



*Using Value Stream Maps To Treatment Waste**
Case study in Karbala Holy Health Department

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Abstract:

The objective of this research is to employ the value stream map as one of the main tools in the strategy of optimization and redesign of service in the service business environment and reducing processes that do not add value which is wasted without being processed. The problem of the study is to increase the waiting times for the official version of the birth certificate of the new born, which is sent to the Directorate of Civil Status to be issued for the national card later. The study is based on the current stream mapping, analysis and mapping in order to identify, remove or reduce waste and improve service efficiency. The data and information needed to study the case were collected through field interviews, interviews and interviews at the government hospital. Some appropriate quantitative methods were used (total time to add value, total time not added value, service efficiency, improvement rate). The most important conclusions: The tool Value Stream Map is an efficient and efficient tool in improving service organizations to enable the organization to invest add times for value and reduce or eliminate non-adding times of value and improve the efficiency of service provided.

Keywords: - Value Stream Maps, Waste, Add value time, efficiency of service, Non-add value times, improvement rate.

1. Introduction:

The health sector is one of the most important service sectors. It provides the solid ground for building a healthy and healthy human being in a manner of commensurate with God's honor. The organizations of this sector must find an effective tool to remove all activities that do not add value to reviewers and improve the efficiency of service provided to them. To success, the development in this area are among the most important indicators to measure the level of civilization and economic progress of any country. The Value Stream Maps of the important topics in the service business environment for its important role in raising the

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level of these works for the better, To identify, remove or reduce waste whenever possible, thereby improving the efficiency of the services and the efficiency of the tasks provided to patients.

2. Methodology

2.1 Research problem

The length of the procedures adopted in the postnatal service to organize the birth certificate of the new born in the women's hospital and the obstetrician of the concerned parties by comparing it with the official version sent to the Directorate of Civil Status to issue the national card, which led to increased waiting times and times of transportation and the frequency. In light of this, the problem of the study can be framed by the following questions:

- a- Is there a possibility to apply the instrument to the value-stream map of the organization in question to reach a redesign of the health service?
- b- Does their use contribute to overcoming or reducing (non- add value times) as well as adding times of value, which improves the efficiency of the service provided by the organization in question.

2.2 Research Importance

The importance of this research to highlighted in an attempt to raise the interest of the organizations in improving the current situation and thus increasing the managers' understanding of the concept of value stream maps and their impact on the future perceptions of the organization. It is an efficient tool in identifying the waste areas in the operations and contributing to drawing future scenarios for improving these processes. And the efficiency of the service provided through its contribution to provide facts supported by quantitative indicators. It also helps institutions to work to avoid deficiencies and improve the working environment in these institutions.

2.3 Research Goals

This research aims to achieve several goals:

- a- Redesigning the health service by focusing on the design and construction of value stream maps for the future reality and testing its results in the current reality of their high efficiency, as proved by the researcher's findings in the applied side.
- b- Reduced times of waste (non- add times) by observing the waiting times and movements revealed by the value stream maps as well as the add times of value to improve the efficiency of the service provided by the organizations in question.



2.4 Data Collection Instruments

Based on the contributions of researchers collected from sources such as magazines, researches, articles, papers, scientific studies and Arabic and foreign languages, as well as the use of Internet services and personal interview with doctors, administrators and health staff in the community, and living to see the conduct of activities and collect the necessary data. The existing records and documents were examined in order to obtain information relevant to the research community and to determine the procedures studied.

2.5 Quantitative Methods

The research was based on a number of quantitative methods for data analysis, tabulation and scheduling, to achieve objectives and verify their results, as follows:

1. **Total Time add Value:** It is the total real time necessary to complete the actual work.
2. **Total time non-add value:** the total time of waiting, movement, delay and storage in the work done.
3. Depend on program microsoft office (Excell) to draw the maps stream value in current state and future state.
4. **Efficiency ratio:** The percentage of the add time of the value to the total time of the completion of the work (the time of the value + the time is not the add of the value) and according to the following equation:

$$\text{Efficiency ratio} = \frac{\text{add value time}}{\text{Total Time}} \times 100\%$$

4.6 Percentage of improvement in service: The percentage of the difference between the time in the current situation and the future situation to the time in the current situation and according to the following equation:

If we assume :

X= add value time for the current status

Y= add value time for the future status

The rate of improvement will be as follows:

$$\text{rate of improvement} = \frac{X - Y}{X} \times 100\%$$

3. Literature review

3.1 The Concept Of Value Stream Maps

Many practitioners believe that the value stream map is the key tool for achieving many things, including identifying the times that can be reduced in the process cycle, applying the process improvement, and in some organizations becoming a function of their agile application. In some areas, it can be a critical tool for documenting the process and



eliminating waste, as each improvement initiative must start from a clear understanding of current performance and the idea of achieving minimum waste (Chena, and Shadyc, 2010: 1069).

