however, the factor of applying cultural values in order to move towards third-generation universities with a coefficient of (0.75) had the least impact.

**Conclusion:** Medical universities officials should endeavor to develop entrepreneurship in universities, which requires simultaneous planning and attention to all factors, especially the factors of management attention to entrepreneurship and reforming of education and research system.

**Keywords:** Entrepreneurship, Delphi Method, Third-Generation University, Medical Sciences

### رتبه بندی عوامل مؤثر دانشگاه های هزاره سوم در نظام آموزش عالی (مطالعه موردی: دانشگاه علوم پزشکی مشهد)

**زمینه و هدف:** ظهور دانشگاه نسل سوم به عنوان نمود عینی ارتباط صنعت و دانشگاه افق‌های نوینی از اشتغال‌زایی فراروی برنامه ریزان و مدیران دانشگاه قرار می‌دهد. در کشور ما بیشتر دانشگاه‌ها در نسل دوم دانشگاهی یعنی دانشگاه‌های پژوهش محور قرار دارند و فعالیت‌چندانی در راستای تجاری سازی یافته‌های پژوهشی ندارند، لذا هدف پژوهش حاضر رتبه بندی عوامل مؤثر دانشگاه‌های هزاره سوم می‌باشد.

**روش:** تحقیق حاضر از نظر هدف کاربردی است و از روش آمیخته استفاده شده است. جامعه آماری در بخش کمی شامل اعضای هیأت علمی، مدیران و معاونین دانشگاه علوم پزشکی مشهد در سال تحصیلی ۹۸-۹۷ می‌باشد (N=1041) که تعداد ۲۱۲ نفر با روش نمونه‌گیری طبقه‌ای انتخاب شدند و در بخش کیفی با روش دلفی از نظرات ۳۰ نفر از خبرگان استفاده شد. ابزار تحقیق پرسشنامه محقق ساخته‌ای مستخرج از قسمت کیفی بود که روایی آن به تأیید خبرگان رسید و پایایی آن با استفاده از ضریب آلفای کرونباخ (۰/۹) تأیید شد و پرسشنامه نهایی با ۷ عامل و ۲۵ مؤلفه در بین نمونه مورد نظر اجرا گردید و داده‌ها با استفاده از نرم‌افزار spss21 مورد تحلیل قرار گرفت.

**یافته‌ها:** نتایج نشان داد که دو عامل تمرکز و توجه مدیریت و منابع انسانی به کارآفرینی و اصلاح نظام آموزشی و پژوهشی با تأکید بر کارآفرینی بیشترین تأثیر (۰/۹۷) و عامل به کارگیری ارزش‌های فرهنگی در مسیر تغییر با ضریب (۰/۷۵) کمترین تأثیر را در بین عوامل به خود اختصاص داده است.

**نتیجه‌گیری:** مسئولین دانشگاه‌های علوم پزشکی باید نسبت به گسترش کارآفرینی در دانشگاه‌ها اهتمام ورزند که این امر نیاز به برنامه ریزی و توجه همزمان به تمامی عوامل به خصوص در زمینه تمرکز مدیریت به کارآفرینی و اصلاح نظام آموزشی و پژوهشی دارد.

**واژه های کلیدی:** کارآفرینی، تکنیک دلفی، دانشگاه نسل سوم، علوم پزشکی

### ترتیب العوامل المؤثرة لجامعات الجيل الثالث في نظام التعليم العالي (دراسة حالة: جامعة مشهد للعلوم الطبية)

مقدمة: إن ظهور جامعة الجيل الثالث كمظهر موضوعي للعلاقة بين الصناعة و الجامعة يضع أفقاً جديدة لخلق فرص العمل على مخططي و مديري الجامعة. في بلدنا ، يتم تصنيف معظم الجامعات في فئة جامعات الجيل الثاني أي الجامعات ذات التوجه البحثي و ليس لديها نشاط كبير من أجل تسويق نتائج البحوث ، فإن الغرض من هذه الدراسة هو تصنيف العوامل الفعالة لجامعات الألفية الثالثة.

