

IT Governance in Healthcare: Research Studies From Brazilian Pathology Departments

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ABSTRACT

This study is based on an empirical investigation conducted by the Secretariat for Logistics and Information Technology and Planning, Budget, and IT Governance and Healthcare Management of the Brazilian Ministry of Planning. Through the implementation of programs centered around: 1) establishing, communicating, and upholding laws and regulations; 2) training and developing the skills of human resources; and 3) offering technical support through consulting, the research study was grounded in theoretical and numerical analysis for data measurement using SPSS software. The results included graphical analysis, chi square analysis, and ANOVA test analysis. The need of setting up IT committees, arranging IT procurement, and formulating an IT strategy was effectively conveyed by the Secretariat to all central government organizations. However, this analysis points up some issues that need to be fixed if the Brazilian central government is to improve IT administration. In particular, it is critical that non-IT management staff members participate more in IT committees and that communication between IT divisions be intensified in order to foster greater alignment between IT strategies and organizational objectives, avoid duplication of procurement procedures, and prevent inefficient use of financial and human resources. Overall research found that IT governance plays as significant role in healthcare pathology departments of Brazilian.

Keywords: IT Governance (ITG), Healthcare (H), Brazilian Pathology Department (PBD)

INTRODUCTION

Nowadays the pathology department in Brazil has become the center of attention because of the use of IT in healthcare departments. In recent years, the use of IT was confined to the field of communication, data analysis, hotel booking, medical science, and others but now the use of IT has become vast to such an extent that it reached the healthcare sector as well. As described by different studies IT can be used for effective output in the healthcare sector. However, by usage of IT is not mandatory but the proper Governance of its use in the healthcare sector is also mandatory. In this introduction, we are going to understand how IT Governance can be helpful in the healthcare sector and how it has been related to Brazilian Pathology Departments[1]. There are a variety of benefits of IT Governance in Healthcare sectors. The first and foremost benefit is that it can be effective and helpful in the implementation of digital pathology in Brazil's healthcare sector. Pathology is the study of the type, composition, structure, and mode of transmission of pathogens and digital pathology means the use of digital ways to study all of these aspects. Digital pathology has been so successful in recent years in the Brazilian healthcare sector that it helped to provide timely, accurate, and error-free results. The cost of using digital pathology is also far less than primitive pathology methods. The second most important benefit of IT Governance in Healthcare sectors in Brazil is that it provided help in laboratory information system upgrade[2]. In recent years, all the information related to laboratory work used to get assembled in the form of manual work but by use of digital means in pathology labs, this system of information has also upgraded. Now all the data has been stored in the form of electrical signals in computer-based systems rather than using paper form. IT Governance has played an important role in the smooth transition of laboratory systems from traditional to new forms. The other important and effective benefit of using IT Governance in Healthcare sectors in Brazil is the service of

telepathology service which means providing the remote services of pathology labs[3]. This aspect is quite beneficial for people as there is no need for continuous visits to pathology labs in this way. All the services of pathology labs become remote to facilitate people. IT Governance has helped in this way that secure the data of the masses to ensure integrity. The other benefit of using IT Governance in Healthcare sectors in Brazil is the use of artificial intelligence in pathology labs. As we know the present era is the era of getting benefits of artificial intelligence which is somehow more reliable than human intelligence these days[4]. The first reason is that the risk of human error is very low in artificial intelligence. The second reason is that most of the procedures are fully automated in artificial intelligence. In contrast, there was a need for lengthy and time-consuming procedures in human-based processes. The third reason is that there is no factor of fatigue in artificial intelligence. The next benefit of using IT Governance in Healthcare sectors in Brazil is electronic health record integration which is also termed as EHR. This aspect has gotten much attention in recent years because of its different and versatile benefits. As we know data integration is one of the important tasks at pathology labs[5]. Because this data can provide enough information about the type of pathogens and can also be used shortly. The aspect of data integration is also related to the privacy of patients because all the important information related to patients is provided in such records. To resolve all of these matters, the digital era has introduced the aspect of electronic health records integration in which the whole data is stored in the form of electrical signals only. All the data can be recovered back in just a few seconds in case of data loss. The risk of misinformation or data loss is much less if we use electronic health records integration as compared to primitive ways of data integration[6]. As the environmental conditions change day by day this may lead to many new types of pathogens and also to the many