The value stream maps are a necessary agile technology, originally developed by Toyota, a key element of improvement as it provides a basic outline of the kinds of changes that require moving from one environment to another where resources stream smoothly from one process to another within a process that adds value and helps implement improvements On the system (Barbara, 2012: 23).

(Haizer & Render, 2011: 292) defined the value stream map as "the process that helps managers understand how to add value to the stream of materials and information through the entire production process." (Gopalakrishnan 2010: 95) defined it as "a tool used as an indicator Visible to all the work required to run the product or service from start to finish. "

And we believe, The VSM value maps are a continuous improvement process, based on the creation of the current status map and then the realization of the proposed future state map. Further mapping of the future situation can be done to enable the continuous improvement cycle to continuously eliminate waste, simplify procedures, reduce costs and eliminate waste.

3.2 Manage value stream maps:

Bonaccorsi defines the management of value stream maps as the preferred method for planning and implementing the change required to achieve the agile project on the ground(Bonaccorsi et al., 2011: 429).

Managing value stream maps is a tactical strategy tool to understand where the full stream of the process goes, allowing management to identify bottlenecks and problems in a value stream. It also connects individuals, flexible manufacturing tools, metrics together, and a planning tool that ensures a smooth business continuity and allows anyone to understand and continually improve things. (Thummala, 2004: 7).

And we believe that the management of value stream maps is the process of planning and linking initiatives or steps of improvement through systematic data collection and analysis. The goal is to identify and eliminate waste in the process and to design and implement a truly flexible plan for managing value stream. They will apply improvements that make it easier to meet customers' requests.



3.3 Principles of value stream mapping planning

There are five basic principles that the organization must adopt to get the benefit from the application of value-stream mapping planning in organizations (Hashlamon, 2017: 31-32):

1. **Value Determination:** By defining customer needs and determining the value of activities that add value to the final service.
2. **Determine the value path:** Determine the value of the stream by eliminating all operations that do not generate value for the final service (Yusuf, 2015: 54).
3. **Stream:** Ensure a continuous stream of operations and the entire supply chain. That is, the focus should be on the process rather than on the final service, and on reaching the optimal value stream and the value must be determined for the customers (Solding & Gollander, 2009: 232).
4. **Dragging:** The use of the drag method in the process of production of the payment allowance, which means production according to the desire and need of customers. The idea is to draw in the limit of unnecessary production and use of production on time.
5. **Perfection:** Aims to achieve optimal solutions and continuous improvements, and provide services that meet the needs and desires of customers and their expectations of the right time, quality and cost; the best way to achieve perfection is through close and constant contact with customers (Gopalakrishnan, 2010: 60).

The following figure summarizes the five principles of value-stream mapping:

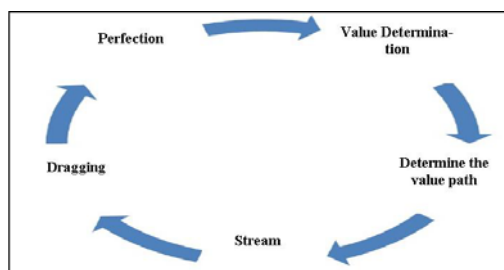


Figure (1) Five Principles of Value Stream mapping

Source: Hashlamon, Yasmine Hatem, 2017, The Effect of the Application of Soft Manufacturing Platforms on Competitive Advantage Strategies in Jordanian Pharmaceutical Companies, Master Thesis, Faculty of Business Administration, Middle East University, Jordan, p.37.

3.4 Importance Of Value Stream Maps

Mentions (Gopalakrishnan, 2010:89) The benefits of value stream maps are as follows:

- Helps employees understand the current process as well as identify opportunities for improvement.