الطرق: الدراسة الحالية هي بحث تطبيقي من حيث الغرض و قد أجريت من خلال نهج مختلط. شمل المجتمع الإحصائي للبحث على أعضاء هيئة التدريس و المدرء و نواب رئيس جامعة مشهد للعلوم الطبية في العام الدراسي ۱۳۹۸-۱۳۹۷ هجرياً شمسياً. (N = 1041) حيث تم اختيار ۲۱۲ شخصاً بطريقة أخذ العينات الطبقية و في القسم النوعي استخدمت طريقة دلفي للحصول على آراء ۳۰ خبيراً. كانت أداة البحث عبارة عن استبيان بحثي تم استخراجها من القسم النوعي و الذي أكد الخبراء صحته و تأكد موثوقيته من خلال معامل ألفا كرونباخ (۰.۹). تمت إدارة الاستبيان المؤكد مع ۷ عوامل و ۲۵ مكوناً و تم تحليل البيانات باستخدام برنامج SPSS 21.

النتائج: أظهرت نتائج الدراسة أن عاملي تركيز و اهتمام الإدارة لريادة الأعمال و إصلاح نظام التعليم و البحث مع التركيز على ريادة الأعمال كان لهما الأثر الأكبر (۰.۹۷) و عامل تطبيق القيم الثقافية من أجل التحرك نحو جامعات الجيل الثالث ذات معامل (۰.۷۵) الأقل تأثيراً.

الخلاصة: على مسؤولي الجامعات الطبية الحرص على تعزيز ريادة الأعمال في الجامعات، الأمر الذي يتطلب التخطيط و الاهتمام المتزامن بجميع العوامل خاصة في مجال الإدارة التي تركز على ريادة الأعمال و إصلاح النظام التعليمي و البحثي.

الكلمات المفتاحية: ريادة الأعمال ، طريقه دلفي ، جامعة الجيل الثالث ، العلوم الطبية

### اعلیٰ تعلیم کے سلسلے میں تیسری نسل کی یونیورسٹیوں کے مؤثر عوامل کی رتبہ بندی - مشهد یونیورسٹی کے بارے میں تحقیق

**بیک گراؤنڈ:** تیسری نسل یا تیسرے ہزارے کی یونیورسٹیوں نے صنعت کے ساتھ عینی رابطہ برقرار کر لیا ہے جس کے نتیجے میں روزگار کے نئے نئے مواقع سامنے آئے ہیں۔ ایران میں بیشتر یونیورسٹیاں دوسری نسل کی ہیں یعنی یونیورسٹیوں میں محض تحقیقات ہوتی ہیں اور ان کی تحقیقات کو پراڈکشن میں نہیں بدلا جاتا۔ اس تحقیق کا هدف تیسری نسل کی یونیورسٹیوں کے مؤثر عوامل کا جائزہ لینا ہے۔

**روش:** اس تحقیق کو عملی صورت میں لانے کی غرض سے انجام دیا گیا ہے۔ اس میں شرکت کرنے والے مشهد یونیورسٹی کی اکیڈمک کونسل کے رکن، یونیورسٹیوں کے وائس چانسلر اور سربراہان شعبہ جات نے شرکت کی۔ یہ تحقیق دوہزار اٹھارہ میں انجام پائی، اس میں دو سو بارہ افراد کو اکیڈمک لیول کے مطابق منتخب کیا گیا۔ تیس اساتذہ کے نظریات سے یونیورسٹی کے علمی معیار کو پرکھا گیا اور اس کے لئے ڈالٹی طریقہ کار استعمال کیا گیا۔ ماہر اساتذہ کے نظریات سوالنامے کے ذریعے حاصل کئے گئے۔ سوالنامے کی علمی حیثیت کرونباخ صفر اعشاریہ نو سے یقینی بنائی گئی۔ حتمی سوالنامہ میں سات اسباب اور پچیس عناصر پر تاکید کی گئی اور ڈیٹا کا تجزیہ ایس پی ایس ایس اکیس سافٹ ویئر سے کیا گیا۔

**نتیجے:** اس تحقیق سے ثابت ہوتا ہے کہ یونیورسٹیوں کے مینجمنٹ اور افرادی قوت کے روزگار کے مواقع فراہم کرنے اور تعلیمی اور تحقیقی نظام کی اصلاح کرنے پر توجہ سے خاصی تبدیلیاں آسکتی ہیں۔ اس تحقیق سے یہ بھی پتہ چلا ہے کہ پیشرفت کی طرف یونیورسٹیوں کی اصلاح میں ثقافتی عوامل بہت کم بار آور ثابت ہوتے ہیں۔