variants of the same pathogens. In such cases, this electronic health records integration system can be effective in retracting data and formulating better policies for the near future. The role of IT Governance is that in this aspect, IT Governance can help smooth the running of such health record systems. The IT Governance can also help ensure the data privacy of patients to reduce the risk of any data hacking and data misuse. The next benefit of using IT Governance in Healthcare sectors in the area of Brazil is that it can be helpful in better analysis of data in different ways[7]. The accuracy of data analysis is dependent on the procedure chosen, the equipment used, the conditions of pathology labs, the entity that performed such tests, and error-free results. All of these aspects can be effectively improved by using IT-based systems. The role of IT Governance in this aspect is that it can guarantee a better quality of procedures and more accurate results in less fraction of time[8]. The next benefit of IT Governance in Healthcare sectors in Brazil is that it can optimize the workflow in Brazil by different means and ways. The first way is that it can attend to more patients at a given time because of online and pre-booking of appointments because of using IT means. The other way of optimizing workflow is that it can perform swift and artificial intelligence-based procedures[9]. The other way of increasing workflow is that it can provide accurate results so there is no need for continuous testing to check the accuracy of results. IT Governance can be effective and beneficial shortly in many ways not only in Brazil but across the whole world[10].

Research Objective

The main objective of this research is to understand the term IT Governance and its role in the healthcare department of Brazil. This study has effectively enumerated the important benefits of using IT Governance in Healthcare sectors.

LITERATURE REVIEW

researchers claim that use of robotics systems in health sectors is growing as a result of the implementation of IT in the health field. Robotic surgical processes are developed to perform colorectal surgery with great accuracy. In Brazil, robotics surgical training is gaining popularity, but the use of robotic surgical methods gives rise to some challenges related to the high cost of surgical procedures. By overcoming the challenges associated with the use of the robotic surgical process, higher positive outcomes can be achieved[11]. Studies reveal that higher care quality is achieved by providing patients of breast cancer with MDC. MDC is a care service for cancer patients that is provided mostly to patients in Latin American states. Certain social barriers affect the process of providence of MDC to cancer patients[12]. Studies suggest that in the past social rejection was common in the Brazilian state. Due to social rejection, people of Brazil faced a lack of health facilities, but in the present time with the advances in technology and improvement in the social justice approach, all Brazilians are provided with just health services[13]. Studies predict that telehealth programs in Brazil allow people to get diagnostic facilities. To diagnose oral disease, tele-diagnosis tests are used by pathologists. The southern population of Brazil gets health services through a technology-based program. The main aim of this program is to provide tele-diagnosis services to people after teleconsultation with the health professionals[14].

Also, eConsult is a program that provides people with health advice after consultation with primary health physicians. Telehealth

organization's role in providing primary health opportunities to people holds importance. In Brazil, a large number of people are getting eConsult from specialists [15]. Studies predict that lung cancer is among the most prevalent cancer in Brazil. The death rate due to lung cancer is highly prevalent. LDCT screening of lung cancer suggests that the risk of lung cancer is higher in adults. The affordable health system or program used by the majority of Brazilian people is CT. This program is used along with screening tests for lung cancer diagnosis[16]. Studies suggest that in Brazil the health system promotes mental health awareness programs among the public. For managing the mental health-related problems of the people of Minas Gerais, effective health management strategies are preferred by the health management system. Brazil is a populous state and the second highest population-containing state of Brazil is Minas Gerais. By strengthening the health services in this state, the psychological health of people improves[17]. Studies explain that shaping the diagnostic activities of pathology labs is a task performed by AI systems. The intelligence system improves the quality of diagnostic tests already taking place in Brazil's pathology labs[18]. Studies claim that sarcoma cancer is a prevalent cancer type in Brazilian people. To provide improved diagnostic opportunities to people for sarcoma, diagnosing the use of technology-based clinical practices is preferred[19]. Studies claim that medical education is provided to students by building education centers. Medical education centers aim to teach medical students about medical-related practices and activities. Like in medical institutes, students are taught to perform surgery practices using virtual reality technology so that they can get the knowledge about tackling any surgery condition[20]. Studies reveal that the survival rate of patients with MCC is fewer. The locally available treatment for MCC is radiation. For proper management of this disease, the Brazilian Surgical Society has provided guidelines. The suitable treatment method for MCC cancer is surgical oncology as recommended by the Brazilian Surgical Society [21]. Studies predict that Alzheimer's disease is prevalent in low-income countries. Different states prepare different coping strategies to overcome the spread of Alzheimer disease. In Brazil, the health systems are well prepared to modify the treatment against Alzheimer disease[22]. Studies predict that oral pathology services provided in Brazilian states are excellent for predicting oral lesions. Majority of the population affected with oral lesions are children as well as adults[23]. Studies suggest that cancer is one of the diseases that is spreading at a high rate despite tremendous research work on oncology. Pathologist researching cancer predicts that the spread of cancer is going to increase in the coming years. In Brazil, biobank hospitals are developed to keep a record of cancer-related research[24]. Researchers reveal that bioinformatics is a modern branch that explains the complexity of biological data using algorithms. The research-related work to understand the biological behavior of different diseases has been made easier through the approach of bioinformatics. Also, in Brazilian universities, the bioinformatics department has been established to guide new medical researchers about the use of this approach in pathology labs[25]. Studies predict that pediatric populations' medical screening process is performed in various countries to early diagnose chances of any disease spread in population. The migrant pathology screening tests are performed on migrants people residing in the Portugal by the pediatric department[26]. Studies of scholars claim that treatment-based decision regarding the oral lesion is made by Estomato-Net. The IT based diagnostic approach for oral disease treatment is regarded as EstomatoNet to reduce the chances of severity

