

Effect of automation process on the efficiency of computerized systems

(Case study: National Fund for Social Insurance in Sudan)

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Abstract—Due to the importance of information technology and information systems applications in business organizations, especially service organizations and due to the leading role played by the National Social Insurance. Therefore, the study was applied to the presidency of the National Fund for Social Insurance in Sudan. The problem of the study was that the automation processes that were followed in establishing a computerized system for the procedures of the National Social Insurance Fund, negatively affected the effectiveness of the system as it is. The study also aimed to evaluate the impact of computerized information systems and what might be in the future to develop administrative work according to the electronic work environment. The study relied on several studies related to systems development, statistical analysis and descriptive tool of the study. The study concluded that when establishing a computerized system must make drastic changes in the work system and procedures to adapt the nature of the system.

Keywords-Automation; computer; process; efficiency; information; system; IPA

I. INTRODUCTION

Automation is the introducing of the machine in the work to replace manual work [1]. In light of the information revolution and the tremendous boom in the fields of computer technology and communications, its popularity and the possibility of employing it, many administrative organizations are shifting from traditional administrative methods to modern technological methods, benefiting from the secretions of modern technology to provide their services. The mechanization or automation processes assume acceptance of reality. This means that high technology will replace a backward technique to perform the same old works or provide advanced methods to perform the same mistakes as before [2]. Institution Process Automation (IPA) make process more efficient and decreasing processing time and effort [3, 4]. Having detailed, accurate and timely information accelerates decision making and prevents the adoption of many erroneous decisions [5].The era of electronic change depends on modern technology, which works to change the management of business thought and practice a radical change[6] Electronic

administration is working to simplify the administrative work in the organization, by dispensing with a large number of forms, papers, and forms used in the performance of administrative work. This leads to speedy completion of work, reduced cost, and efforts in performing transaction [7].Many scientific research papers adapt Process reengineering to improved service and business such as [8,9,10,11] . Some studies have aimed to activate the role of the Internet in the office automation system using (IoT) [12] where it works to control and automate the office and most devices through Android applications and can be easily controlled. It supports the radical change in office work and the ability to control office equipment.

The aims of this paper is to study and evaluate the status of computerized information systems in business organizations, and what they might be in the future to develop administrative work according to the electronic work environment, I. highlight the role of computerized information systems to contribute to the management of institutions and increase their efficiency and to demonstrate the impact of the use of information systems on the organizational and administrative level in institutions.

II. METHODOLOGY

Study Population and Sample:

simple random sample was used and 150 questionnaires were distributed. The distribution should include those who are related to the administrative operations of the National Social Insurance Fund. 130 valid questionnaires were used. Table (1) shows the number of questionnaires distributed and returned after filling.

TABLE I.

Distributed and returned questionnaires	Distributed		
	Statement	Frequency	Percentage
1	Completed questionnaires	130	87%
2	Questionnaires not returned	18	13%
3	Total distributed questionnaires	150	100%

From the table 1 it is clear that the response rate was 87% of the distributed questionnaires and that 13% of the questionnaires were not returned. This rate is very good in applied studies.

Design of the study tool

In order to obtain the information and preliminary data of this study, the researcher designed a questionnaire to study the effect of radical changes in administrative procedures and processes and organizational structures on the effectiveness of computerized systems. The questionnaire is a well-known means of collecting field information and is characterized by the possibility of collecting information from multiple vocabularies of the sample of the study and is analyzed to reach the specific results. During the process of building the study tool, the researcher followed the following steps:

- 1- Reviewing many studies related to systems development.
- 2. Preparing the questionnaire list, which consists of three sections:

The first section includes a letter addressed to the respondents indicating the purpose of the study and its title. While the second Section include data on the individuals of the study sample: These are independent variables set at the level of measurement (nominal or hierarchical, or quantity converted into categorical variables). Career status, Educational level, Years of Experience, Age. using the computer.- Dealing with the Internet. The desire to keep up with evolution. Set up a computerized system. The third Section concern with the variable of the study is that the automation processes (conversion of manual systems to computer systems) currently used negatively affect the effectiveness of the information system and consists of (11) statement. Through which the impact of drastic changes in administrative procedures, processes and organizational structures on the effectiveness of computerized systems is identified. Strongly agree), the scale used in the study was corrected as follows:

- The total score of the scale is the sum of the individual scores on the statement.
- Give each of the five Likert scale a weighting weight as follows: Strongly agree (5), Agree (4), Neutral (3), Disagree (2), Strongly disagree (1). Weighted circles were calculated For these circles as in TABLE II.

