ORIGINAL ARTICLE

Identifying strategies to increase the public-private partnership (PPP) with the aim of improving the quality of education in Mashhad University of Medical Sciences

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Background: Financing and developing the infrastructures of health and education services have been among the basic issues in health care management. The present study aimed to identify management solutions in attracting public-private partnership (PPP) in the construction, management, and development of healthcare centers and the expansion of educational spaces with the aim of increasing education quality.

Methods: The study exploited a Delphi technique to identify management solutions. The Delphi panel included 26 individuals, such as faculty members, heads of departments, directors of healthcare centers, and other experts. The inclusion criteria were a minimum academic degree of BSc and having relevant education and experience. In addition, the subjects had to have at least a valid scientific article, experience in conducting relevant scientific and executive studies, and membership in a relevant working group. The panel members were selected by purposive sampling, and the Delphi technique was conducted in three stages.

Results: The management solutions had seven dimensions, including finance-investment, legal, technical-engineering, managerial, governance-political, structural-procedural, and technology-skill. Each dimension had a number of components, the total number of which was reported at 76.

Conclusion: It seems necessary to focus on the dimensions and components of management solutions with the aim of increasing education quality. In this regard, it is vital to pay attention to partnership purchasing of services and products before concluding a PPP contract, guaranteeing perspective in PPP projects, support of PPP projects by insurance companies and banks, legal supports and incentives, stability in policies and instructions, and capacity building in the private sector to participate in PPP projects.

Keywords: Management Solutions, Public-private Partnership (PPP), Hospital Construction and Management, Mashhad University of Medical Sciences

تحديد استراتيجيات زيادة الشراكة بين القطاعين العام والخاص بهدف تحسين جودة التعليم في جامعة مشهد للعلوم الطبية

الخلفية: يعد تمويل وتطوير البنى التحتية للخدمات الصحية والتعليمية من بين القضايا الأساسية في إدارة الرعاية الصحية. هدفت الدراسة الحالية إلى تحديد الحلول الإدارية في جذب الشراكة بين القطاعين العام والخاص في بناء وإدارة وتطوير مراكز الرعاية الصحية وتوسيع المساحات التعليمية بهدف زيادة جودة التعليم.

أساليب العمل: استخدمت الدراسة تقنية دلفي لتحديد الحلول الإدارية. ضمت لجنة دلفي ٢٦ فردًا، مثل أعضاء هيئة التدريس ورؤساء الأقسام ومديري مراكز الرعاية الصحية وغيرهم من الخبراء. كانت معايير الاشتمال هي الحد الأدنى من الدرجة الأكاديمية لدرجة البكالوريوس والحصول على التعليم والخبرة ذات الصلة. بالإضافة إلى ذلك، يجب أن يكون لدى المشاركين مقال علمي صالح على الأقل، وخبرة في إجراء الدراسات العلمية والتنفيذية ذات الصلة، وعضوية في مجموعة عمل ذات صلة. تم اختيار أعضاء اللجنة عن طريق أخذ العينات الهادفة، وتم إجراء تقنية دلفي على ثلاث مراحل.

النتائج: كان للحلول الإدارية سبعة أبعاد، بما في ذلك التمويل والاستثمار، والقانوني، والهندسي الفني، والإداري، والحوكمة السياسية، والهيكلية الإجرائية، والمهارات التكنولوجية. وكان لكل بعد عدد من المكونات، بلغ العدد الإجمالي لها ٧٦.

الاستنتاج: يبدو من الضروري التركيز على أبعاد ومكونات الحلول الإدارية بهدف زيادة جودة التعليم. وفي هذا الصدد، من الضروري الاهتمام بالشراء التشاركي للخدمات والمنتجات قبل إبرام عقد الشراكة بين القطاعين العام والخاص، وضمان المنظور في مشاريع الشراكة بين القطاعين العام والخاص، ودعم مشاريع الشراكة بين القطاعين العام والخاص من قبل شركات التأمين والبنوك، والدعم والحوافز القانونية، والاستقرار في السياسات والتعليمات، وبناء القدرات في القطاع الخاص للمشاركة في مشاريع الشراكة بين القطاعين العام والخاص.

الكلمات المفتاحية: الحلول الإدارية، الشراكة بين القطاعين العام والخاص، بناء وإدارة المستشفيات، جامعة مشهد للعلوم الطبية

مشہد یونیورسٹی آف میڈیکل سائنسز میں تعلیمی معیار کو بہتر بنانے کے مقصد کے ساتھ پبلک پرائیویٹ پارٹنرشپ (PPP) کو بڑھانے کے لیے حکمت عملیوں کی نشاندہی

پس منظر: صحت اور تعلیم کی خدمات کے بنیادی ڈھانچے کی مالی اعانت اور ترقی صحت کی دیکھ بھال کے انتظام میں بنیادی مسائل میں سے ایک رہا ہے۔ موجودہ مطالعہ کا مقصد صحت کی دیکھ بھال کے مراکز کی تعمیر، انتظام اور ترقی میں پبلک پرائیویٹ پارٹنرشپ (**PPP**) کو راغب کرنے کے لیے انتظامی حل کی نشاندہی کرنا اور تعلیمی معیار کو بڑھانے کے مقصد سے تعلیمی جگہوں کی توسیع کرنا ہے۔