caused by oral lesion the health professionals are suing Estomato-Net as primary health service. the specialty of Estomato-Net service is that it is used by health care professionals to ease the process of decision making for them[27]. Also, the oral medication in Brazil is regarded as stomatology. This medication is prescribed as oral medication by the brazilian dental society. The origin of this medication is old and thus makes it the best suitable medication for oral problems[28]. Scholars explain that tele-medication usage was increased during the COVID pandemic to maintain the social distancing protocol. in Brazil, telemedicine was used as an infection-prevention medicine source during the coronavirus pandemic. the health institutes working in Brazil were bound to increase their teleconsultation services when the outbreak of coronavirus happened[29]. Scholars claim that MS in Brazil has developed a virtual learning education center for students. the brazilian health system is one the important systems in Brazil that promote the management of medical students and professionals in virtual education programs. The Virtual education environment provide both the health education and health services to the people of Brazil. also the AVASUS greatly helps the Brazilian health system to enhance their health service quality[30].

Methodology

The research study based on primary data and some theory-based data for determine the result used SPSS software and generate result included descriptive, chi square, the ANOVA test analysis also that explain the graphical analysis between them. The IT has made its place in every field of life ranging from communication, transportation, medical science, educational, health and many others. The importance of usage of IT can be explained well in terms of its benefits and easy accessibility in fraction of seconds. The use of IT has become need of the hour to get swift and accurate responses. Along with use of IT in healthcare sectors, the proper Governance of it is also mandatory. Few cases were studied in Brazilian Pathology Departments by using the aspect of IT Governance. Following are important implications of IT Governance in healthcare sectors:

Enhanced Data Management and Improved Safety of Patients

The management of data at pathology labs is one the main factors in deciding the performance of pathology labs. If all the previous and present data is perfectly managed in pathology Labs, the chances of accurate results increase. In primitive ways of data management, there was extensive use of manual work and data was stored by using paper and pencil. But now with the revolution by IT, there is no need of human labor and manual work. Now all the data related to any pathology labs can be stored and managed in the form of Electronic Health Record systems which is abbreviated as EHRs. In such systems, the whole data is stored in electronic signals in computer-based systems. It can store large amount of data in small chips which can easily be used. Because all the data is stored in electronic signals from so there is very less or no risk of data loss in case of electronic health record system.

The other benefit is that as there is no or less involvement of human in such computer-based systems so there is very less risk of any human errors. The second most important benefit is the accessibility of data in electronic health record system. The data related to any specific patient or report can easily be accessed in just few seconds. The other important implication of IT Governance in healthcare sector is that it helps to assure the aspect of safety of patients in terms of privacy

of patients. As the data which is taken from patients may include their personal information as well so there must be such suitable system which ensures the safety of patients. The proper Governance of IT in healthcare sectors helped patients in safety aspect by minimizing the risk of any data misuse or data hacking. This aspect of IT Governance has brought the factor of patient satisfaction in such systems. This implication of IT Governance in healthcare sectors proves the important of IT Governance in near future. These aspects related to IT Governance will make it more useful in healthcare sectors.