- Identifies the actual ways in which dangerous problems and possible solutions are identified by connecting ideas, information and data related to the process visually and effectively.
- Enables employees to examine each step of the process, identify waste in the process and create a future value stream map (developed).
- Employees can use the current and future activity map to clearly determine the amount of improvement.

Value Stream Maps (VSM) is a proven method for building a common team view of the workflow, identifying possible "quick success" improvements, and combining information flows and technical services. VSM combines multidisciplinary teams to understand all process details to avoid common project risks (Emily, 2014: 1148).

we see the expected benefits of using value planning for health organizations:

- Redesign services in a Service business environment such as hospitals using VSM.
- Dissemination of the culture of eliminating waste at work at different levels in the organization.
- Changing the location of some service centers, which reduces the distance between the health service center and the examination site and thus reduce the times that do not add value.
- It is used as a training tool for employees by drawing shapes and standing on the current situation and the possibility of improving the process in order to ensure their efficiency.
- Abandoning traditional technologies and investing in modern technologies.

3.5 Key factors for the successful implementation of value stream maps:

Value stream maps are an integrated process that includes strategic dimensions in improving processes in order to reach the zero defect and seek to activate continuous improvement through the use of a set of tools and methods that eliminate all types of waste and efficient use of available resources and create a culture of thinking of improvement in all stages of operations (Tobias , 2016: 4)

The success factors can be summarized as follows (Hashlamon, 2017: 32):

1. Management commitment to the process of adopting and implementing the lean manufacturing system.
2. A comprehensive strategy for integrating the system in all operations of the organization..



3. Create the necessary changes in organizational culture.
4. Participation of all employees.
5. A good network (with suppliers, customers).

3.6 Stages Of Building Value Stream Maps

Prepare (Teemu & Juha, 2015: 9-10) Value stream analysis is a method for applying agile principles to the study of business processes, as it works to describe a realistic system is very complex and make it simplified in a two-dimensional format, which facilitates the vision and understanding, While Adwait believes that VSM is a graphical tool, which includes information about the production process, current and future status maps provide vital information related to the production process such as cycle time and lead time. The phases of VSM are discussed as follows (Adwait, 2017: 7670-7671) Steps to build the value stream map shown in Figure (2):

Step 1: Choose the service family to improve:

The service family is selected for mapping, and at this stage the organization's past experience, the amount of information available, the size of the service to be provided and its administrative boundaries (adwait, 2017:7670).

Step 2: Map the current situation:

Participants are given the opportunity to meditate and provoke intellectual controversy, criticism and creativity in stream maps by working in groups and exchanging ideas to access the best map for the installation of information, where the current status map is drawn (Roosen, 2013:30).

Step 3: Analyze and evaluate the current status map:

The current status map is fully analyzed to determine wastage, bottleneck operations, congestion points and all waste, and priorities are assigned to all wastes found (Yusuf, 2015:53).

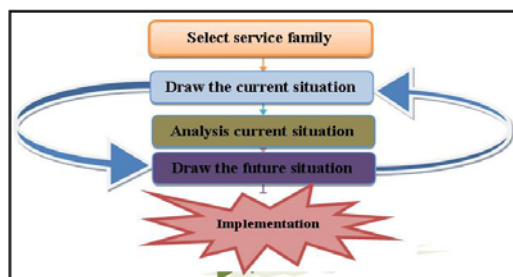


Figure (2) Steps for mapping the value stream map

Source : Adwait , Deshkar & et al , (2017) Design and evaluation of a Lean Manufacturing framework using Value Stream Mapping (VSM) for a plastic bag manufacturing unit, Mechanical Department, Yeshwantrao Chavan College of Engineering, Nagpur , Maharashtra, India , Proceedings 5 (2018) 7668–7677.



Step 4: Waste disposal and mapping of the future status:

One of the objectives of the value stream map is to highlight the sources of wastage and target the foreseeable places for improvement. The waste present in the current status map is disposed of on the basis of its priorities. After waste disposal, the future status is drawn (Teemu & Juha, 2015:10).

Step 5: implementation

Following the support of senior management, the process of improvement is initiated in accordance with the plan and the results of the management process are noted.

3.7 Types Of Waste

Value stream maps are also important in clarifying the wastage in operations, as the exclusion of waste sources would focus efforts on activities that create the value desired by customers and the outcome improved processes such as reducing time, minimizing errors, defects, and lower cost. (Roosen, 2013:25). And that there are three types of wastage as you can see in Toyota (Shlash, 2014:161):

☒ **(Muda)**: Mean useless, or waste any business or movements that do not add value.