**سفارش:** میڈیکل س کی یونیورسٹیوں کے عہدیداروں کو یونیورسٹی سے فارغ التحصیل ہونے والوں کے لئے روزگار کے مواقع فراہم کرنے کا اہتمام کرنا چاہیے۔ اس امر کے لئے بنیادی طرح سے منصوبہ بندی اور تعلیمی اور تحقیقی نظام کی بہرپور اصلاح کی کوشش کرنی چاہیے۔

**کلیدی کلمات:** روزگار کے مواقع، ڈلفی تکنیک، تیسری نسل کی یونیورسٹیاں، طبی علوم

## INTRODUCTION

Nowadays, attention to entrepreneurship is one of the major concerns of different institutions and centers, including universities. Theory of Entrepreneurial University is one of the models proposed to explain the new role of universities with the important feature of broader interactions with community. Based on this theory, some higher education systems adapt themselves to economic development and business market through modifying their programs, and they educate innovative and creative graduates by implementing entrepreneurial initiatives (1). Mission and vision of universities in the past consisted of education and research which nowadays, due to the developments taken place as well as the mission and commitment of universities to society and survival and growth of university itself, are gradually shifting away from traditional role. In addition, they have taken on a new role and mission by participating in social and economic development. Those universities that have been able to adapt themselves to new conditions are known as third-generation universities (entrepreneurial universities) which are the evolved form of first and second generation universities (2).

A third-generation university is defined as a university that is capable of innovating, recognizing and creating opportunities, working in teams, taking risks and responding to challenges, and seeking to make substantial shift in organizational characteristics so that it will have a bright future (3). An Entrepreneurial University is defined as a research-based university in which research is emphasized and developed. Although, in some analyses, analysts see academic entrepreneurship as a deviation from research university objectives (4-5), adopting a coordinated strategy for all vital activities (education, research and entrepreneurship) is a natural incubator. However, endeavors to provide university community with sufficient space to explore, evaluate, and exploit those ideas that can be transformed into economic entrepreneurship initiatives are important as well (6). In addition to teaching theoretical issues, this type of university teaches students management skills and job skills required for the intended field of study as well as how to take advantage of opportunities and innovations, introduces them the realities and requirements of the business market, welcomes new and creative ideas, and develops entrepreneurial spirit among students. Students of a third-generation university not only do not wait for a long time to be employed or seek a job after graduation but they intend to be entrepreneurs (7).

In our country, most universities are placed in second generation universities category, i.e. research-oriented universities which are not so active in commercialization of research findings, educating entrepreneurs, and transforming into a third-generation university that is an entrepreneurial university. Commercialization activities of the universities of the country are often limited to the creation of science and technology parks which do not have much effect on the business market (8). There has been a dramatic increasing in unemployment of 42% of the university graduates with an increase of more than 850,000

persons annually, unemployment and joblessness of 15000 to 20000 Ph.D graduates with an increase of over 7500 persons annually, writing dissertations by others, islanding performance in higher education irrespective of the quantity and quality of the needs of the society and industry, the disproportionality of occupation and the employed person, the promotion of professional culture in education and research institutions, Credentialism, un-even growth of higher education centers, which today has increased to 2800 units. Lack of development model and roadmap in higher education and lack of up-to-date higher education, brain drain which leads to a pecuniary loss of over 60 billion dollars, and politicization of scientific institutions are among the issues higher education and consequently the country are facing with. Therefore, these damages will result in pecuniary loss of billions of dollars in the present time and will threaten national interest in long time (9). Hence, it is necessary to create innovative activities through the creation of entrepreneurial universities, because without the existence of such universities the results of scientific research will have no fate other than being stored in academic repositories and libraries which are rarely transformed to innovative activities, products and services. Along with global developments and transformations and in line with the response to the contingency needs of the society, the mission of the universities has evolved through the time and is moving towards an entrepreneurial paradigm (10). Unfortunately, due to the inconsistency between academic courses and community needs, university graduates do not have the necessary expertise and efficiency. In such condition, attention to entrepreneurship and its development as well as expansion in higher education is of particular importance. On the other hand, given the increasing growth of economic, social, cultural, and political changes in society as well as the emergence of new challenges and expectations in society, attention to the development of entrepreneurship capabilities and promotion of entrepreneurial spirit among graduates and even students is crucial (11). Transformation of higher education under the umbrella of entrepreneurship is inevitable for the reasons such as environmental changes at national and global level, public expectations changes, increased competition for public resources, criticizing the financial and structural status of higher education, being dependent on government funding, changes in higher education policies like decentralization, reducing tenure, creating strong policy sets, creating and maintaining diversity in higher education, reduction of bureaucracy, the importance of paying attention to students, respecting and protecting human dignity, and the advancement of information technology. Therefore, it is necessary to create innovative activities through the creation of entrepreneurial universities. The development of entrepreneurship at the universities of medical sciences and health services that oversee and implement a wide range of health care services at four levels of prevention, treatment, rehabilitation, and palliative care is important. In addition, they carry out the mission of education and research at the highest levels of medical sciences; on the other hand, the presence of many challenges to the management approach and systems are