Improved Resources Allocation and Better Decision Making in Pathology Labs

The resources and their management talk about better working and efficiency of any system. When there is better and effective use of resources to any system, the system remains cost effective but if resources are extensively misused, the overall cost of that system increases making system less reliable. The same in the case of pathology labs. The resources of pathology labs can easily be allocated and improved by using IT Governance in healthcare sectors. As we have described that by use of IT Governance in healthcare sectors, the risk of error decreases so the resources are not wasted in this way. The other aspect is that as the results are accurate in less time, there is no need to perform these diagnostic tests again and again. In this way, resources are used in better way.

Secondly by using IT Governance system, the revenue system is planned in such way that the wastage of resources decreases ultimately. The other important implication of IT Governance in healthcare sectors is that it helps in decision making in pathology labs. As the aspect of decision making is dependent upon data stored and data analysis. When both of these aspects become better and error free by using IT Governance in healthcare sectors, so the decision making becomes easy at pathology labs. All of these aspects described that the effective use of IT Governance in healthcare sectors can bring fruitful results in healthcare sectors.

Enhanced Workflow, More Accuracy and Less Cost

Usually, the workflow has been increased in pathology labs in recent years because of different types of pathogens discovered and studied. As the condition of environment changes day by day and becoming worse, so the type and pathogenicity of pathogens have also been varying so the workload has been increasing in pathology labs. So, there is never of such effective system in pathology labs which can improve workflow in these labs. The use of IT Governance in healthcare sectors has done this job. As the IT Governance system is totally based upon computer-based systems so it can perform quick procedures with less risk of error. Most of the procedures are totally automatic procedures so there is very less involvement of human in such systems. By using IT Governance in healthcare sectors, mostly appointments are online booked and most of the services are pathology labs are provided online, in this way most of the time of pathology labs can be saved which will help in increasing workflow in pathology labs. The other aspect is that there is less risk of errors in results so there is no need of performing tests again and again, this aspect also increases workflow in pathology labs. Secondly, as most of the systems are totally automated so there is more accuracy of results. There is no factor of being biased in it, so we cannot say that the results are having any favor for something. The other important implication of IT Governance in healthcare sectors is that it is cost effective. As systems

are totally automatic and self-operating, so there is less need of manual work, in this way less cost is used in it. All of these important

implications of IT Governance in healthcare sectors make it suitable for use in healthcare sectors all over the world.

Table 1: Result of ANOVA

		ANOVA				
		Sum of Squares	Df	Mean Square	F	Sig.
IT Governance 1	Between Groups	.000	2	.000	.000	1.000
	Within Groups	17.000	49	.347		
	Total	17.000	51			
IT Governance 2	Between Groups	.022	2	.011	.026	.974
	Within Groups	20.804	49	.425		
	Total	20.827	51			
IT Governance 3	Between Groups	.462	2	.231	.613	.546
	Within Groups	18.462	49	.377		
	Total	18.923	51			
Healthcare 1	Between Groups	2.587	2	1.293	3.474	.039
	Within Groups	18.240	49	.372		
	Total	20.827	51			

The results of above table 1 indicate how the ANOVA test analysis reflects the relationship between IT governance and healthcare. It also explains the substantial level of association between the two by displaying sum of square values, mean square values, and F statistic values. The primary independent variable, IT governance 1, has a significant rate of 1.000, indicating a 100% significant level of correlation between them. The outcome also illustrates the IT governance 1 mean square value, which is 0.347 and indicates a 34% average square rate amongst the rates. The results of the IT governance 2 and 3—which are both regarded as independent variables—show

that their significant levels are 97% and 54%, respectively. The sum of square values pertaining to the relationships between and within the group also demonstrate a favorable relationship. The results of the dependent variable healthcare 1 show that its total value is 20.827, its within-group value is 18.240, and its sum of square value is 2.587. There is a positive and 3% significant level between them, as indicated by the F statistic rate of 3.474 and the significant level of 0.039. The total outcome demonstrates a strong and favorable relationship between healthcare and IT governance.

Table 2: Result of Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.402 ^a	.161	.109	.60320

a. Predictors: (Constant), IT Governance 3, IT Governance 2, IT Governance 1

The above results of table 2 demonstrate that model summary result shows R value is 40% its mean the model of IT governance and healthcare is fit for analysis. The R square rate is 0.161 is 16% the adjusted R square rate is 0.109 its shows that positive adjusted rate. The standard error of the estimate value is 60% respectively.