طریقے: مطالعہ نے انتظامی حلوں کی شناخت کے لیے ڈیلفی تکنیک کا فائدہ اٹھایا۔ ڈیلفی پینل میں ۲۶ افراد شامل تھے، جیسے کہ فیکلٹی ممبران، شعبوں کے سربراہان، صحت کی دیکھ بھال کے مراکز کے ڈائریکٹرز، اور دیگر ماہرین۔ شمولیت کا معیار بی ایس سی کی کم از کم تعلیمی ڈگری اور متعلقہ تعلیم اور تجربہ تھا۔ اس کے علاوہ، مضامین کے پاس کم از کم ایک درست سائنسی مضمون، متعلقہ سائنسی اور ایگزیکٹو مطالعہ کرنے کا تجربہ، اور متعلقہ ورکنگ گروپ میں رکنیت کا ہونا ضروری تھا۔ پینل کے ارکان کا انتخاب مقصدی نمونے کے ذریعے کیا گیا تھا، اور ڈیلفی تکنیک کو تین مراحل میں انجام دیا گیا تھا۔

نتائج: انتظامی حل کی سات جہتیں تھیں، جن میں فنانس-سرمایہ کاری، قانونی، تکنیکی-انجینئرنگ، انتظامی، گورننس-سیاسی، ساختی-طریقہ کار، اور ٹیکنالوجی کی مہارت شامل ہیں۔ ہر طول و عرض میں کئی اجزاء ہوتے تھے، جن کی کل تعداد ۷۶ بتائی گئی تھی۔

نتیجہ: تعلیمی معیار کو بڑھانے کے مقصد کے ساتھ انتظامی حل کے طول و عرض اور اجزاء پر توجہ مرکوز کرنا ضروری معلوم ہوتا ہے۔ اس سلسلے میں، پی پی پی معاہدہ کرنے سے پہلے خدمات اور مصنوعات کی شراکت داری پر توجہ دینا، پی پی پی کے منصوبوں میں نقطہ نظر کی ضمانت، انشورنس کمپنیوں اور بینکوں کی طرف سے پی پی پی منصوبوں کی حمایت، قانونی معاونت اور مراعات، پالیسیوں اور ہدایات میں استحکام، اور نجی شعبے میں پی پی پی کے منصوبوں میں حصہ لینے کے لیے استعداد کار میں اضافہ۔

کلیدی الفاظ: مینجمنٹ سلوشنز، پبلک پرائیویٹ پارٹنرشپ (**PPP**)، ہسپتال کی تعمیر اور انتظام، مشہد یونیورسٹی آف میڈیکل سائنسز

راهکارهای مدیریتی جلب مشارکت بخش عمومی – خصوصی (PPP) در ساخت و راهبری و توسعه بیمارستان‌ها و مراکز درمانی و گسترش فضاهای آموزشی با هدف افزایش کیفیت آموزش در دانشگاه علوم پزشکی مشهد

زمینه و هدف: تأمین مالی و توسعه زیرساخت‌های خدمات سلامت و آموزش موضوعی بنیادی در مدیریت بخش بهداشت و درمان به‌شمار می‌رود. تحقیق حاضر با هدف شناسایی راهکارهای مدیریتی در جلب مشارکت بخش عمومی – خصوصی (PPP) در ساخت و راهبری مراکز درمانی و گسترش فضاهای آموزشی با هدف افزایش کیفیت آموزش در دانشگاه علوم پزشکی مشهد انجام شد.

روش: در این تحقیق که با رویکردی کیفی به شناسایی راهکارهای مدیریتی پرداخته شده، از تکنیک دلفی بهره گرفته شد. پانل دلفی شامل ۲۶ نفر بود که شامل اساتید هیأت علمی دانشکده‌ها، رئیس گروه های آموزشی، رؤسای بخشهای درمانی و سایر گروه های متخصصین می‌باشد که گروه خبرگان این تحقیق را تشکیل داده‌اند. اعضای پانل دلفی به‌صورت نمونه‌گیری غیراحتمالی هدفمند انتخاب شدند و تکنیک طی سه مرحله به اجرا درآمد.

یافته‌ها: بر اساس نتایج حاصله از تکنیک دلفی، راهکارهای مدیریتی دارای هفت بُعد می‌باشد که به‌ترتیب اهمیت عبارتند از: (مالی – سرمایه‌گذاری، حقوقی – قانونی، فنی – مهندسی، مدیریتی، حاکمیتی – سیاسی، ساختاری – فرایندی و تکنولوژی – مهارتی). هر یک از ابعاد مذکور از چندین مؤلفه تشکیل شده‌اند که در مجموع ۷۶ مؤلفه می‌باشند.