☒ **(Mura)**: It means disparity, divergence, inconsistency and harmony, which means wasteful use of resources unfairly, unequal access or different downloads from time to moment and from one resource to another.

☒ **(Muri)**: It is meant to be unreasonable, excessive, or overload, because it reduces output because of excessive work and sometimes because of something unnatural that generates obstacles and bottlenecks.

In service organizations there are other types of wastage, as in the table below.

Table (1) Types of wastage in service organizations

Types of waste	the details
Defects	Error entering data, missing files, crash or damage to goods.
Repetition	Data re-entry, multiple signatures, unnecessary reports, multiple queries.
Incorrect storage	Incremental storage, loss of time to search for lost, unnecessary copies.
Lack of focus on the customer	Bad treatment, rudeness or rough handling, lack of attention to the customer.
Communication is unclear	Wrong information, no data format, unclear flow.
Movement or transfer	Poor arrangement, ineffective filing, double amenities.
Incomplete use of workers	Insufficient tools, excessive or excessive bureaucracy, limited powers.
Diversification / variation	Ineffective procedures, lack of standard models, standard or standard time is unclear.
Delay or wait	Waiting for approvals, stop working, waiting for processing.

Source: Shalash, Fares Jaabaz, 2014, using the process map of the operation in reducing wastage: A case study at al-Diwaniyah Teaching Hospital, published on the site of the University of Babylon P 161.

There are also seven sources of waste or waste that Toyota has adopted in its industry, abbreviated in the word "**Timwood**" in the following terms:



Transport, Inventory, Motion, Waiting, Over Processing, Overproduction, Defect And added to the eighth type is Eschewed Talents

The rationale is to eliminate (value not added) and shorten the time spent (necessary but not of added value), or even reorganize the stream in order to avoid the necessity of type II activities (Dario & Dorota, 2017:32).

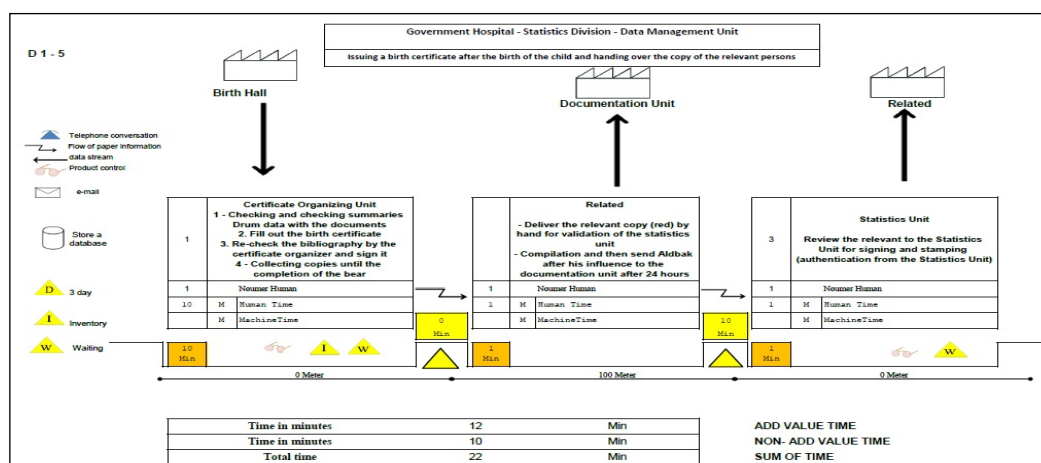
4. Results

Case study: birth Certificate for new baby :

4.1 apping value stream maps of the current situation:

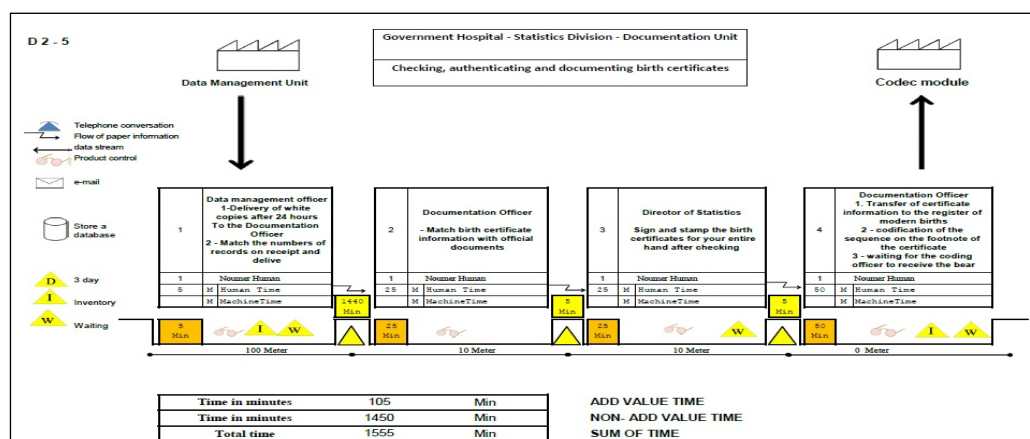
In this study, the current procedures for issuing a certificate of birth from the government hospital is provided by hand for those who remain restricted and are not allowed to review the Directorate of Civil Status were researched unless the official government copy arrives by official mail, which requires days to do so.

The following stream charts show the procedures adopted by the State hospital in its administrative operations, as follows:



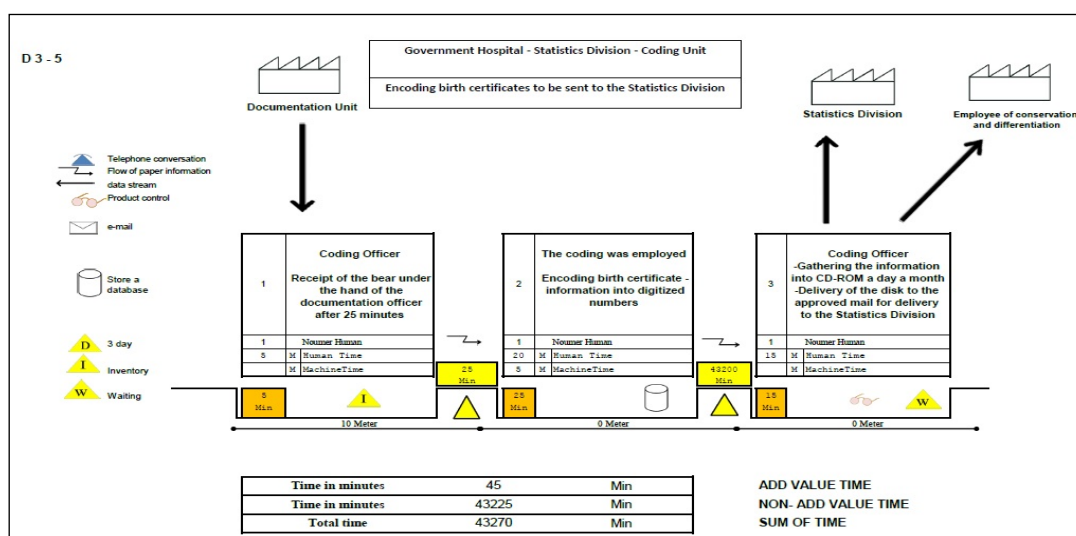
Value Stream Map D 1-5 (3) Data Management unit at the Government Hospital

Source: Prepared by the researcher



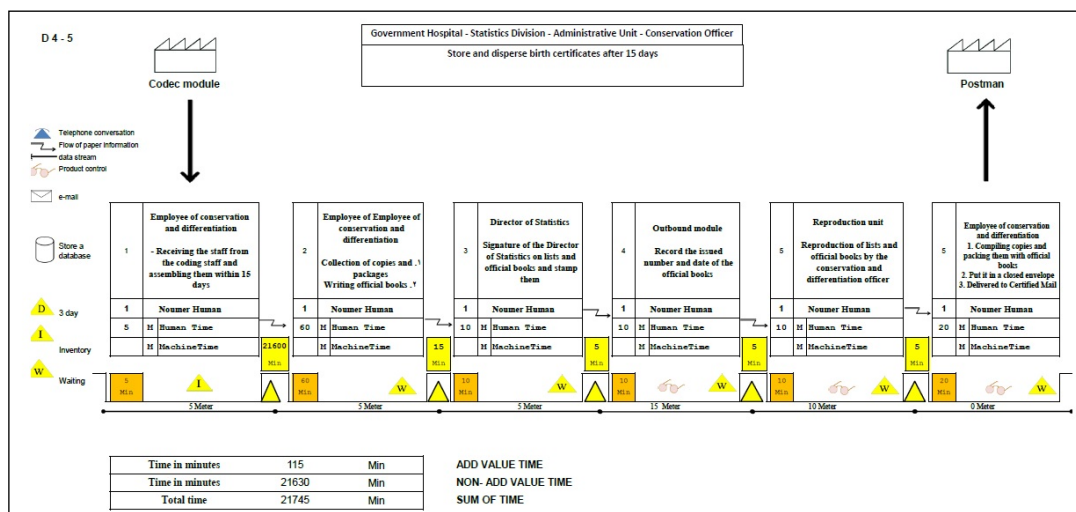
Value Stream Map D 2-5 (4) The documentation unit at the Government Hospital