illustrates the weights and weighted media for the sample responses options	Weight and weighted mean of the study scale				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
Weight	1	2	3	4	5
Weighted average	0.1-1.79	1.8-2.59	2.6-3.39	4.19-3.4	4.2-5

Table II, show that the length of the period used is the result of dividing (5/4) or about (0.80). Here, the researcher believes that "Neutral" tends to approve by (50%), and also tends to disapprove by (50%), so the degree of approval of the medium. Accordingly, the higher the weighted weight than (3) there was approval and the less weighted weight less than (3) there was disagreement. To achieve more accurate results, the scale used is corrected to differentiate between the following levels: Greater than 4 highest approval score (budget impact on performance is high), 4 to greater than 3.5 positive consent, from 3.5 to greater than 3 medium degree of approval (tends to positive), 3 to greater than 2.5 medium degree of disapproval (inclined to negative), from 2.5 to greater than 2 not OK (negative) and less than 2 strongly disagree (very negative).

Third: The method of statistical analysis used in the study:

The researcher coded the questionnaire questions and then dumped the data collected through the questionnaires using the statistical package program (SPSS) and then analyzed through a set of statistical methods appropriate to the nature of the data and the type of variables of the study, to achieve the objectives of the study and test the study hypotheses conducting Cronbach's Alpha and reliability test

For questionnaire questions consisting of all data using the "Cronbach- Alpha coefficient"

C.Descriptive statistics methods

to describe the characteristics of the reflex ion of the sample of the study through the work of iterative tables include the iterations, percentages and graphs of variables (age, educational qualification, area of specialization, years of experience and current job), to identify the general trend of the sample reflex ion for each variable individually, and the standard deviation to determine The amount of dispersion in the respondents' answers for each statement is the arithmetic mean. The reference average for sample responses was also calculated using the Likart scale to measure the direction of respondents' opinions.

D Methods of statistical inference

to test the hypotheses of the study, and these methods were to use the test.This test was used to test the statistical significance of the study hypotheses at the level of significance 5%. This means that the value of the Chi square calculated at the level of significance less than 5% rejects the imposition of nothingness and the alternative hypothesis (study hypothesis) is true. If the value of the square of Chi at the level of significance greater than 5%, this means

TABLE II.

acceptance of the imposition of nothingness and therefore the alternative hypothesis (hypothesis) study is not true.

Stability means (the stability of the scale and its inconsistency with the same, that is, the scale gives the same results with a probability equal to the value of the coefficient if reapplied to the same sample). It is used to measure the stability of the “Cronbach’s Alpha” coefficient, which takes values ranging from zero to one true. Is equal to the true one. This means that increasing the coefficient of Alpha Cronbach means increasing the reliability of the data from the results of the sample to the study population. The researcher took into consideration the stability of the scale that it built before using it in the study by re-testing it on thirty individuals and calculating the “Cronbach’s coefficient”. He also performed the test on the statement and calculated the coefficient of stability where the stability of the resolution statements was 0.88 according to the Alpha Cronbach method. This value indicates the availability of a very high degree of internal stability for all the axes of the questionnaire. The validity of the content of the standards metrics was assessed by evaluating the validity of the concept and the validity of its questions in terms of formulation and clarity, which may be due either to different meanings according to the culture of the community or as a result of translating the standards from one language to another. (3) arbitrators, to analyze the contents of the metrics statements and to determine the compatibility between the statements of each metric and then accept and modify some statement, After the questionnaire was retrieved from the arbitrators and then the amendments proposed to it, the questionnaire was finalized

D. EValidity of the scale:

The validity test of the questionnaires used was done by calculating the square root of the Alfa Cranach’s coefficient as shown in TABLE III.

TABLE III.

illustrates the validity of the test Learn to pronounce	validity		
	Number of statement	Stability coefficient	Coefficient of continuance
	11	0.88	0.93

TABLE III shows that the validity of the test for the questionnaires (0.93), which are very large values, which means the validity of the resolution to measure what was set to measure.

V. Statistical description of the study sample according to personal characteristics

E. Work in the National Fund for Social Insurance in the Department

TABLE IV.

position Distribution	Distribution	
	Frequency	Percentage
Revenues	13	13.1
Financial Department	17	13.1
Technical Section	22	16.9
Benefits Section	15	11.5
Field Inspection Section	23	17.7
Department of Information Systems	16	12.3
Other	20	15.4
Total	130	100

Age Distribution	Distribution	
	Frequency	Percentage %
20 and less than 30year	21	16.2
30 and less than 40year	27	20.8
40 and less than 50yea	58	44.6
50 and less than 60year	24	18.5
60 year and more	0	0
Total	130	100

It is clear from TABLE IV the majority of the sample from the section and information systems (32.3%), while the proportion of employees in the revenue and financial section (26.2)%. The number of employees in the field inspection department was 17.7%.