نتیجه‌گیری: جهت نیل به اهداف پژوهش توجه به ابعاد فوق و مؤلفه‌های تشکیل‌دهنده آنها براساس اولویت مطرح شده کارگشا به نظر می‌رسد که از آن جمله می‌توان به خرید تضامنی خدمات و محصولات قبل از انعقاد قرارداد PPP؛ تضمین دورنما و آینده‌گری در پروژه‌های PPP و حمایت شرکت‌های بیمه‌ای و بانک‌ها از پروژه‌های PPP، حمایت‌ها و مشوق‌های قانونی، ثبات خط مشی‌ها و دستورالعمل‌ها، ظرفیت‌سازی در بخش خصوصی برای حضور در پروژه‌های PPP اشاره نمود.

واژه های کلیدی: راهکارهای مدیریتی، مشارکت بخش عمومی – خصوصی (PPP)، ساخت و راهبری بیمارستان‌ها و مراکز درمانی، رویکرد کیفی، تکنیک دلفی، بهبود کیفیت زیرساخت‌های آموزشی

INTRODUCTION

Strengthening physical infrastructures in various areas is one of the priorities of universities of medical sciences. Therefore, it is vital to heed attention to the infrastructure and formation of a proper foundation for the improvement of the quality of services provided by universities. Due to the growing increase in the population and economic development of various countries in the past few years, there has been a dire need for infrastructural constructs in many countries. Meanwhile, government budgets for the development of the necessary infrastructures of a country are conventionally limited and non-optimal (1).

In fact, governments may lack the necessary resources for investing in infrastructure even though it is important for economic growth. Therefore, government managers seek to cooperate with the private sector (2).

The public-private partnership (PPP) phenomenon was started when the government less intervened in the economic sector and as a solution to deal with the shortage of public resources for infrastructural investments. Therefore, governments have initiated inducing private investment due to insufficient financial space and increased social demand (3).

Despite the fact that PPP contracts are proper solutions to deal with limitations, they often do not lead to the realization of beneficiaries' goals because of their complexities (4). In fact, some factors can facilitate this cooperation (5). According to a report by the World Bank, the huge gap between the taste of public and private sector beneficiaries is the first cause of incomplete PPP projects (6).

Construction projects, such as roads, highways, schools, green spaces, hospitals, etc., are done by using PPP contracts in the world, and both parties (public and private sectors) benefit from these contracts in achieving the goals of their project. The cooperation between the private and public sectors leads to improved communications, financing, investment, outsourcing, construction, and development of infrastructures (7). Government officials play the key role in molding health-related policies and programs that fit the country's conditions. The last few years have seen an exponential rise in healthcare costs due to the increased population of the elderly and changes in people's lifestyles. This has forced governments to seek alternatives in order to reduce costs and expand services.

As the largest organization providing health services in the east of the country, Mashhad University of Medical Sciences is no exception and has required development in various sections in the past few years due to increased demand for healthcare services. Obviously, physical centers such as different buildings must be constructed to be able to provide services. Given the current budget situation, this issue has been a problem for the university, and the private sector can play a great role in solving the problem.

Therefore, the present study aimed to evaluate management solutions for attracting PPP in the construction, management, and development of hospitals and healthcare centers and expansion of educational spaces with the goal of improving education quality at Mashhad University of Medical Sciences.

In a study, Kazemi et al. (2021) determined the optimal model of build-operate-transfer (BOT) contracts in PPT contracts. Using the supposed parameters (lifetime, income, costs, future incomes discount rate, and salvage value of project costs), the simulation results for an optimal contract were calculated at 38 years (project utilization time), 78% (principal participation after transfer time), 45% (principal participation during the operation), and 7% (risks to the principal), respectively. According to the results, the foregoing parameters were fully matched with the theoretical properties of the model and the principals' utility was maximum besides the agent participation (8).

In another research, Ghafari et al. (2020) identified factors affecting PPP in urban construction projects and proposed a suitable model in this regard (case study: Tehran Municipality). Factors affecting public-private participation in Tehran's urban civil engineering projects and related models were extracted. In the end, seven factors that affected the success of PPP in the model were identified, which were: 1) transparent processes and procedures, 2) knowledge, skills, and support of managers, 3) legal support and incentives, 4) health of the administrative system, 5) political stability and support, 6) capacity building, and 7) policy making (9).

Heydarzadeh et al. (2020) investigated the factors affecting PPP in selected countries (with an emphasis on institutional factors). These scholars evaluated factors affecting PPP in 17 countries (Brazil, China, Colombia, France, Germany, India, Indonesia, Italy, Mexico, Peru, Philippines, Russia, South Africa, Spain, Turkey, United Kingdom, and Vietnam) through examining the channels affecting PPP as well as economic analysis by panel method. The results of the research econometric model showed the positive impact of government debt, market size, macroeconomic stability, and a strong legal system on the rate of PPP projects (10). Pimentel et al. (2017) assessed the impact of investment in PPPs on public, and private investment, and GDP in Portugal by using the VAR model during the period of 1998-2013. According to their results, public and private investment had a positive effect on GDP (11). Mota & Moreira (2015) explored the non-financial determinants which have generated a wide prevalence of PPPs within the European Context. The results emphasized the importance of PPP in macroeconomic legal spaces as much as the legal system. In other words, the quality of regulations and the effective rule of law are related to the effective implementation of PPP (12). Besada (2013) conducted a study entitled "doing business in fragile states: The private sector, natural resources and conflict in Africa, London: James Currency Publishers", concluding that private investment is strongly affected by the risk of expropriation, the degree of freedom of citizenship and bureaucracy, and economic growth is affected by the risk of expropriation and non-compliance with contracts in the long term. It was also mentioned that the probability of civil conflict, how bureaucracy is practiced, and the government's indifference to contracts play a key role in economic growth and investment performance (13).

