

The Comprehensive Quality in Health Services by Using Six Sigma

Dr. Amal Hassan Mohammed Yassin

Abstract

The study aimed to know the overall quality of the concept and its importance in providing high-quality health services and the availability of the key factors in the application and services and to take administrative factors, technical and human and financial, which may contribute to the raise if directed properly and have an adult in improving the quality of health services impact. Based on the nature of the study and the objectives it seeks, the analytical descriptive approach was used. It was based on the study of the phenomenon as it exists in reality and it is treated as a precise description and expressed in qualitative and quantitative terms. To analyze the analytical aspects of the research subject and then collect the initial data through the questionnaire as a main tool for research, designed specifically for this purpose, and distributed to government hospitals in Khartoum State, and included the study community department managers and patients in government hospitals in Khartoum state. A random sample was collected (300) department managers and patients from the Khartoum government hospitals. Each individual has the opportunity to be a member of the study sample during the year 2016. The study concluded with a number of results, the most important of which is that the hospital management has the material potential (furniture, equipment, ...) to use the Six Sigma curriculum with an intermediate degree. The hospital management is ready to use the Six Sigma curriculum to a high degree. Six Sigma In the middle level, the hospital management is keen to train the heads of departments to form teams for the process of continuous improvement to a high degree, the hospital administration is continuously improving the purpose of reducing the deviations and errors that occur, the hospital management is ready to provide an information system Its data continuously At, there is the management of the hospital readiness to provide direct contact with an intermediate degree of quality coaches tuning software system. The study presented a number of recommendations, the most important of which is linking the promotion system in the public hospitals in Khartoum state with the quality control program, paying attention to the overall quality and stressing the possibility of using it in hospitals in Khartoum State because of its scientific and practical importance and improving the quality of the services and the operations provided.

Keyword: total quality management, health services, competitiveness, sigma six

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The study presented a number of recommendations, the most important of which is linking the promotion system in the public hospitals in Khartoum state with the quality control program, paying attention to the overall quality and stressing the possibility of using it in hospitals in Khartoum State because of its scientific and practical importance and improving the quality of the services and the operations provided.

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Introduction:

Quality within the common linguistic concepts expresses a status that is closely connected within the prescribed. Such prescribed thing might be tangible as goods or intangible as services. Which means that

the thing is prescribed thing is characterized by positive characteristics that is acceptable at least from the authority that deals with it. Accordingly, the quality is connected with tangible and intangible things in an acceptable manner since its described and embedded advantages surpass its disadvantages, or these things have obtained positive characteristics with certain levels of acceptance and rejection.⁽¹⁾

The concept of comprehensive quality management is considered from modern administrative concepts which depends on a group of ideas and principles that enable the institutions that have various activities to apply it in order to accomplish the best performance, improve its productivity, increase its profits, improve its reputations in the market whether local or external.

The comprehensive external quality is regarded as the best method for moving forward as well as the basic measurement for preferentialism between institutions that has been used in various organizations due to extreme importance strategy which in turn increased its importance and its ability to remain in the computational market.

The quality of health services has developed since it focused on the clinical care in the hospitals. The doctor's relation with the patient considered as the core of quality. After that such concept when the service relation was with the client which means the emergence to the role of the team individuals whether medical, administrative, the supportive services in quality. For example, a high competent surgeon can make a successful surgery, but due to the weakness of the nursing services after the operation the complications occur on the final results of the surgery, consequently on quality service".⁽²⁾

The comprehensive quality management requires a continuous improvement processes for products, services; performance without any interruption, the perfectness shall be the second required goal that cannot be easily achieved. Therefore, the organization policy and its organizational structure, and the methods of its working shall be achieved on the basis of encouraging and supporting the improvement and development processes in order to provide the best continuously.

The aims of the study revolve around knowing the concept of the comprehensive quality and its importance in providing high quality health services and the extent of having both the primary factors in application and the services as well as taking into consideration financial, humanitarian, technical, and administrative factors that contribute, enhance, and have the optimal impact in improving the quality of health services. The study depended on the analytical descriptive approach through an applied study in order to know the importance of the comprehensive quality in health services.

The data of this study is culled by referring to literature, books, theses, scientific researches, financial reports, and magazines in order to build a theoretical framework of the study and accomplish its goals. In addition, a study case has been adopted in order to study the comprehensive quality and its importance in health services.

2. Theoretical framework:

The general concepts of the comprehensive quality management

The concept of comprehensive quality management is considered from modern administrative concepts that depend on a group of ideas and principles of the institutions with its various fields and activities since

applying comprehensive quality management reflects positively on institutions in terms of achieving the best performance, increasing their profits, improving their reputations in the external and local markets.