inevitable (12).

The transformation from traditional university to entrepreneurial university will play an important role in the development of a global knowledge-based economy (13). At the present time, given the traditional mission of universities (first generation), the business market is saturated with academic graduates. Moreover, the situation demands using the available opportunities and making fundamental changes in the education and research structure at least in the leading universities of the country to move them towards research-oriented and mission-oriented universities in the field of research and technology (14).

If the country's medical universities make the transition to third-generation universities, their position in the knowledge-based economy will be explained and their dependence on government budgets will be minimized (12). This is the result of creativity and innovation, and innovation requires a systematic organization needing a clear policy and hard working. A third-generation university should be organized in such a way that it can give an address to innovation and entrepreneurship in the field of targeted medical sciences and it can be capable of transforming all individual and organizational activities in economic, social, cultural, and political dimensions into profession (15). In this regard, it is required that the universities of medical sciences of the country pay attention to the identification of their specific features and adopt the approach of reducing the level of dependency on public funds. This issue is of a great importance since the structures of higher education of university organization require it for planning some processes and it should be performed in response to the changing condition of the society. It is first necessary to write a mission statement. Then, considering their specific features and strength and weakness points, they should take steps towards moving to third-generation universities. Hence, to successfully implement the concept of commercialization and entrepreneurship in universities, their specific features and conditions require to be identified as well as appropriate policies and decisions should be made accordingly (9).

## METHODS

The present study is an applied research in terms of purpose. The data were collected through a mixed methods approach (qualitative-quantitative). For the qualitative section three-stage Delphi method and for the qualitative section the survey method was used. The statistical population of the research included 1041 faculty members, managers, deputy directors of education departments, and heads and deputy directors of the Schools of Medicine, Dentistry, Pharmacy, Paramedical Science, Nursing, Midwifery, and Reproductive Health of Mashhad University of Medical sciences in the academic year 2019-2020. In order to estimate the sample size, Cochran's generalized formula was used based on which a sample of 212 individuals was selected through two-stage stratified sampling method (16). The research tool was a research-made questionnaire extracted from the qualitative section with 7 factors and 25 components in which the items were scored on a five-point Likert scale from completely desirable to completely undesirable. In the present study,