METHODS

This research used a qualitative approach, the Delphi technique, and interviews to identify management solutions

in PPP in the construction of hospitals (case study: Mashhad University of Medical Sciences). In Delphi technique certain criteria must be considered in selecting experts. These criteria must fully comply with the research topic and model under study. In this research, 26 people, including faculty members, heads of departments, heads of medical departments, and other groups of experts, were selected as members of the expert panel. After the formation of an expert panel, a pre-developed questionnaire was given to the subjects as the first stage of the Delphi method to identify management solutions in PPP in the construction, management, and development of hospitals and healthcare centers and the expansion of educational spaces to increase education quality.

In the second stage of the Delphi method, another questionnaire developed based on the results of the first stage of the Delphi technique was given to the panel of experts, who were asked to express their opinions about the items with scores from "completely agree" to "completely disagree." Following receiving and processing the opinions of panel members regarding each of the variables obtained from the first Delphi stage, the components and dimensions that received a score above four were kept and other variables were removed. At the end of this stage, 7 dimensions and 76 components were accepted by the panel members. However, the third Delphi stage was performed due to a lack of consensus and homogeneity among the responses of Delphi panel members and reaching consensus. According to the results, all dimensions and components (7 and 76, respectively) had a mean score above four, and none of them were eliminated from the research at this stage. In fact, their level of importance was agreed upon by the panel of experts. Therefore, the model for identification of management solutions in PPP in the construction, management, and development of hospitals and healthcare centers and expansion of educational spaces with the goal of increasing education quality was created with 7 dimensions and 76 components.

Another criterion for reaching experts' consensus was the use of Kendall's Coefficient of Concordance (W), which is a scale to determine the degree of coordination and agreement between several rank categories related to N objects or individuals. In fact, the scale can be exploited to find the rank correlation between k-rank sets. Such a scale is especially useful in studies related to interjudge reliability.

Kendall's Coefficient of Concordance shows that people who have arranged several categories based on their importance have basically used similar criteria to judge the importance of each category and have a consensus in this regard.

This scale is one in the case of full consensus and is zero in the absence of consensus. "Schmidt" proposes a statistical criterion for deciding whether to continue the Delphi periods or stop the process. This criterion determines the level of consensus among panel members based on the value of Kendall's Coefficient of Concordance. According to this scholar, high consensus will be found when Kendall's Coefficient of Concordance is above 0.6 (Abbaasi Esfanjani, 2014).

Kendall's Coefficient of Concordance was used to further ensure consensus over the developed components and dimensions. The results were estimated at 0.47 in the second Delphi stage and 0.65 in the third Delphi stage, which demonstrated strong and acceptable consensus among the panel members regarding the conceptual model of the research. In addition, the value of the coefficient was reported at 0.45 in the second stage, which increased to 0.61 in the third stage. Considering the acceptable consensus range, there was an acceptable consensus among the experts regarding the studied dimensions and components.

Ultimately, the final conceptual model of the research was presented in Figure 2 following approving the model by the panel of experts and confirming its interjudge reliability.

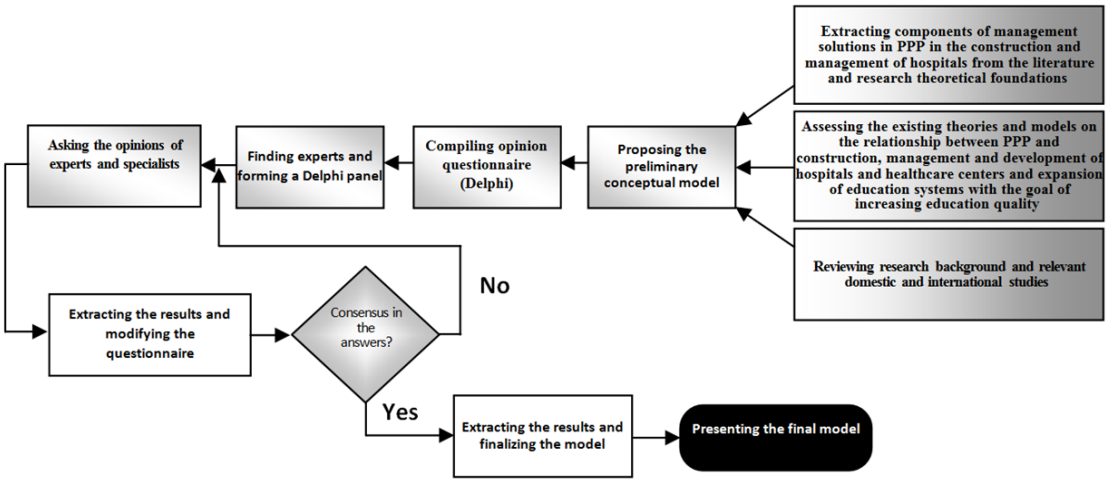

Figure 1. Implementation of the Delphi method based on the conceptual model

Table 1. Coefficient of Concordance along with the return rate of questionnaires based on different Delphi stages for each variable