TABLE V.

Age Distribution	Distribution	
	Frequency	Percentage %
20 and less than 30year	21	16.2
30 and less than 40year	27	20.8
40 and less than 50yea	58	44.6
50 and less than 60year	24	18.5
60 year and more	0	0
Total	130	100

It is clear from TABLE V the majority of respondents were between the ages of (40-50) years (44.6%), while the percentage of those aged (30-40) years (20.8)%. The sample, aged between 20-30 years, reached (16.2)%.

F. Distribution of sample according to educational qualification:

Table VI shows the iterative distribution of the study sample according to the qualification variable.

TABLE VI.

Qualification Distribution	Distribution	
	Frequency	% Percentage
Secondary	25	19.2
University	88	67.7
Above the university	18	13.1
Total	130	100

It is clear from Table VI the majority of the sample of the level of university education where they reached (67.7%) of the sample while the percentage of higher education level (13.1%), while the secondary level of education in the sample was (19.2% of the total sample and accordingly we can say that the sample of the study of scientifically qualified samples and thus will lead to obtain objective opinions on the subject of research

G. Distribution of sample members according to job experience:

Table VIII shows the iterative distribution of the study sample according to the functional experience variable.

TABLE VII.

Job experience Distribution	Distribution	
	Frequency	%
less than 5year	22	16.9
5 and less than 10year	14	10.8
10 and less than 15year	44	33.8
15 and less than 20year	23	17.7
20 and less than 25year	19	14.6
25 year and more	8	6.2
Total	130	100

It is clear from Table VII the majority of respondents have years of experience between 10-15 years (33.8%) and 17.7 years (17.7 years). The respondents who have more than 25 years of experience have reached 6.2% of the total sample.

H. Distribution of sample according to the level of computer proficiency:

Table VIII shows the frequency distribution of the study sample according to the level of computer proficiency

TABLE VIII.

Computer level Distribution	Distribution	
	frequency	%
Excellent	33	25.4
Good	81	62.3
Weak	16	12.3
Very weak	0	0
Total	130	100

It is clear from Table VIII the majority of respondents have a good level of use of the computer is good (62.3%) of the sample while the percentage of those who are good at using the computer at an excellent level (25.4)%, while those who are good at using it at a weak level They were (12.3)% of the total sample and therefore we can say that the sample of the study of the samples that are fluent in using the computer and thus will lead to obtaining objective opinions on the subject of research.

I. Distribution of respondents according to the level of Internet knowledge:

Table IX shows the frequency distribution of the study sample according to the level of Internet knowledge

TABLE IX.

Internet level Distribution	Distribution	
	frequency	%
Excellent	48	36.9
Good	63	48.5
Weak	18	13.8
Very weak	1	0.8
Total	130	100

It is clear from Table IX the majority of respondents have a good level of knowledge of the Internet (48.5%), while the level of knowledge of the level of the Internet is excellent (36.9%). They reached (14.6)% of the total sample and therefore we can say that the sample of the study of the samples that have knowledge of electronic services and thus will lead to obtain objective opinions on the subject of research.

J. Distribution of sample according to the desire to keep pace with the evolution:

Table X shows the iterative distribution of the study sample according to the desire to keep up with the evolution

TABLE X.

Desire Distribution	Distribution	
	Frequency	Percentage %
Yes	130	100
No	0	0
Total	130	100

It is clear from Table X all respondents have a desire to keep up with the evolution, where they reached (100)%.

K. Distribution of the sample according to the desire to establish a computer system:

Table XI shows the frequency distribution of the study sample according to the desire to establish a computer system

TABLE XI.

Computer desire Distribution	Distribution	
	frequency	percentage %
Yes	130	100
No	0	0
Total	130	100

It is clear from Table XI all members of the sample have a desire to establish a computer system where the proportion of (100)%.

III. DATA ANALYSIS:

Tables XII summarize the data to illustrate the most important characteristics of the sample in the form of frequency and percentages of the study statement in addition to discuss and interpret the results of the field study through descriptive statistical analysis.