Source: Prepared by the researcher



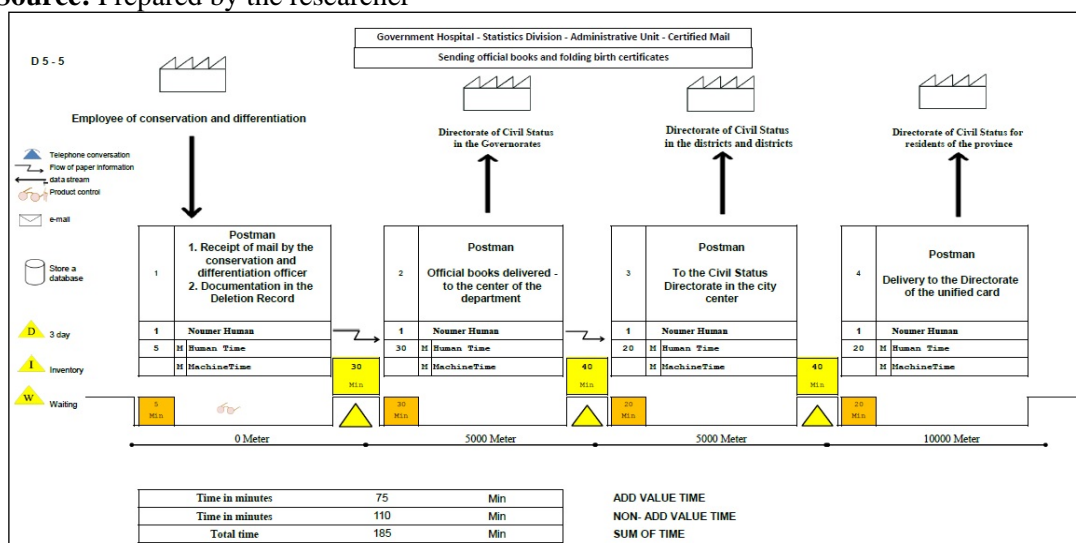
Value Stream Map D 3-5 (5) Coding unit at the Government Hospital

Source: Prepared by the researcher



Value Stream Map D 4-5 (6) Administrative unit at the Government Hospital

Source: Prepared by the researcher



Value Stream Map D 5-5 (7) certified mail at the Government hospital

Source: Prepared by the researcher



Illustrated by the above Value Stream Map and times of administrative procedures in the issuance of the birth certificate, As follows:

Table (2) shows the number of procedures and time elapsed to issue the birth certificate in the government hospital and to the three beneficiaries of the current situation

The main actions from	Service direction to	The result	No. procedures	Elapsed time		
				add value	Non_add value	all
Birth in the government hospital	Related to the certificate	Receiving relevant copies of official reviews	3	12	10	22
	Division of Statistics	Provide statistics with birth certificates after coding	9	162	44685	44847
	Directorate of Civil Status	To issue the national card	19	352	23200	23552

Source: Prepared by the researcher

The efficiency of the service can be calculated under the following equation, as shown in table (3):

$$\text{Efficiency ratio} = \frac{\text{add value time}}{\text{Total Time}} \times 100\%$$

Table (3) Ratio of service efficiency to the current situation

The main actions from	Service direction to	efficiency
Birth in the government hospital	Related to the certificate	54%
	Division of Statistics	0.36%
	Directorate of Civil Status	1.4%

Source: Prepared by the researcher

4.2 Draw Future Mapping :

After analyzing the flow charts of the current situation and presenting the ideas of the managers and the participants in the work teams, we felt that a network is established by using the information technology to ensure the best time in the service provided to the citizen as well as the high efficiency and the lowest effort with the possibility of high advanced, (Server) is working to receive information from all ports with authority and linked with it through the network (INTRANET NETWORK) as shown in Figure (8), and that there are infrastructure in health centers to work so step towards improving work and develop staff capabilities and improve the delivery The service is The strategic dimension because it achieves immediate goals and long-term future goals.