Delphi	Number of Questionnaires		Questionnaire Return Rate	Kendall's Coefficient of Concordance
	Sent	Completed and returned		
First stage	26	25	100%	0.31
Second Stage	25	22	80%	0.47
Third stage	22	20	90%	0.65

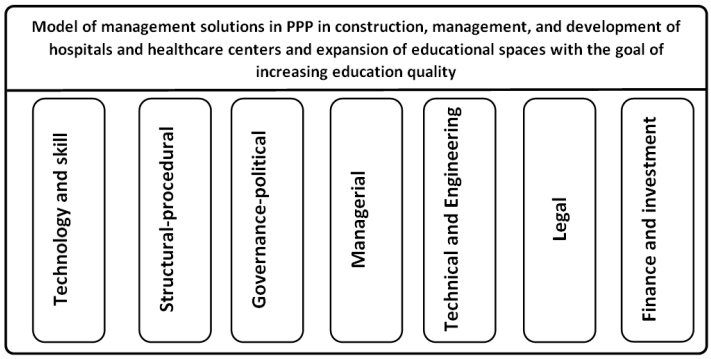

Figure 2. Model of management solutions in PPP in construction, management, and development of hospitals and healthcare centers and expansion of educational spaces with the aim of increasing education quality

RESULTS

As mentioned in the previous section, the Delphi method was the main technique in three stages. Here, we only focused on the results of the third stage in order to prevent stating similar findings in other stages. Therefore, the results obtained from the dimensions and components of the last Delphi method (i.e., the third stage) along with Student's t-test results and consensus index for each dimension and component are presented in table 2. Notably, the results were indicative of the significance and impact of all dimensions and components extracted from the Delphi method at this stage.

According to the results presented in Table 2, all dimensions finalized in the third Delphi stage were significant; therefore, the hypothesis of insignificance (null hypothesis) of all dimensions was rejected because the P-value of all of the dimensions was smaller than the supposed significance level ($\alpha=0.05$) ($P=value=0.000<\alpha=0.05$). In addition to the mean values and the consensus index, the Student's t-test results were indicative of the significance and effectiveness of all dimensions obtained from the Delphi method in the model of identification of management solutions in PPP in the construction, management, and development of hospitals and healthcare centers and expansion of educational spaces with the aim of improving education quality in Mashhad University of Medical Sciences. Furthermore, the consensus index value was close to two for all dimensions, which indicated the high consensus of the panel members on each dimension of the research conceptual model. The consensus index is the extent to which the experts of the present study had an agreement regarding the significance of each of the proposed dimensions in the conceptual model of the research. In fact, the index was calculated by using a five-point Likert scale with the alternatives of "completely appropriate", "appropriate", "partially appropriate", "inappropriate", and "completely inappropriate."

$$Consensus\ index = \frac{\begin{array}{c}the\ number\ of\ responses\ to\ the\ completely\ appropriate\ alternative \times (2) + the\ number\ of\ responses\ to\ the\ inappropiate\ alternative \times (1) \\ +the\ number\ of\ responses\ to\ the\ partially\ appropriate\ alternative \times (0) \\ +the\ number\ of\ responses\ to\ the\ inappropriate\ alternative \times (-1) + \\ the\ number\ of\ responses\ to\ the\ completely\ inappropriate\ alternative \times (-2)\end{array}}{Total\ number\ of\ responses\ to\ questions}$$

Here, consensus index values closer to zero indicated the dispersion of opinions or a large dispersion among the responses of the experts, whereas the farther the consensus index is from zero, the greater the experts' agreement on the topic. In this study, the value of the consensus index was estimated in a range of "+2 to -2", and the level of consensus on each dimension or component was determined through this calculation. The results of which are shown in Table 2.

The results were indicative of the consensus of all panel members regarding all extracted components (because all calculated coefficients were significantly far from zero and close to +2, which is the maximum level of consensus). Therefore, all dimensions and components of management solutions in PPP in construction, management, and development of

hospitals and healthcare centers and expansion of educational spaces with the aim of improving education quality (7 dimensions and 74 components) were significant based on Table 2 and can be used in the research model.