after the approval of the survey subject in the research department of the university and the approval by the Ethics Committee of the University of Medical Sciences, the factors and components affecting the third-generation university were extracted according to the research conducted. The library and Internet studies included books, papers, and research performed by other national and international researchers. Then, using the opinions obtained from the experts of Mashhad University of Medical Sciences and applying three-stage Delphi technique, they were evaluated. For the present study, the members of the Delphi panel were selected through purposive and judgmental sampling, a non-probability sampling technique which consisted of 30 individuals, all of whom had experience of education and research activities in the field of education and were familiar with the concepts of third-generation universities. They had a working experience as the manager of decision-making section in educational organizations; they were experts and had research article in this field as well as their informed consent was obtained in person. The questionnaire used in the first stage of Delphi method consisted of the factors and components of third-generation universities. The experts expressed their viewpoints while assessing the criteria related to the importance of each of the factors and components in the form of agreement and disagreement. In addition, they expressed their descriptive opinions in written form. In the second and third stage of Delphi method, the respondent's experts were asked to state their views and opinions on each of the factors and components accepted in the first stage and submitted it on a five-point Likert scale from "totally agreed" to "totally disagreed" and gave their comments and suggestions. In all the three stages of Delphi method, the participants were asked to write any factors or components not considered in the checklist. Moreover, factors and components were modified based on participants' views and opinions. Finally, given the consensus of opinions reached among the members of experts group, Delphi stages were stopped and the obtained factors and components were identified with 7 main factors and 25 sub-components. Then, they were transferred to the ultimate research questionnaire for testing and evaluation in quantitative sample (17). The questionnaire consisted of two sections. The first section of the questionnaire assessed the demographic characteristics of process owners (faculty members, managers and deputy directors of Mashhad University of Medical Sciences) including gender, education level, job experience, age, organizational position, and field of study; the second section of the questionnaire consisted of 139 questions about the variables related to third-generation universities that measured the impact of each of these variables on moving towards entrepreneurial universities from the viewpoints of process owners. The questions in this section of the questionnaire were scored on a five-point Likert scale ranging from completely desirable = 1 to completely undesirable = 5. In this study, face validity and content validity were used to confirm the validity of the data collection tool. The validity of the questionnaire was confirmed by the experts and commentators in this field and Cronbach's alpha coefficient was used to calculate and measure the reliability of

the research tool. For this purpose, Cronbach's alpha coefficient was calculated using pre-test data in a sample of 15 individuals of the statistical population who responded to the research questionnaire with a reliability of 0.93, indicating the high reliability of the research tool or the questionnaire. After distributing, collecting and reviewing the questionnaires in a sample of 212 faculty members, managers, and deputy directors of Mashhad University of Medical sciences, the questions were coded and SPSS 21 software was used for data processing, data analysis, and statistical inferences. Structural equation modeling and factor analysis were used for data analysis. Factor analysis attempts to identify underlying variables or factors that explain the pattern of correlations within a set of observed variables and plays a very important role in identifying latent variables or factors through the observed variables. Due to the large number of variables researchers usually face with in research, they look for a way to reduce the number of factors and form a new structure for it, to do so, factor analysis is used for more accurate data analysis to achieve more scientific and operational results (18).

**RESULTS**

Given the obtained results, 135 (64%) males and 77 (36%) females were studied in terms of their demographic characteristics. The mean age of the sample was 50.3 ranging from 40 to 70 years with a standard deviation of 8.7. The results suggested that the majority of respondents (0.98) have a Ph.D. degree and (0.2) a master's degree. Meanwhile, the highest proportions of the sample (89%) were those with official employment status and the rest (11%) were with contractual employment status. The faculty members with 87% had the highest frequency in the research. Managers and deputy directors of education groups with 10% and managers and deputy directors of the schools with 3% had the highest proportion; however, they were placed after faculty members. The mean work experience of the sample was 16.5 years with a standard deviation of 8.3. On the other hand, those with work experience between 10-19 years had the highest proportion (40%) (Table1).

The research model which was obtained through Delphi technique was evaluated using confirmatory factor analysis and the impact of each factor and its components of third-generation universities were examined as well. Confirmatory factor analysis was performed using structural equation modeling (SEM). Structural equation modeling is one of the latest achievements of statisticians at this point and is among the statistical models for examining the linear relationship between latent variables (unobserved) and explicit variables (observed). As it was indicated, the model extracted from the three stages of Delphi method consisted of seven factors along with their components. At first, first-order measurement model and second-order measurement model were examined.

**Evaluation of first and second order measurement model**

At first, the first-order measurement model of the research was examined. According to the results obtained  $t > 1.96$

<b>Gender</b>	<b>Number</b>	<b>Percent</b>
Male	135	64
Female	77	36
<b>Education</b>	<b>Number</b>	<b>Percent</b>
Master's Degree	4	2
Ph.D.	208	98
<b>Employment Status</b>	<b>Number</b>	<b>Percent</b>
Contractual	188	89
Official	24	11
<b>Organizational Position</b>	<b>Number</b>	<b>Percent</b>
Faculty Member	183	87
Manager and Deputy Directors of the School	7	3
Manager/Deputy Director of Educational Group	22	10
<b>Job Experience</b>	<b>Mean</b>	<b>Standard Deviation</b>
	5/16	8.3
<b>Age</b>	<b>Mean</b>	<b>Standard Deviation</b>
	50.3	8.7

for all components and coefficients were statistically significant and also all components had a significant role in explaining their associated factors. Fit indices of the first-order measurement model indicated that the root mean square error of approximation (RMSEA) is less than 0.09, the confirmatory fit index (CFI) is greater than 0.9 and the  $\chi^2$  index is less than 3. Therefore, all indices were in the desired range, so the appropriateness of the first-order measurement model to fit the collected data was confirmed.