The following is an analysis of the data of the applied study of the problem, which is that (the processes of automation (conversion of manual systems to computer systems) currently used negatively affect the effectiveness of the information system), first, iterative distribution of axis statements.

TABLE XII a repetitive distribution of the responses of the researched units to all axes of the questionnaire shows the following:

1. The majority of respondents agree that the current computer system has not been able to cancel all paper transactions and convert them into electronic transactions (88.4%) and (7.7%) disagree. The respondents who did not show specific answers reached 3.8%.
2. The majority of respondents agree that the computer system currently in place did not help to reduce the accumulation of the required papers (82.3%) while the percentage of those who did not approve (13.8%). Their percentage (3.8)%.

TABLE XII.

characteristic of the sample Statement	sample									
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	freq	%	freq	%	freq	%	freq	%	Freq	%
1. The existing computer system has not been able to cancel all paper transactions and convert them into electronic transactions	64	49.2	51	39.2	5	3.8	8	6.8	2	1.5
2. The existing computer system has not helped to reduce the accumulation of required paperwork	57	43.8	50	38.5	5	3.8	16	12.3	2	1.5
3. The computer system did not contribute effectively to reduce the procedures followed by the insured to obtain the benefit	48	36.9	44	33.8	9	6.9	22	16.9	7	5.4
4. When establishing the computer system there was no significant improvement in the performance of the institution	24	18.5	41	31.5	13	10	36	27.7	16	12.3
5. All revenue cycle procedures are performed manually "	44	33.8	53	40.8	13	10	12	9.2	8	6.2
6. Online forms are not available	82	63.1	37	28.5	4	3.1	4	3.1	3	2.3
7. There are difficulties and obstacles in converting many of the procedures performed manually "into computer	44	33.8	58	44.6	11	8.5	11	8.5	6	4.6
8. There is duplication in the implementation of some procedures	27	20.8	53	40.8	18	13.8	26	20	6	4.6
9. The existing computer system did not contribute to the speed of decision-making	37	28.5	51	39.2	19	14.6	16	12.3	7	5.4
10. Under the current computer system audit procedures are performed manually	64	49.2	49	37.7	9	6.9	7	5.4	1	0.8
11. The computer system did not contribute to increasing the degree of cooperation and creating team spirit among the employees	29	22.3	44	33.8	30	23.1	19	14.6	8	6.2
Total statements	520	36.4	531	37.1	136	9.5	177	12.4	66	4.6

3. The majority of the respondents agree that the computer system did not contribute effectively to reduce the procedures followed by the insured to obtain the benefit (70.7%), while the percentage of those who disagreed (22.3%). Respondents who did not show specific answers reached 6.9%.

4. The majority of respondents agree that when the computer system was established there was no noticeable improvement in the performance of the institution as it reached 50% while the percentage of those who approved it reached 40%. Respondents who did not show specific answers reached 10%.

5. The majority of respondents agree that the execution of all revenue cycle procedures is done manually (74.6%) while the percentage of those who do not agree (15.4%). Respondents who did not show specific answers reached 10%.

6. The majority of respondents agree that it is not possible to fill out the forms online (91.6%) while the percentage of those who disagree (5.4%). Respondents who did not give specific answers reached 3.2%.

7. The majority of respondents agree. There are difficulties and obstacles in converting many of the procedures that are carried out manually "to computer (78.4%), while the percentage of those who disagree with it (13.1%). The respondents who did not give specific answers (8.5%) .

8. The majority of respondents agree on the existence of duplication in the implementation of some procedures, where the percentage reached (61.6)%, while the percentage of non-

consenting to it (24.6)%. The respondents who did not show specific answers reached 7.6%.

9. The majority of respondents agree that the computer system currently in place did not contribute to the speed of decision-making (67.7%) while the percentage of non-respondents reached (17.7%). (14.6)%.

10. The majority of respondents do not agree that under the current computer system, the audit procedures are conducted manually (86.9%) while the percentage of those who disagree (6.2)%. Respondents who did not give specific answers reached 6.9%.

11. The majority of respondents agree that the computer system did not contribute to increasing the degree of cooperation and creating team spirit among the employees (56.1%), while the percentage of those who did not agree (20.8)%. Respondents who did not show specific answers reached 23.1%.

The majority of respondents agree with all the statements of the axis (automation processes (conversion of manual systems to computer systems) currently used "negatively" affect the effectiveness of the information system) (73.5%), while the percentage of non-consenting (17)% . . Respondents who did not give specific answers reached 9.5%.