Table 2. Descriptive and inferential statistics based on the opinions of a panel of experts regarding the components of each dimension of management solutions in PPP in the expansion of educational spaces with the aim of increasing education quality along with presenting the consensus index

Dimensions	Components	Descriptive Index	Inferential Results			Consensus Index (-2 to +2)	Result
		Mean (SD)	T-Value	df	P-value		
Finance and investment	Financial appeal of the project	4.58 (4.79)	4.975	18	0.000	1.58	confirmed
	Guarantee determination model	4.83 (0.38)	9.220	17	0.000	1.83	confirmed
	Considering the financial capacity of contractors	(0.50)4.63	5.555	18	0.000	1.63	confirmed
	Return on investment in a guaranteed period of time	(0.47)4.70	6,658	19	0.000	1.70	confirmed
	Support of insurance companies for such projects	4.50 (0.62)	3.341	17	0.003	1.50	confirmed
	Familiarizing investable institution with investment literature	4.53 (0.70)	3.293	18	0.004	1.53	confirmed
	Special financial support of banks and credit institutions for contractors in this field	4.53 (0.51)	4.472	18	0.000	1.53	confirmed
	Controlling the necessary financial resources of the contractors before handing over the project	4.55 (0.60)	4.067	19	0.001	1.55	confirmed
	Timely payment of salaries and fees according to the announced schedule	4.72 (0.46)	6.648	17	0.000	1.72	confirmed
	Facilitating the issuance guarantees and guarantors by banks	4.70 (0.47)	6.658	19	0.000	1.70	confirmed
	Partnership purchase of services and products before concluding the contract	4.65 (0.49)	5.940	19	0.000	1.65	confirmed
	Attention to the general prosperity of investment in the health sector with the aim of increasing education quality	4.63 (0.50)	5.555	18	0.000	1.63	confirmed
	Empowering the private sector to fully face the challenge of investing in PPP projects	4.60 (0.60)	4.485	19	0.000	1.60	confirmed
	Guaranteeing perspective and foresight (financial security) in PPP projects	4.63 (0.50)	5.555	18	0.000	1.63	confirmed
	Total	**4.79 (0.42)**	**8.216**	**18**	**0.000**	**1.79**	**confirmed**
legal	Efficiency and transparency of laws and regulations in this filed	4.53 (0.62)	3.497	16	0.003	1.53	confirmed
	Stability in rules and regulation	4.74 (0.45)	7.099	18	0.000	1.74	confirmed
	Legal support and incentives	4.79 (0.42)	8.216	18	0.000	1.79	confirmed
	Assimilation of the frame work of partnership contracts	4.60 (0.60)	4.485	19	0.000	1.60	confirmed
	Drafting of the issue upstream regulation and documents	4.60 (0.50)	5.339	19	0.000	1.60	confirmed
	Consistency of policies and guidelines	4.68 (0.48)	6.245	18	0.000	1.68	confirmed
	Transparency in calls and advertisements	4.68 (0.48)	6.245	18	0.000	1.68	confirmed
	Considering the conditions of force majeure	4.55 (0.51)	4.819	19	0.000	1.55	confirmed
	Introduction of officials and authorities of supervisory and executive agents	4.45 (0.69)	2.932	19	0.009	1.45	confirmed
	Modification of legal licenses	4.67 (0.49)	5.831	17	0.000	1.67	confirmed
	Code of criminal Procedure	4.40 (0.60)	2.990	19	0.008	1.40	confirmed
	Compilation of codified and stable bylaws in relation to collaborative projects	4.68 (0.48)	6.245	18	0.000	1.68	confirmed
	Correcting and removing cumbersome regulations by the assembly and cabinet	4.75 (0.44)	7.550	19	0.000	1.75	confirmed
	Facilitating the process of obtaining legal permits	4.65 (0.49)	5.940	19	0.000	1.65	confirmed
	Control of ownership documents and ability to the project execution location by the employer	4.45 (0.60)	3.327	19	0.004	1.45	confirmed
	Total	**4.85 (0.42)**	**8.216**	**18**	**0.000**	**1.79**	**confirmed**