The second-order measurement model included explicit variables, latent variables, first-order latent variables, and the second-order latent variables. The second-order latent variable was measured on the basis of first-order latent variables. Second-order measurement model with its factors were considered as first-order latent variables and the components of each of them as the explicit variables. In this model, there also existed a second-order latent variable, namely the transformation of Mashhad University of Medical Sciences into a third-generation university. In this model,  $t > 1.96$  for the coefficients of all factors and components was obtained. Therefore, all factors and components had a significant role in this model. The RMSEA index was 0.78 and the CFI index was 0.95, indicating the desirable values for the evaluation of factors and components. The structural equation model with its coefficients was shown below (Figure 1). In this model it was identified that the seven factors of formulating appropriate organizational strategies, creating grounds and structural and contextual conditions of the organization, focus and attention of management and human resources



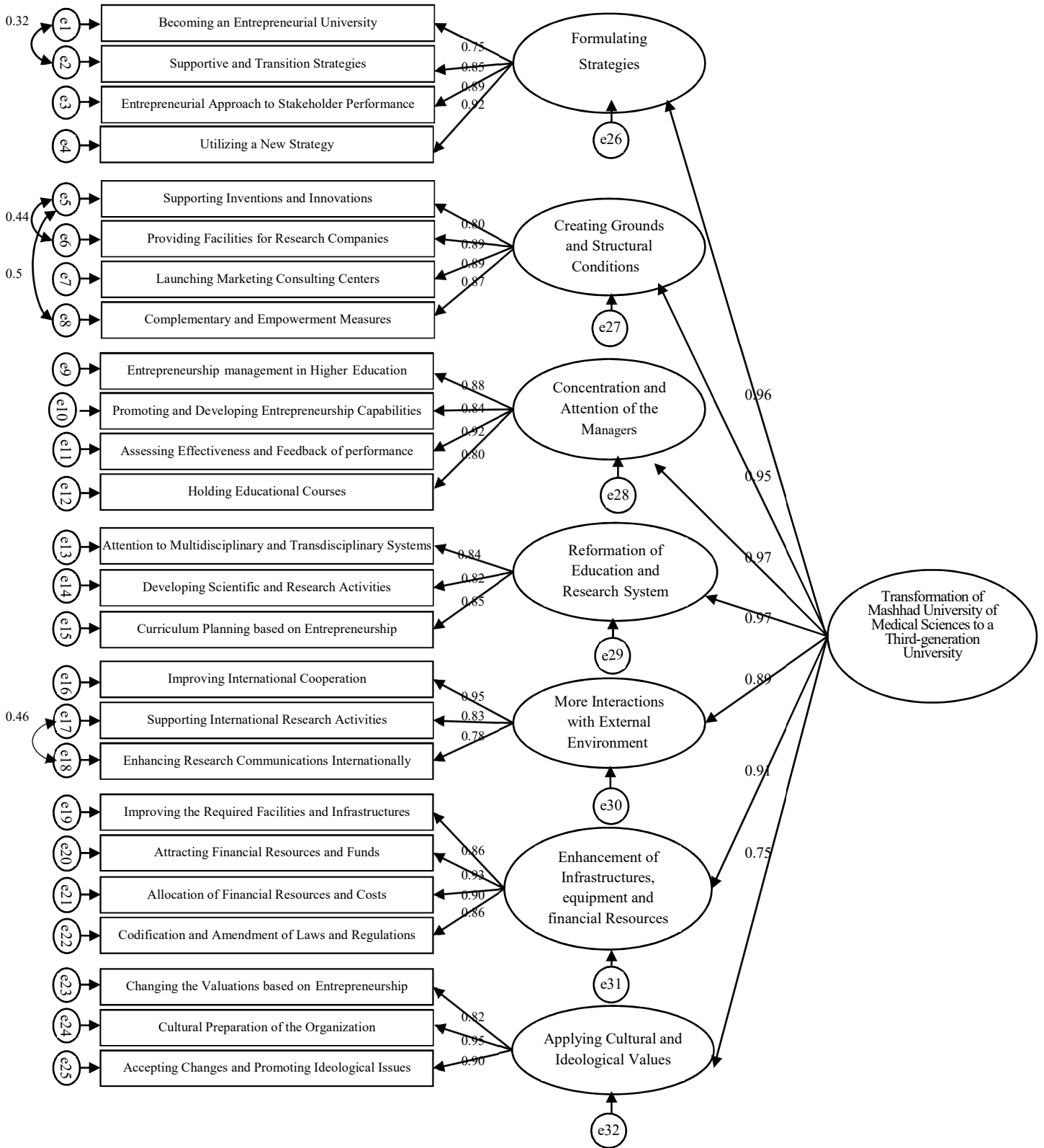


Figure 1. Fit model and coefficients of structural equations of factors and components

to entrepreneurship, reformation of education and research system with the emphasis on entrepreneurship, more interactions with external environment (national and international) and internationalization, enhancement of infrastructures, equipment and financial resources and the application of cultural and ideological values on the path of change to third-generation university were well explained by their components. According to the results obtained, the fit of the measurement model to the collected data was well confirmed by the fit indices. In this model, all the seven effective factors had significant coefficients (Table 2).

Meanwhile, prioritizing and comparing the level of the importance of factors and components affecting third-generation universities was performed in Mashhad University of Medical Sciences based on the coefficients obtained through structural equation modeling. It can be said that the distribution of the level of importance of factors affecting third-generation universities in Mashhad University of Medical Sciences had a significant difference ( $t > 1.96$ ). Comparing the rank coefficients with respect to structural equation coefficients indicated that the most important and effective factors are associated with the focus and attention of management and human resources of the organization to entrepreneurship and reformation of education and research