The most important definitions that tackled the concept of comprehensive quality management as follows:

The federal quality institute defines it as: “a comprehensive applied approach aims at achieving the client’s needs and expectancies that employ the quantitative methods for the purpose of continuous improvement in services and operations”.⁽³⁾

It has another definition as “ a long term effort that aims at orienting the whole institution’s activities towards quality concept, the comprehensive quality management is accomplished when the institution becomes able to provide goods or services that meet the consumers’ expectancies and when the commitment of the continuous improvement becomes as a part of organization culture”.⁽⁴⁾

Alshebrawe believes that the concept of comprehensive quality management is one of the newest management concept and attempting approach for private and public sectors alike. The comprehensive quality management represent an excellent strategy for achieving the best competitive situation since it provides the methods and tools for such competitive situation, improves the knowledge and skills for the whole management levels. It constantly focuses on making continuous improvement in quality. It has a long term vision of the consumers, changes, and improvements that might occur.⁽⁵⁾

Researchers believe that most of comprehensive quality management definitions have the same basics in spite of its different definitions in terms of its concentrating on comprehensiveness, continuous improvement, working on satisfying the consumer, improving the participation between workers.

The goals of comprehensive quality:⁽⁶⁾

- Creating an environment that maintains and supports the continuous development.
- Involving the whole workers’ effort in the organization.
- Improving and following the measurement tools for operations’ performance.
- The necessity to reach the efficiency and effectiveness in productivity process to transforms the inputs to final outputs that serves the client’s needs.
- Continuous improvement on the quality of outputs.
- Elevating the level of efficiency by increasing the mutual cooperation and efforts to the various management levels and supporting the group work.
- Guiding the workers to take the resolutions on the basis of facts not feelings.
- Finding a cultural context that increases the clients’ awareness.
- Monitoring the whole efforts for attracting a large number of clients and to decrease their complaints if applicable.

The primary requirements for applying the comprehensive quality management:⁽⁶⁾

- Reshaping the system and the culture related to the organization.
- Marketing and promoting the program.

- Teaching and training the workers.
- The assistance of specialized consultancies.
- Reshaping the work's team in order to accomplish the tasks effectively.
- Encouraging and motivating the workers toward working.
- Supervising the operations and watching their performance.

The strategic planning for the comprehensive quality

It defines as: determining the primary objectives for obtaining a long term quality as well as the primary steps for accomplishing these objectives as well as adding indicators and measures for measuring the performance levels.⁽⁵⁾

The strategic planning in quality management starts by preparing and working to the next phase, thinking and predicting its future, the organization work nature as well as the strategies that will be followed to accomplish long term objectives are taken into consideration in this step. After that the determined plans will be developed, and then work planning for sections, workers, and existed activities that occur after determining them effectively.

Comprehensive quality in health sectors:

The interest in health services quality refers to the 1910 AD when Dr. Ierstink Doman suggested a system called the final results as a standard for hospitals performance, such system requires watching every patient for sufficient period to ensure the efficiency of the given remedy. If the remedy is ineffective, the hospital will look for the reasons behind that in order to attain benefits in the future.

American College of Surgeons has developed in 1917 a group of standards followed by a system for inspecting and searching in 1918 AD. After that in 1915 AD a mutual committee that is assigned to supervise on the organizations that provide health services. Next, in 1970 AD the standards have been reformulated to represent the optimal level of the quality levels that can be achieved.⁽⁷⁾

The definition of quality in health field

In the context of health care, the determined and hoped goal in any health system is to improve the health situation. The definition of quality becomes much harder when it is related to physical or psychological aspects and less harder when it is related to the health level in general.

Loohar defines the quality of health service as “the level that health services whether for individuals or community reach to elevate the general health level for accomplishing better life and by applying the latest scientific and technical that are accomplished through the best performance”.⁽⁸⁾

It considers as new features of a developed service i.e. it defines as innovating new characteristics that attract the beneficiaries, distinguish doctors' performance or distinguish health service unit from others as follows:

- Integrated services.
- A lucrative waiting place.
- A computerized medical report.

- Providing hot meals in the internal section.
- Follow cases by phone.
- The instructions are clear and it shall be abided by the members of the health team.
- House follow-up visits.⁽⁹⁾

The dimensions of comprehensive quality in health sectors:

- **Continuous improvement:** the comprehensive quality management requires improvement operations to the products, services, performance without any interruption. The perfectness shall be the second required goal that cannot be easily achieved. Therefore, the organization policy and its organizational structure, and the methods of its working shall be achieved on the basis of encouraging and supporting the improvement and development processes in order to provide the best continuously. Thus, development and improvement process is the responsibility for everybody works in the organization like the presidents, subordinates, and the whole of organizational levels.⁽¹⁰⁾
- **Taking decisions according to the information:** improving the information systems is one of the best requirement for applying the comprehensive quality management because the existence of these essential information system enhances the level of certainty while taking decision and impact positively on cost and efficiency factors which reflect on the type of goods and provided services. When all the facts depend on achieving abundance in the information, it gives a clear view to the decision maker about the surrounding circumstances. Consequently, it helps him/her to take a decision in the light of these facts. Generally speaking, the computerized information system aids decision makers both to accomplish their tasks and to resolve the work problems effectively.⁽¹⁰⁾
- **Supporting the higher management:** the success of the comprehensive quality management and applying its methodology depend on the extent of higher management's conviction and belief about its importance and necessity to accomplish the continuous improvement in the goods and service quality to find a good competitive center to the organization in the market. Such conviction shall be expressed through a continuous material and moral support, providing an appropriate organizational atmosphere by considering the new methodology of comprehensive quality management require taking strategic resolutions from the higher management of the organization that has only the authority to take these resolutions.
- **Concentrating on the patient:** which considers one of the most important pillars on the comprehensive quality management. The international Malcom Award has allocated 25% of the evaluation marks in order to obtain such award.⁽⁷⁾ In a condition to connect the organization success in the long run with the organization interest of its clients and how to accomplish their wishes through its efforts in maintaining its customers and its ability to respond instantly to their dynamic needs and wishes constantly. Besides, providing services that satisfying or exceeding their expectancies.

The benefits of applying the comprehensive quality in health sectors:

It is clearly obvious from the objective usage to the comprehensive quality management achieving various successes that are represented by the following points: ⁽⁸⁾

- 1- Achieving profitability and a competitive ability in the market.
- 2- Diminishing the accidents and complaints.
- 3- Achieving consumers' satisfaction.
- 4- Increasing the organizational efficiency.
- 5- Accomplishing various benefits.

The desired goals from applying the comprehensive quality: ⁽⁹⁾

- 1- Achieving patients' satisfaction: includes improving the relations with the patients (open communications) and the patients' satisfaction about the provided services.
- 2- Improving the competitive ability.
- 3- Improving the quantitative productivity i.e. increasing the number of patients in one bed.
- 4- Decreasing the cost of health services production.
- 5- Decreasing and preventing the medical errors.

The fields of applying the comprehensive quality management in health sectors: ⁽¹⁰⁾

- 1- **The level of care effectiveness:** the level of achieving the used health procedures to achieve the desired goals of it i.e. when the care improves the human age in addition to the ability of having the job performance and the constant feeling of enjoyment and happiness.
- 2- **Appropriateness:** choosing the appropriate health procedures for the patient case.
- 3- **Acceptance:** accepting the patient and community in order to use a certain health procedure.
- 4- The ability to access a health service: such as the waiting lists that are used for obtaining appointments whether in outpatient clinics, hypnosis, or to make surgeries.
- 5- **Equity:** the extent of having health care for those who really need it and the inequality of obtaining it among the categories of the society for unhealthy reasons.
- 6- **Efficiency:** the optimal usage for the resources and costs by taking into consideration other needs. Study case has been used in governmental hospitals in Khartoum state in order to know the extent of commitment and higher management support in quality control as well as the extent of having the processes and systems in applying the comprehensive quality.

Applying aspect:

Study community expresses all the phenomenon terminologies that are studied by the researcher. Therefore, study community defines all the individuals or things that compose the study subject. Study community includes departments' managers and patients in the governmental hospitals in Khartoum state. The study tool after verifying its validity was distributed to three arbitrators in a number of official universities, and then it was randomly distributed to the workers in the medical and administrative sectors in the governmental hospitals in Khartoum. The number of questionnaires reached to (320) while the

number of recovered questionnaires reached to (300) and the recovery percentage reached approximately to (94%), it has been ascertained after the verification that all of them are valid to be included in the analysis. Study tool has been prepared and developed that is represented by a questionnaire for collecting data about the study variables, after a comprehensive reviewing to the literatures and related studies to the study subject. The researcher will touch upon rendering the study content as follows:

The first section: includes demographic information about the study sample which involves (age, scientific qualification, years of experience, work field, the number of training courses that have been enrolled in the field of six sigma).

The second section: includes the questionnaire axis which includes (22) paragraph that are distributed to (4) axis: commitment, higher management support, quality control tools, applying the program six sigma in the hospitals in Khartoum state, it includes (5) paragraphs continuous improvement and quality control and includes (6) paragraphs.

The extent of having the human materials in quality control and applying the approach of six sigma and included 5 pages, the extent of having the processes and the systems in applying six sigma in order to obtain an outstanding results in quality control and included (6) pages. The researcher has adopted five points scale/Likert to determine the level of responses in study tool by adding the symbol (×) to the answer that reflects their approval degree whether very high, high, intermediate, low, very low in order to evaluate the level of responses on the study axis from the perspective of workers in medical and administrative sector in the governmental hospitals in Khartoum state. Three levels of arithmetic averages have been adopted as follows:

Intermediate	Evaluation
More than 3.6	High quality
From 2.6 to 3.6	Acceptable
Less than 2.6	Requires development

The first hypothesis: there is no statistically significant effect to the commitment and higher management support at the significant level (0.05).