Table 2. Continued

Dimensions	Components	Descriptive Index	Inferential Results			Consensus Index (-2 to +2)	Result
		Mean (SD)	T-Value	df	P-value		
Technical-engineering	Capacity building in private sector	4.50 (0.51)	4.359	19	0.000	1.50	confirmed
	Project scope management	4.40 (0.68)	2.629	19	0.017	1.40	confirmed
	Control of estimates and values and updating the estimated amount	4.63 (0.50)	5.555	18	0.000	1.63	confirmed
	Controlling the adequacy of plans, schedules, etc. of contractors before initiating the project	4.75 (0.44)	7.550	19	0.000	1.75	confirmed
	Facilitating the use of internal and external expect consultants for the design, construction, and management of the hospital byPPP	4.50 (0.69)	3.249	19	0.004	1.50	confirmed
	Explaining and teaching standards such an Iranian Concrete Code, publication 55, and 22 subjects to contractors	4.63 (0.60)	4.609	18	0.000	1.63	confirmed
	Preparation of the project charter and objectives before handing it over	4.40 (0.50)	3.559	19	0.002	1.40	confirmed
	Provision and equipment of construction machinery and equipment for hospitals by the assignor	4.60 (0.50)	5.339	19	0.000	1.60	confirmed
	Providing safety training (personnel, machinery, workshop, and work environment) to contractors	4.60 (0.50)	5.339	19	0.009	1.60	confirmed
	Clarifying work requirements and service quality in PPP projects	4.55 (0.51)	4.819	19	0.000	1.55	confirmed
	Total	**4.85 (0.37)**	**10.376**	**19**	**0.008**	**1.85**	**confirmed**
Managerial	Introducing and documenting possible risks in the project	4.74(0.45)	7.099	18	0.000	1.74	confirmed
	Identification and introduction of the project beneficiaries to the contractors and the influential power of each of them in the project	4.47(0.51)	4.025	18	0.001	1.47	confirmed
	The positive belief of effective managers The determination and seriousness of senior managers to hand over projects	4.56(0.62)	3.828	17	0.001	1.56	confirmed
	The determination and seriousness of senior managers to hand over projects	4.50(0.61)	3.684	19	0.002	1.50	confirmed
	Marketing of relevant officials to attract contractors	4.80(0.41)	8.718	19	0.000	1.80	confirmed
	Holding organizations and institution related to projects accountable by senior government managers	4.61(0.50)	5.169	17	0.000	1.61	confirmed
	Prioritizing the assignment of PPP projects by senior managers	4.42(0.69)	2.650	18	0.016	1.42	confirmed
	Coordination and cooperation with contractors to solve problems	4.75(0.44)	7.550	19	0.000	1.75	confirmed
	Increasing the necessary knowledge, skills, and expertise of managers in this field	4.53(0.51)	4.472	18	0.000	1.53	confirmed
	Stability in related specialized management teams in this field	4.50(0.61)	3.684	19	0.002	1.50	confirmed
	Fulfilment of commitments by managers in PPP projects	4.65(0.49)	5.940	19	0.000	1.65	confirmed
	Total	**4.68(0.48)**	**6.245**	**18**	**0.000**	**1.68**	**confirmed**
Governance and political	Political stability in the country	4.50(0.51)	4.359	19	0.000	1.50	confirmed
	Introducing a new attitude and approach to the category of hospital construction and management	4.63(0.50)	5.555	18	0.000	1.63	confirmed
	Cultivating and correcting the wrong view of the private sector investor	4.60(0.50)	5.339	19	0.000	1.60	confirmed
	Facilitating the entry of capital and attracting internal and external resources	4.65(0.49)	5.940	19	0.000	1.65	confirmed
	Cooperation of supervisory and inspection agencies	4.68(0.48)	6.245	18	0.000	1.68	confirmed
	Justification of the government sector for fear of diminishing power, sovereignty, and jurisdiction	4.40(0.60)	2.990	19	0.000	1.40	confirmed
	Preventing the limitation of various therapeutic and educational capacities	4.56(0.51)	4.610	17	0.000	1.56	confirmed
	Stability and all-round political support for contractors in this area	4.84(0.37)	9.798	18	0.000	1.84	confirmed
	Issuing a license for the establishment of chain educational hospitals	4.63(0.50)	5.555	18	0.000	1.63	confirmed
	Encouragement and motivation in the private sector by the government	4.65(0.49)	5.940	19	0.000	1.65	confirmed
	Total	**4.65(0.49)**	**5.940**	**19**	**0.000**	**1.65**	**confirmed**

Table 2. Continued

Dimensions	Components	Descriptive Index	Inferential Results			Consensus Index (-2 to +2)	Result
		Mean (SD)	T-Value	df	P-value		
Structural-procedural	Persuading insurance companies to provide insurance coverage for various project risk	4.53(0.51)	4.472	18	0.000	1.53	confirmed
	Introducing the opportunities and capacities of the city/province	4.40(0.60)	2.990	19	0.008	1.10	confirmed
	Widespread announcement to invite cooperation	4.45(0.60)	3.327	19	0.004	1.45	confirmed
	Modifying and improving the structure and process of assignments	4.37(0.50)	3.240	18	0.005	1.37	confirmed
	Providing basic infrastructure to improve the medical education and treatment of people	4.60(0.50)	5.339	19	0.000	1.60	confirmed
	Transparency in the investor selection process	4.72(0.46)	6.648	17	0.000	1.72	confirmed
	Cooperation and support of passive defense in handovers	4.79(0.42)	8.216	18	0.000	1.79	confirmed
	Proper distribution of responsibilities in PPP projects	4.65(0.49)	5.940	19	0.000	1.65	confirmed
	Accurate definition and formulation of the PPP process in medical education projects	4.56(0.51)	4.610	17	0.000	1.56	confirmed
	Total	**4.58(0.51)**	**4.975**	**18**	**0.000**	**1.58**	**confirmed**
Technology and skill	Equipping contractors with new data collection system, document filing, and as-built drawings	4.60(0.50)	5.339	19	0.000	1.60	confirmed
	Appropriate skill, experience, and expertise among private sector investors	4.68(0.58)	5.121	18	0.000	1.68	confirmed
	Empowering the public sector in the development of PPP process management	4.45(0.51)	3.943	19	0.001	1.45	confirmed
	Having a qualified expert force to carry out PPP projects	4.79(0.42)	8.216	18	0.000	1.79	confirmed
	The use of new technical equipment and hardware by the private sector in carrying out projects	4.58(0.51)	4.975	18	0.000	1.58	confirmed
	Total	**4.80(0.51)**	**8.718**	**10**	**0.000**	**1.80**	**confirmed**

DISCUSSION

The present study aimed to identify management solutions in PPP in the construction, management, and development of hospitals and healthcare centers and expansion of educational spaces with the aim of improving education quality in Mashhad University of Medical Sciences using a qualitative approach and the Delphi method Following conducting the Delphi method in three stages, the results showed that there were seven dimensions regarding management solutions in PPP in the construction, management, and development of hospitals and healthcare centers and expansion of educational spaces with the aim of improving education quality which included: finance and investment, legal, technical and engineering, managerial, governance and political, structural – procedural, and technology and skill. The foregoing dimensions encompassed 76 components, which were introduced in the results section of the research.