Plans and Policies for National Health

The Federal Constitution of 1988, which lays forth the guidelines and policies for the provision of healthcare throughout the nation via the Unified Health System (SUS), serves as the foundation for national health policy. According to the constitution, the federal government's operations must be guided by four-year plans that have been approved by the national congress. The primary goals of the health sector were to improve general health conditions, with a focus on lowering child mortality, and to reorganize the sector politically and institutionally in

order to increase the SUS's operational capability. The plan for the upcoming term (2000–2003) upholds the goals set forth earlier and gives priority to actions that will guarantee access to programs and services, enhance patient care, and strengthen the decentralization of SUS management.

The results of below table 3 show the regression and residual significant rates for each model, along with the sum of square values, mean square values, and F statistic. The regression model's sum of square rates is 3.362, its residual rate is 17.465, and its total value is 20.827, all of which indicate a positive sum of square value between them. The square root of 1.121 is equal to 0.364. It demonstrates their 36% positive average rate. The 3% significant value between IT governance and healthcare is indicated by the significant level of 0.036.

Table 3: Result of ANOVA^a

		ANOVA ^a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.362	3	1.121	3.080	.036 ^b
	Residual	17.465	48	.364		
	Total	20.827	51			

a. Dependent Variable: Healthcare 1

b. Predictors: (Constant), IT Governance 3, IT Governance 2, IT Governance 1

Linear least Square Model

Table 4: Result of Linear least square model

		Coefficients ^a			t	Sig.
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta		
1	(Constant)	1.474	.373		3.955	.000
	IT Governance 1	-.439	.164	-.396	-2.682	.010
	IT Governance 2	.094	.136	.094	.691	.493
	IT Governance 3	.387	.159	.369	2.438	.019

a. Dependent Variable: Healthcare 1

The result mentioned above of table 4 shows how the results of the linear regression analysis explained the beta value and standard error value of the unstandardized coefficient analysis. The outcome also explains the significant values of the independent model as well as the t statistic and standardized coefficient analysis. Based on the results, the primary independent variable is IT governance 1, with a beta value of -0.439 and a t statistic value of -2.682. Additionally, the 10% significant level between IT governance 1 and healthcare is indicated by the significant level of 0.010. The second independent component is IT governance 2, which has a positive and 49% significant link with healthcare. Its t statistic value is 0.691 and its significant level is 0.493. In a similar vein, results from the IT governance 3 independent variable also show that the beta value is 0.387. The t statistic value of 2.438, the standard error value of 0.159, and the significant rate of 0.019 indicate a positive and 19% significant level of relationship between them.

IT Governance and Healthcare Risk Management

IT risk management is a necessary for healthcare providers to ensure the right amount of privacy and security. Healthcare providers may make sure they are taking the appropriate precautions to secure the data of their patients by recognizing and reducing these risks. Healthcare providers should develop a risk management strategy in addition to routine cybersecurity audits and scans to help detect and assess any possible IT security risks. In-depth details regarding the IT security training materials available as well as any established rules or procedures for handling security events should be included in this plan. A collection of guidelines and practices that control how IT resources are managed and used in order to enhance overall business performance is known as an IT governance framework. It should

provide the proper balance between business needs, technological capabilities, and regulatory constraints, have clear and quantifiable goals, and be compliant with internal IT standards. To guarantee that all stakeholders are informed about the progress of IT projects and procedures, healthcare institutions must have an IT governance framework in place. This will assist in lowering future risk factors like unpaid bills and data security breaches. Additionally, it can aid in averting mishaps like unintentional data loss or excessive spending on pointless software licenses. A successful IT governance framework is made up of different parts. To produce the best results, all of these elements must cooperate and assist one another.

Organizational Structure

One of the key determinants of the successful implementation of an IT governance framework is the organizational structure. The structure must be in line with organizational culture, decision-making procedures, and management philosophies.

Engagement of Stakeholders

People who are impacted by events and actions inside an organization are known as stakeholders. They are also people who have a stake in the success of the organization. Stakeholder support is necessary for IT governance to move forward and be successful.

Roles and Duties

There needs to be a definite and unambiguous relationship between roles and responsibilities. Everyone will be aware of their level of authority in this way. The tasks and responsibilities associated with IT governance ought to correspond with those of other organizational levels.

Table 5: Result of Test Statistics

Test Statistics					
	IT Governance 1	IT Governance 2	IT Governance 3	Healthcare 1	Healthcare 2
Chi-Square	21.385 ^a	16.423 ^a	18.500 ^a	16.423 ^a	20.462 ^a
df	2	2	2	2	2
Asymp. Sig.	.000	.000	.000	.000	.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.3.