To discuss such hypothesis the averages and standard deviations have been taken to the evaluations of the study tool sample on the paragraphs of the first study axis. Table (4) clarifies that. In addition, sample T. test was applied to the individual samples on the general deviations to the paragraphs that measure the extent of commitment and higher management support on the quality control in the hospitals in Khartoum state from the point of view of the administrative and medical staff as demonstrated in Table (1).

The first axis of the study contains (5) paragraphs that elaborates the most important methods of the commitment and higher management support such as the quality control in the hospitals in Khartoum state (acceptable) through the result of its general arithmetic average that reached to (3.50) the arithmetic averages and standard deviations have been taken for each paragraph of the study as demonstrated in the following Table (4):

Table (1) the averages and standard deviations to the commitment paragraphs and higher management support on quality control in the hospitals in Khartoum state (n=300).

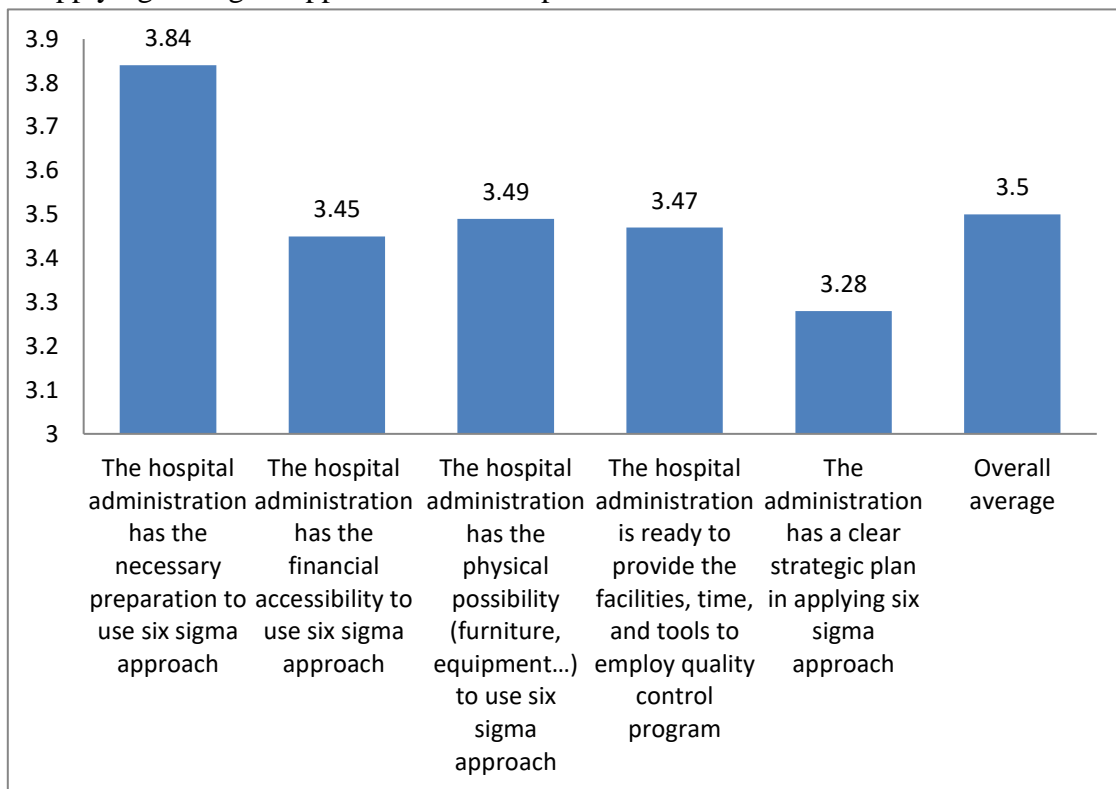
No.	Paragraphs	Arithmetic average	Evaluation	Standard deviation	Variation Factor	Degree of homogeneity
1-	The hospital administration has the necessary preparation to use six sigma approach	3.84	High quality	0.80	21%	Homogeneous
2-	The hospital administration has the financial accessibility to use six sigma approach	3.45	Acceptable	1.08	31%	Homogeneous
3-	The hospital administration has the physical possibility (furniture, equipment...) to use six sigma approach	3.49	Acceptable	1.06	30%	Homogeneous
4-	The hospital administration is ready to provide the facilities, time, and tools to employ quality control program	3.47	Acceptable	1.08	31%	Homogeneous
5-	The administration has a clear strategic plan in	3.28	Acceptable	1.08	33%	Homogeneous

applying six sigma approach					
Overall average	3.50	Acceptable	0.86	29%	Homogeneous

Resource: prepared by the researcher by employing SPSS.