✓ Considering that the structure of the PPP model is directly dependent on institutions and economic, social, cultural, executive, and managerial structures, it is vital to compile a comprehensive and inclusive program within the framework of the upstream laws and based on the institutional structure of the country to lay the groundwork for the implementation and expansion of this type of participation in various fields.

✓ Removing any government or infrastructural obstacles in various fields such as software-hardware of centralized information systems related to projects by eliminating legal obstacles, cumbersome regulations, and laws related to pricing, will facilitate the process of implementing the PPP model and projects.

✓ Carrying out comprehensive studies regarding the fields of expansion and utilization of the PPP model in various structures and sub-sectors in the universities of medical sciences of the country according to the specific requirements of each city as well as the requirements of each structure in integrated urban management (spatial, economic, and social structures)

As shown by Delphi technique results, the finance and investment dimension was one of the most important effective dimensions in management solutions in attracting and improving PPP in the construction, management, and development of hospitals and healthcare centers and expansion of education space with the aim of increasing education quality in Mashhad University of Medical Sciences. In fact, it had the highest priority among the dimensions from the perspective of experts. Therefore, it is suggested that beneficiary areas and relevant ministries take the necessary measures in the partnership purchase of services and products before concluding the contract,

ensuring perspective in PPP projects and supporting insurance companies and banks for PPP projects.

The legal dimension was prioritized second among the dimensions affecting the identification of management solutions in attracting and improving PPP in the construction, management, and development of hospitals and healthcare centers and expansion of education space with the aim of increasing education quality in Mashhad University of Medical Sciences. In this area, it is recommended that legal supports and incentives, stability of policies and guidelines, and elimination of cumbersome laws be taken into account in concluding PPP contracts in order to witness advancements.

In terms of importance, the technical and engineering dimension was the third prioritized dimension based on experts' opinions in the identification of management solutions in attracting and improving PPP in the construction, management, and development of hospitals and healthcare centers and expansion of education space with the aim of increasing education quality in Mashhad University of Medical Sciences. Overall, there are few obstacles in this field due to the considerable potential and experiences of consultants and contractors of medical universities in Iran. Nevertheless, special attention must be paid to components such as capacity building in the private sector to participate in PPP projects.

Finally, other dimensions and components of the research, which were presented in Table 2, can be used to make progress in PPP contracts, especially in the field of medical universities and the construction of hospitals and healthcare centers.

Notably, our findings are congruent with the results of previous studies. For instance, Ghafari et al. (2020) mentioned the dimensions of skill and legal support and incentives. Mota & Moreira (2015) introduced the legal investment system as an effective factor in the investment of the public and private sectors in PPP. However, the difference between the current research and previous studies was data collection through the use of a qualitative approach and interviews with experts. In addition, the present researchers aimed to evaluate a set of factors in this area.

Finance and the development of health service infrastructures have been fundamental issues in the healthcare sector. At the same time, the public sector deals with challenges in financing healthcare services due to the introduction of novel technologies, the explosion of knowledge, informed clients, changed needs, and epidemiological and population transitions. Therefore, examining and developing models to improve the quality and manage the costs of providing services is on the agenda of health system policymakers. In this regard, a solution is to use the resources, experiences, and skills of the private sector in government institutions or PPP. In fact, PPP has been used as an option to improve the quality of service delivery and infrastructure development for a long time in various economic sectors. This participation in the healthcare section has been a relatively new experience, which has increased significantly in the past decade worldwide. Despite its acceptable benefits, the long-term outcomes of PPP have yet to be determined due to the limited raw data. Without a doubt, there is a need for attracting private investors in developing services because of the growth of urbanism, the increase of contagious diseases, and domestic and international economic problem.

One of the strengths of the current research was assessing a set of management solutions in attracting and improving PPP in the construction, management, and development of hospitals and healthcare centers and expansion of education space with the aim of increasing education quality in Mashhad University of Medical Sciences. We also used a qualitative approach and evaluated the opinions of an expert panel, which was another strength of the present study.

Obviously, there could be other factors affecting the PPP phenomenon that was not covered in this research. Therefore, it is recommended that the role of other factors such as the possibility of returning a part of the costs of participating in the tender for the bidders, clarity of goals and responsibilities, fair risk sharing and allocation between the parties, reducing the cost of the public sector through the reduction of involvement, and motivating the private sector be assessed in future studies.

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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