Second: Descriptive analysis and testing of differences for the statements of the first axis:

The current automation processes (conversion of manual systems to computer systems) "negatively" affect the effectiveness of the information system:

The following is an estimate of the mean and the standard deviation of all the study axes to know the direction of the study sample and the relative importance of the terms of the scale for each axis and to test the existence of statistically significant differences between the numbers of approvers, neutrals and non-approvers of the above results. The Chi squared test was used to denote differences.

1. The mean value of the study sample for the first statement was (4.28) with standard deviation (0.916). Statistically between the answers of respondents in favor of strongly agree that. The existing computer system "has not been able to cancel all paper transactions and turn them into electronic transactions

2. The mean value of the individuals of the study sample for the second statement (4.11) with a standard deviation (1.05). Among the responses of the sample respondents who strongly agree that the existing computer system did not help to reduce the accumulation of paperwork required.

3. The mean value of the study sample for the third statement was (3.80) with a standard deviation (1.25). Statistical among the responses of the respondents in favor of those who agree that the computer system did not contribute effectively to reduce the procedures followed by the insured to obtain the benefit.

4. The average value of the study sample for the fourth statement (3.16) with a standard deviation (1.34) and the value as any quadrature (23) at the level of significance (0.000) and this value is less than the level of significance (5%) and therefore this indicates the existence of significant differences Statistical among the answers of the respondents in favor of yes agree that when the establishment of the computer system there was no significant improvement in the performance of the institution.

5. The mean value of the study sample for the fifth statement (3.87) with a standard deviation (1.16) and the value as any quadrature (67) at the level of significance (0.000) and this value is less than the level of significance (5%) and therefore this indicates the existence of significant differences Statistical among the responses of the sample respondents in favor of agreeing that the implementation of all procedures of the revenue cycle is done manually.

6. The mean value of the study sample for the sixth statement (4.47) with a standard deviation (0.888) and the value of any quadrature (182.8) at a significant level (0.000) and this value is less than the level of significance (5%) and therefore this indicates the existence of significant differences Statistical questionnaire among respondents who strongly agree that the forms are not available online.

7. The mean value of the study sample for the seventh statement (3.95) with a standard deviation (1.08) and the value as any quadrature (84.5) at the level of significance (0.000) and this value is less than the level of significance (5%) and therefore this indicates the existence of significant differences Statistical among the responses of the respondents in favor of the approval that there is difficulty and obstacles in the conversion of many of the procedures that are implemented manually to computer.

8. The mean value of the study sample for the eighth statement was (3.53) with a standard deviation (1.16). Among the responses of respondents in favor of strongly agree that the existence of duplication in the implementation of some of the procedures.

9. The mean value of the study sample for the ninth statement was (3.73) with a standard deviation (1.15). Statistical significance between the responses of the respondents in favor of those who disagree that the current computer system did not contribute to the speed of decision-making.

10. The mean value of the individuals of the study sample for the tenth statement (4.29) with a standard deviation (0.875) and the value of Kay squared (124.9) at a significant level (0.000) and this value is less than the level of significance (5%) and therefore this indicates the existence of significant differences Statistical among the responses of the respondents in favor of those who do not agree that under the current computer system the audit procedures are done manually.

11. The mean value of the individuals of the study sample for the eleventh statement (3.52) with a standard deviation (1.16) and the value of Kay squared (27.7) at a level of significance (0.000) and this value is less than the level of significance (5%) and therefore this indicates the existence of differences Statistical significance between the responses of the respondents in favor of those who disagree that the computer system did not contribute to increase the degree of cooperation and create team spirit among the workers

12. The mean value of the individuals of the study sample for all the statements of the first axis (3.88) with a standard deviation (0.391) and the value of Kay squared (49.5) with a level of significance (0.000) and this value is less than the level of significance (5%) and this indicates that there are differences Statistically significant among the responses of the sample respondents in favor of all the statements of the axis (automation processes (conversion of manual systems to computer systems) currently used negatively affect the effectiveness of the information system).

IV. CONCLUSION

The study concluded that when establishing a computerized system must make drastic changes in the work system and procedures to adapt the nature of the system

V. RECOMMENDATIONS

- Before building computerized systems drastic changes in procedures should be made in accordance with the system environment
- When switching to the electronic work environment, the organizational structures of the organization should be reviewed in accordance with the electronic work environment
- Activate the role of the Internet and connect local systems to the Internet
- Activating the role of all technical tools and delivering paperwork

- Utilize the databases of institutions and companies to activate the role of internal and external networks
- Encouraging studies and scientific research that are concerned with the development of systems

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