system with emphasis on entrepreneurship with the coefficient of (0.97); however, the factor of applying cultural and ideological values on the path of change with the coefficient of (0.75) had the least importance. Table (3) represents the importance and impact of each of the seven factors affected the transformation of Mashhad University of Medical Sciences into a third-generation university.

**DISCUSSION**

Based on the opinions and views of university professors, it was found that the effective factors in entrepreneurial universities include formulating appropriate organizational strategies, creating grounds and structural and contextual conditions of the organization, focus and attention of management and human resources to entrepreneurship, reformation of education and research system with the emphasis on entrepreneurship, more interactions with external environment (national and international) and internationalization, enhancement of infrastructures, equipment and financial resources and the application of cultural and ideological values on the path of change to third-generation university. Moreover, the results showed that the two factors of focus and attention of management and human resources to entrepreneurship as well as the reformation of education and research system with the

**Table 2. Factors affecting third-generation universities**

Variable	Factor	Coefficient	T
Factors affecting third-generation universities	Formulating appropriate organizational strategies	0.96	-
	Creating grounds and structural and contextual conditions of the organization	0.95	11.22
	Focus and attention of management and human resources to entrepreneurship	0.97	12.67
	Reformation of education and research system with the emphasis on entrepreneurship	0.97	12.04
	More interactions with external environment (national and international) and internationalization	0.89	12.40
	Enhancement of infrastructures, equipment, and financial resources	0.91	11.66
	The application of cultural and ideological values on the path of changing to third-generation university	0.75	9.53

**Table 3. Prioritizing factors affecting the transformation of Mashhad University of Medical Sciences into a third-generation university**

Factor	coefficient	priority	T
Focus and attention of management and human resources to entrepreneurship	0.97	1	12.67
Reformation of education and research system with the emphasis on entrepreneurship	0.97	1	12.04
formulating appropriate organizational strategies	0.96	2	-
creating grounds and structural and contextual conditions of the organization	0.95	3	11.22
enhancement of infrastructures, equipment, and financial resources	0.91	4	11.66
more interactions with external environment (national and international) and internationalization	0.89	5	12.40
The application of cultural and ideological values on the path of changing to third-generation university	0.75	6	9.53