Table (1) points out that paragraph (1) “The hospital administration has the necessary preparation to use six sigma approach” occupies the first rank with arithmetic average (3.84) high quality, followed by paragraph (3) “The hospital administration has the physical possibility (furniture, equipment...) to use six sigma approach” with arithmetic average (3.49) intermediate degree, and then paragraph (5) “The administration has a clear strategic plan in applying six sigma approach”.

The questions of the first axis: around commitment and higher management and tools support in quality control and applying six sigma approach in the hospitals in Khartoum state.



Resource: prepared by the researcher by employing Excel.

Figure No. (1) First axis questions.

The high proportion indicated that hospital administration has the necessary preparation to use six sigma approach as well as the physical possibility (furniture, equipment...) to use six approach with intermediate degree. Moreover, the administration has a clear strategic plan in applying six sigma approach with intermediate degree as well.

Table (2) the findings of employ one sample. T test on the arithmetic average to measure the level of commitment and higher management support on quality control in the hospitals in Khartoum state (n=300).

Field	Arithmetic average	Standard deviation	The degrees of freedom	T value	Statistical significant
Measure the level of commitment and higher management support on quality control in the hospitals in Khartoum state.	3.50	0.86	299	70.582	0.00

Resource: prepared by the researcher by employing SPSS

Table (2) shows that a statistically significant effect at a significant level ($\alpha \leq 0.05$) the level of commitment and higher management support on quality control in the hospitals in Khartoum state since T value reached to (70.582) with a statistical significant of (0.00).

The high proportion indicated that hospital administration keens on training the department heads to constitute work teams for the process of continuous improvement. In addition, hospital administration makes continuous improvement for the purpose of decreasing the errors and deviations that might occur.

The second hypothesis: there is no statistically significant effect to the continuous improvement in quality control and applying six sigma approach at a significant level (0.05).

For the purpose of discussing such hypothesis the arithmetic averages and standard deviations for the study sample evaluations have been taken on the paragraphs of the study second axis as demonstrated in Table (3). Besides, one sample t. Test on the arithmetic averages has been applied on the paragraphs that measure the extent of applying the continuous improvement methods in quality control and in the application of six sigma approach in the hospitals in Khartoum state according to the perspectives of the workers in the medical and administrative sectors in Khartoum hospitals as shown in Table (9).

The second axis questions includes (6) paragraphs that tackle the most important methods for continuous improvement in quality control and applying six sigma approach in the hospitals in Khartoum state since the study sample considers the degree of continuous improvement in both quality control and in the application of six sigma approach in the hospitals in Khartoum state is high with the arithmetic average indication that reached to (4.11). The arithmetic averages and standard deviations for each study paragraph as shown in Table (3) as follows:

Table (3) arithmetic averages and standard deviations to the continuous improvement paragraphs in quality control and applying six sigma approach in the hospitals in Khartoum state (n=300)

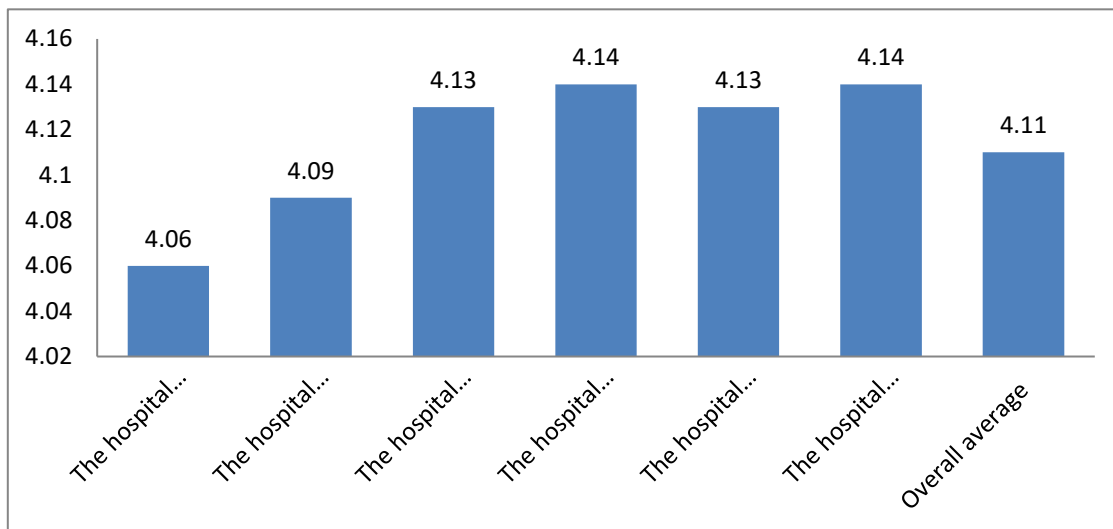
No.	Paragraphs	Arithmetic average	Evaluation	Standard deviation	Variation Factor	Degree of homogeneity
1-	The hospital administration considers the continuous improvement as a part of quality requirements	4.06	High quality	0.82	20%	Homogenous
2-	The hospital administration depends on six sigma approach for the purpose of developing knowledge to the dimensions of artistic and administrative process	4.09	High quality	0.73	18%	Homogenous
3-	The hospital administration keeps on knowing clients' suggestions in improving the quality of services	4.13	High quality	0.80	19%	Homogenous
4-	The hospital administration keeps on training department heads on constituting work teams for the process of	4.14	High quality	0.71	4%	Homogenous