The results of table 5 demonstrates that test statistical analysis the chi square value of IT governance 1,2 and 3 is 21.385, 16.423 and 18.500 shows positive chi square. Similarly, the healthcare 1,2 shows

that 16.423 and 20.462 its shows that positive chi square rate of dependent variable. the overall significant level is 0.000 shows that 100% significant level in between IT governance and healthcare.

Table 6: Result of Total Variance Explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.564	31.287	31.287	1.564	31.287	31.287
2	1.370	27.397	58.684	1.370	27.397	58.684
3	.948	18.955	77.639			
4	.786	15.724	93.364			
5	.332	6.636	100.000			

Extraction Method: Principal Component Analysis.

The above results of table 6 demonstrate that total variance explained analysis result shows initial eigenvalues related to total, % of variance and cumulative % of each component related to IT governance and healthcare. The total value is 1.564, 1.370, 0.948, 0.786, 0.332 its shows that all of them are positive rates between them. the extraction sums of square value related to % of variance and cumulative % its rate is 31.287, 27.397, 1.564 and 1.370 respectively

shows that positive and significant link in between governance and healthcare between them.

The below graph of figure 1 represents that histogram analysis in between healthcare and IT governance 1. The vertical side shows strongly agree, agree, neutral level, disagree and strongly disagree. The above line shows that red line present agree factor and green line shows neutral level between them.

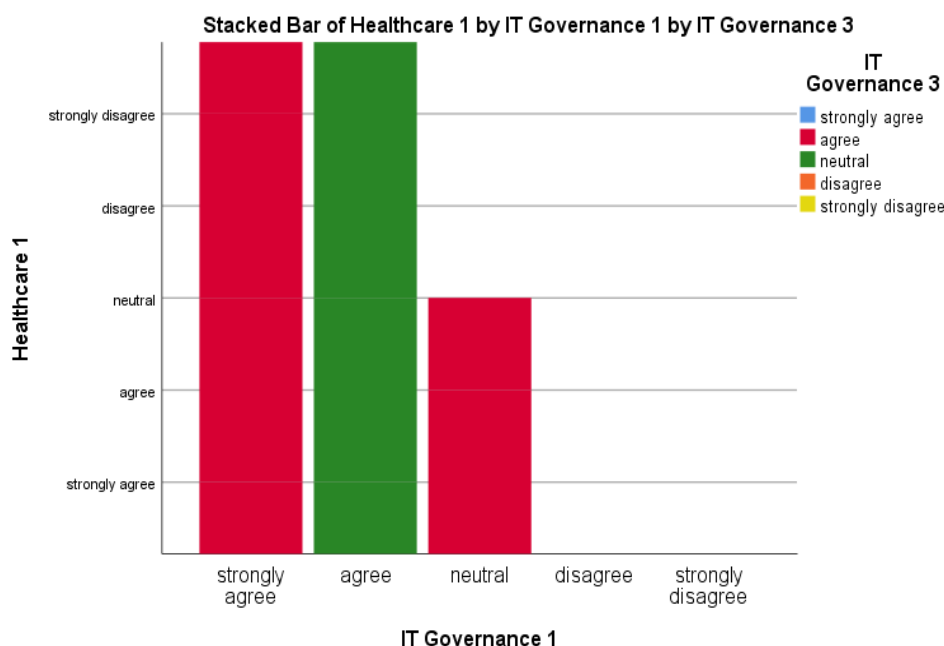


Figure 1: Stacked Bar of Health care 1 by IT Governance by IT Governance 3

Conclusion

After overview of all these important implications of IT Governance in healthcare sectors, we can conclude that IT has benefited us in different fields of life including healthcare sectors. A government is the most formal form of governing entity, with the power and duty to impose legally binding choices through set norms and rules on a particular geographical system (such as a nation). A government may function as a democracy in which the people choose who will lead in pursuit of the common good. There are governing bodies for entities other than governments. The research based on numerical analysis overall research concluded that direct and significant relation in between IT governance and healthcare. These

can be officially recognized legal entities or organizations, like corporations, businesses, or non-profits run by tiny boards of directors with more focused objectives. Sociopolitical organizations such as families, tribes, religious subgroups, and hierarchical political institutions can also be seen as such. In the case of a state, governance reflects an increasing understanding of how amorphous forms of authority and power can maintain order even in the absence of formal governmental action. Various outside parties lacking the ability to make decisions may have an impact on this state government structure. These consist of political parties, lobbying groups, think tanks, non-governmental organizations, the community, and the media. It is also influenced by outside forces including social movements, globalization, and technological advancement.

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