emphasis on entrepreneurship have the most impact and are of the greatest importance in the development of third-generation universities. Ghahremani et al. in a study called "The Role of Transformational Leadership in Promotion of University to Entrepreneurial Organization" suggested that the promotion of University to Entrepreneurial Organization is influenced more by the inspirational motivation of transformational leaders than other variables. In addition they stated that the more the managers have inspirational motivation features, the more likely a university will promote to an entrepreneurial organization (19). Entrepreneurial management of the university is of great importance for fostering entrepreneurship and entrepreneurial activities based on the entrepreneurial management of the organization. An environment should be created where all the students and staff tend to move towards innovation and progress. Lack of commitment of university managers and leaders is the main cause of business failure. Fast and Perth (1981) stated that regardless of the size or stages of an organization evolution, if senior managers do not have commitment to change, business creation in the organization may fail (20). One of the most prominent organizational features of an entrepreneurial university is its management which plays an important role in the two following aspects in improving the compatibility of university organizational structures with entrepreneurial activities including participatory management. 1. University manager should manage creativity, innovation, and entrepreneurship in the university through creating the required atmosphere in universities. 2. University manager should transform university organization into an innovative and entrepreneurial organization through building creativity and innovation (21). The manager of the organization should lay the groundwork in a proper framework so that the universities would stay up-to-date and grow; and they would be a proper place for the cooperation of researchers and professors of the universities as well as an important place for education and research. Meanwhile, reformation of education and research system with emphasis on entrepreneurship in the organization has an effective impact on the transformation of universities to entrepreneurial universities. In addition to their traditional role, universities require to implement other partners' plan. In fact, in addition to educating and training students and staff, universities should participate in conducting research and producing science and knowledge as well as establishing and running knowledge-based companies. Due to the importance role of innovation and entrepreneurship, the issue of entrepreneurial university or third-generation university has received particular attention in recent decades. Considering the national and international evolution and transition from industrial society to knowledge society, adopting effective strategies is essential for utilizing new values and opportunities. To do so, education and research patterns of the university system need to evolve and skills and abilities of academic community (students, graduates, faculty members, managers and staff) should be promoted in line with innovation and entrepreneurship (22). In their study, Jarohnovich and Avotins proposed the three missions of

education, research, and industry for entrepreneurial universities in which education is provided through entrepreneurship education programs and skilled students are trained for entrepreneurship, as well as the output of research is transformed to scientific knowledge and consequently students can communicate with small businesses in reproductive companies (23).

In the same vein, considering all these factors, the managers and officials of University of Medical Sciences should give particular attention to the role and position of third-generation universities in the development of the country as well. Meanwhile, the two factors of focus and attention of management and human resources to entrepreneurship and reformation of education and research system with entrepreneurial perspectives should receive serious attention by university managers, since these two factors have the highest priority and impact among the studied factors. Therefore, the followings are suggested in line with these two factors:

✓ Those managers who have entrepreneurial vision should be employed in the organization. Managers' attention should be drawn to the future orientations of universities based on their visions and strategies. The managers of the organization should pay special attention to the mutual and effective collaboration between universities, industry, and business sectors. Entrepreneurship-related courses and workshops should be conducted for managers and executives. Regular meetings with experienced managers and entrepreneurs should be held. Particular attention should be paid to educational courses and extracurricular activities of human resources in the field of entrepreneurship. The entrepreneurship criterion should be considered in employing and promoting human resources. Operational and influential managers and staff need to be selected for decision-making and plans related to the transformation into third-generation universities. Entrepreneurship criterion should be considered in evaluating university performance and brainstorming sessions in the field of entrepreneurship in the organization conducted for managers.

✓ Teaching methods should be modified and revised in order to improve the quality of teaching. Innovative and applied methods should be used. Research and education activities should be performed collaboratively and in the form of teamwork. Curricula should be developed based on entrepreneurship and value creation. Multidisciplinary and transdisciplinary systems should receive particular attention. Positive steps should be taken towards the promotion and improvement of faculties of scientific groups with interdisciplinary attitudes. Fostering analytical skills and critical thinking should be considered in university curricula and entrepreneurship-based research and education activities should be developed.

Although the general purpose of this study was to identify and prioritize the factors affecting a third-generation university, considering and revealing the importance and necessity of entrepreneurship in the universities of the country can be mentioned as the ultimate goal. It is obvious that the development of this goal requires broader scientific efforts and more scientific researches.

**Ethical considerations:** Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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