	continuous improvement					
5-	The hospital administration makes the necessary actions to ensure that the plans of quality improvement are executed by the workers	4.13	High quality	0.74	18%	Homogenous
6.	The hospital administration makes continuous improvement for the purpose of decreasing both the deviations and the mistakes that might occur in applying six sigma approach	4.14	High quality	0.74	18%	Homogenous
Overall average		4.11	High quality	0.49	12%	Homogenous

Resource: prepared by the researcher by the using of SPSS

Table (2) indicates that paragraph (4) "" occupies the first rank with arithmetic average (4.14) with a high degree, subsequent by paragraph (6) with arithmetic average (4.14) with a high degree.

The second axis questions about the continuous improvement in quality control



Source: prepared by the researcher by using Excel
 Figure (2) demonstrates the questions of the second axis

Table (4) the results of one sample T. test to the overall average to measure the extent of applying the methods of continuous improvement in quality control and applying six sigma approach in the hospitals in Khartoum state (n=300).

Field	Arithmetic average	Standard deviations	Degrees of freedom	T value	A statistical significant
Measures the extent of applying the continuous improvement methods and applying six sigma approach in the hospitals in Khartoum state.	4.11	0.49	299	144.487	0.00

Source: prepared by the researcher by using SPSS.

- Table (4) shows a statistically significant effect at the statistical significant ($\alpha \leq 0.05$) in applying the continuous methods in quality control and in six sigma approach in hospitals in Khartoum state since T value reached to (144.487) with a statistical significant of (0.00).

The second hypothesis: there is no statistically significant effect concerning the abundance of human resources in quality control and applying six sigma approach at a statistical significant (0.05).

To discuss such hypothesis the arithmetic averages and standard deviations have been taken to the evaluations of the study tool sample on the paragraphs of the second study axis. Table (11) clarifies that.

In addition, sample T. test was applied to the individual samples on the general average to the paragraphs that measure the extent of applying human resources on quality control and applying six sigma approach in the hospitals in Khartoum state from the point of view of the administrative and medical workers in Khartoum hospitals as demonstrated in Table (5).

The third axis of the study contains (5) paragraphs that elaborates the most important methods regarding the abundance of human resources in quality control and applying six sigma approach in the hospitals in Khartoum state (intermediate) by its arithmetic average indication that reached to (3.39) the arithmetic averages and standard deviations have been taken for each paragraph of the study as demonstrated in the following Table (5):

Table (5) the averages and standard deviations to the paragraphs of abundance of human resources in quality control and applying six sigma approach in the hospitals in Khartoum state (n=300).

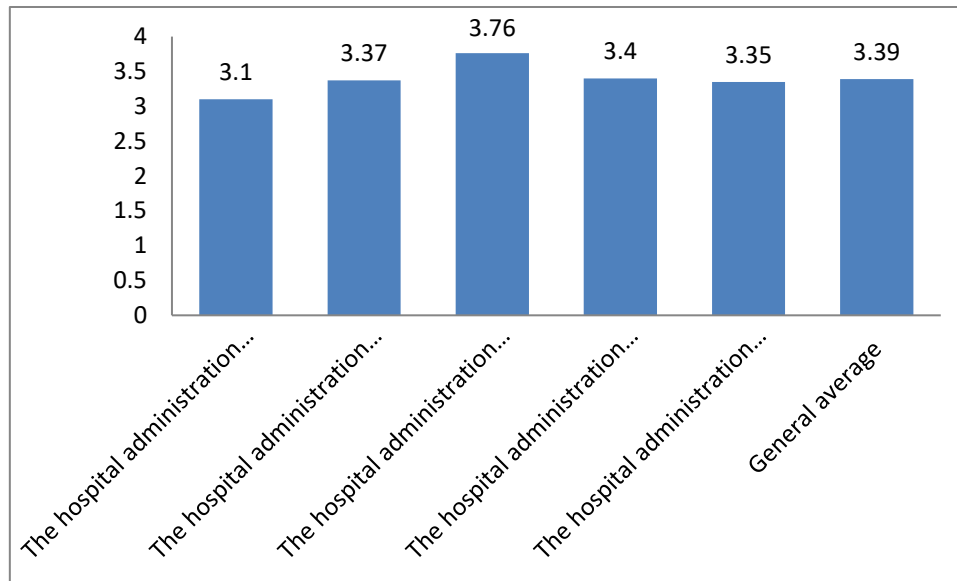
No.	Paragraphs	Arithmetic average	Evaluation	Standard deviation	Variation Factor	Degree of homogeneity
1-	The hospital administration is not ready for connecting the promotions in hospitals with quality control program	3.10	Acceptable	1.04	34%	Homogeneous
2-	The hospital administration is successfully ready for connecting the higher management awards with quality control program.	3.37	Acceptable	0.94	28%	Homogeneous
3-	The hospital administration is able and ready to assign consultancies and experts for applying quality	3.76	High quality	0.95	25%	Homogeneous

	control program.					
4-	The hospital administration provides material incentives to the workers who take the full responsibility for executing quality control program	3.40	Acceptable	1.09	32%	Homogeneous
5-	The hospital administration provides moral incentives to the workers who take the full responsibility for executing quality control program	3.35	Acceptable	1.06	32%	Homogeneous
General average		3.39	Acceptable	0.72	21%	Homogeneous

Resource: prepared by the researcher by using SPSS.

Table (5) indicates that paragraph 3 “The hospital administration is able and ready to assign consultancies and experts for applying quality control program” occupies the first rank with arithmetic average (3.76) high degree while paragraph 1 “The hospital administration is not ready for connecting the promotions in hospitals with quality control program” occupies the last rank with arithmetic average (3.10) an intermediate degree.

Third axis questions: the extent of having the human resources in quality control and applying six sigma approach.



Source: prepared by the researcher by using Excel.

Figure (3) clarifies the questions of the third axis

The high proportion of the hospital administration indicated that it has the ability and readiness for assigning consultancies and experts to apply quality control program. Besides, hospital administration is ready to connect the promotions in the hospitals with quality control program with a low degree.

Table (9) the results of applying one sample.t test to the overall average for measuring the extent of applying the abundance of human resources on quality control and applying six sigma approach in the hospitals in Khartoum state (n=300).

Field	Arithmetic average	Standard deviations	Degrees of freedom	T value	A statistical significant
Measuring the extent of applying the abundance of human resources on quality control and applying six sigma approach in the hospitals in Khartoum state	3.39	0.72	299	82.154	0.00

Source: prepared by the researcher by using SPSS.

Table (6) shows a statistically significant effect at a statistical significant ($\alpha \leq 0.05$) in applying the methods of the abundance of human resources on quality control and applying six sigma approach in the hospitals in Khartoum state since the (T) value reached to (82.154) with a statistical significant of (0.00).

The fourth hypothesis: there is no statistically significant effect to both processes and systems of quality control and applying six sigma approach at a statistical significant (0.05).

To discuss such hypothesis the arithmetic averages and standard deviations have been taken to the evaluations of the study tool sample on the paragraphs of the second study axis. Table (7) clarifies that. In addition, sample T. test was applied to the individual samples on the general deviations to the paragraphs that measure the impact of processes and systems on quality control and in the application of six sigma approach in Khartoum state from the point of view of the administrative and medical staff as demonstrated in Table (7).

The questions of the second axis contains (6) paragraphs that tackle the most important methods of quality control to the processes and systems in the hospitals in Khartoum state. The study sample believes that the degree of processes and systems on quality control in hospitals in Khartoum state is (high) by its arithmetic average indication that reached to (4.06). The arithmetic averages and the standard deviations for each study paragraph have been taken. As illustrated in Table (7) as follows:

Table (7) the averages and standard deviations to the paragraphs to the processes and systems in quality control and in the application of six sigma approach in the hospitals in Khartoum state (n=300)

No.	Paragraphs	Arithmetic average	Evaluation	Standard deviation	Variation Factor	Degree of homogeneity
1-	The hospital administration is ready to provide information exchange within the programs of quality controls.	4.02	High quality	0.83	21%	Homogenous
2-	The hospital administration has the ability to provide the system for data collection to the patients and the provided services for them.	4.03	High quality	0.86	21%	Homogenous

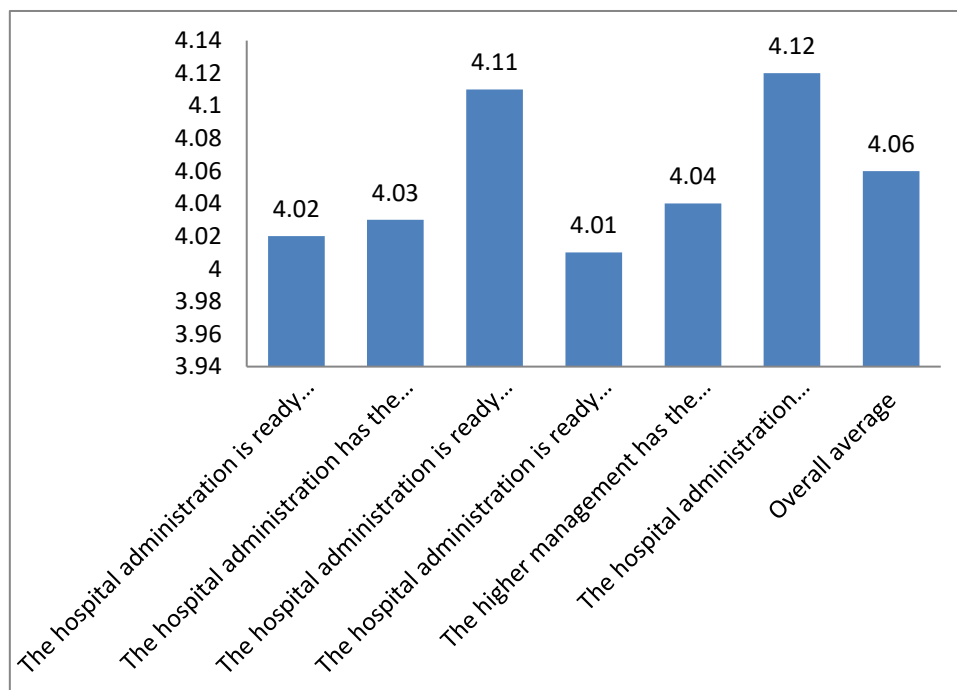
3-	The hospital administration is ready to provide a continuously updated information system	4.11	High quality	0.89	22%	Homogenous
4-	The hospital administration is ready to provide a direct communication system with the trainers of quality control program	4.01	High quality	0.84	21%	Homogenous
5-	The higher management has the ability to provide software that enable the usage of tools and modern techniques to be used in training process	4.04	High quality	0.86	21%	Homogenous
6.	The hospital administration executes the training programs according to clear basis and standard	4.12	High quality	0.80	19%	Homogenous
Overall average		4.06	High quality	0.57	14%	Homogenous

Source: prepared by the researcher by using SPSS.

Table (7) indicates that:

- Paragraph (6) “The hospital administration executes the training programs according to clear basis and standard” occupies the first rank with the arithmetic average (4.12), followed by paragraph (3) “The hospital administration is ready to provide a continuously updated information system ” with the arithmetic average (4.11) high degree.
- Paragraph (4) “The hospital administration is ready to provide a direct communication system with the trainers of quality control program” occupies the last rank with the arithmetic average (4.11) intermediate degree.

Fourth axis question: the extent of having the processes and the systems in the application of six sigma approach in order to obtain outstanding results in quality control.



Source: prepared by the researcher by using Excel.

Figure (4): clarifies the questions of the fourth axis

Table (8) the results of applying one sample.t test to the overall average for measuring the impact of systems and processes on quality control and applying six sigma approach in the hospitals in Khartoum state (n=300).

Field	Arithmetic average	Standard deviations	Degrees of freedom	T value	A statistical significant
Measuring the impact of systems and processes on quality control and applying six sigma approach	4.06	0.57	299	123.105	0.00

Source: prepared by the researcher by using SPSS.

Table (8) shows a statistically significant effect at a statistical significant ($\alpha \leq 0.05$) to the processes and systems in quality control and in the application of six sigma approach in the hospitals in Khartoum state since the (T) value reached to (123.105) with a statistical significant of (0.00).

The high proportion indicated that the hospital administration executes the training programs according to clear basis and standards. In addition, the hospital administration is ready to provide a continuously updated information system. Moreover, the hospital administration is ready to provide a direct communication system with the trainers of quality control programs with an intermediate degree.

Findings:

The study came to the following findings:

- 1- The hospital administration has the necessary preparation to use six sigma approach with a high degree.
- 2- The hospital management has the material potential (furniture, equipment, ...) to use the Six Sigma curriculum with an intermediate degree.
- 3- The administration has a clear strategic plan in applying six sigma approach with an intermediate degree.
- 4- The hospital administration keens on training the department heads to constitute work teams for the process of continuous improvement with a high degree.
- 5- The hospital administration is continuously improving the purpose of reducing the deviations and errors that occur.
- 6- The hospital administration is able and ready to assign consultancies and experts for applying quality control program with a high degree.
- 7- The hospital administration is not ready for connecting the promotions in hospitals with quality control program.
- 8- The hospital administration executes the training programs according to clear basis and standards.
- 9- The hospital administration is ready to provide a continuously updated information system.
- 10- The hospital administration is ready to provide a direct communication system with the trainers of quality control program.

Recommendations:

In the light of the study findings, the study recommends the following:

- 1- Connecting promotions' system in the governmental hospitals in Khartoum state with quality control program.
- 2- Interesting in the comprehensive quality and assuring the possibility of using it in the hospitals in Khartoum state due to its practical and scientific importance as well as in improving the quality of services and provided processes.

- 3- Preparing the study once again after a period of time to indicate the impact of applying the comprehensive quality approach on quality management in the governmental hospitals in Khartoum state.
- 4- Preparing other studies to indicate the impact of applying the comprehensive quality management in other sectors.

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