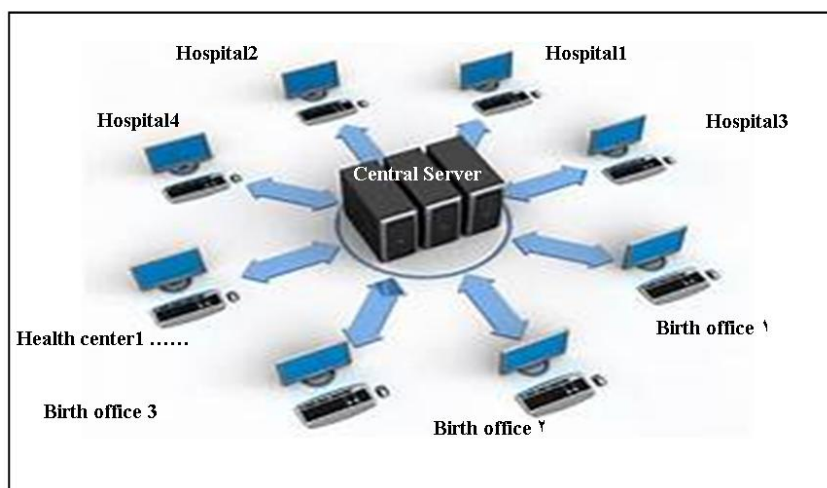
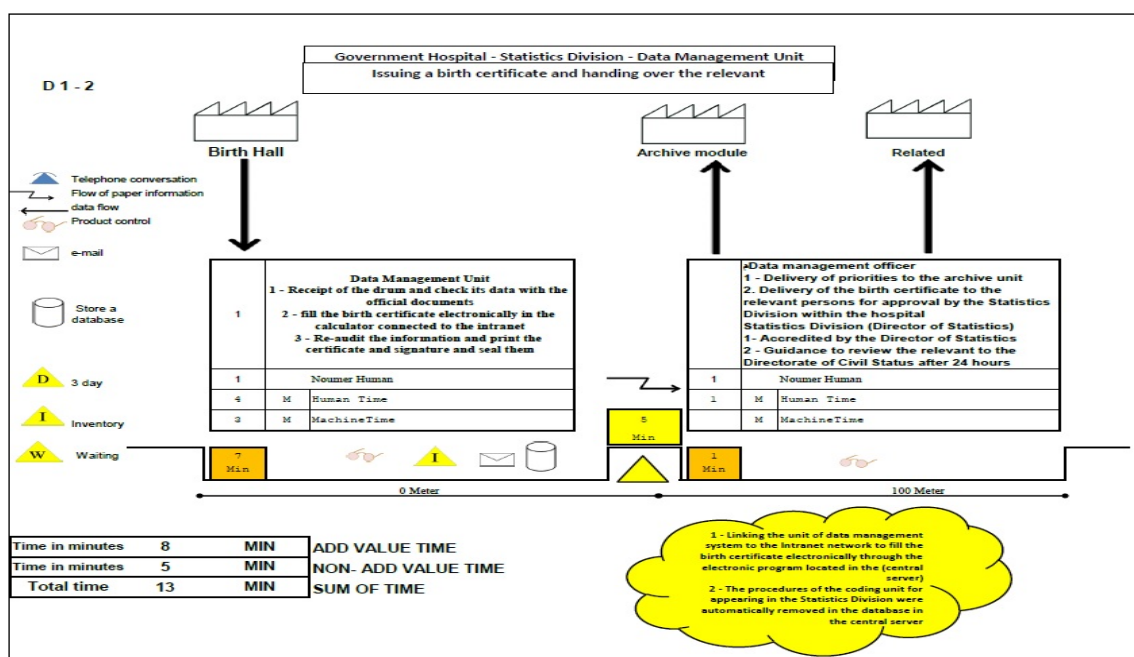


Figure (8) Central Server work with other health institutions

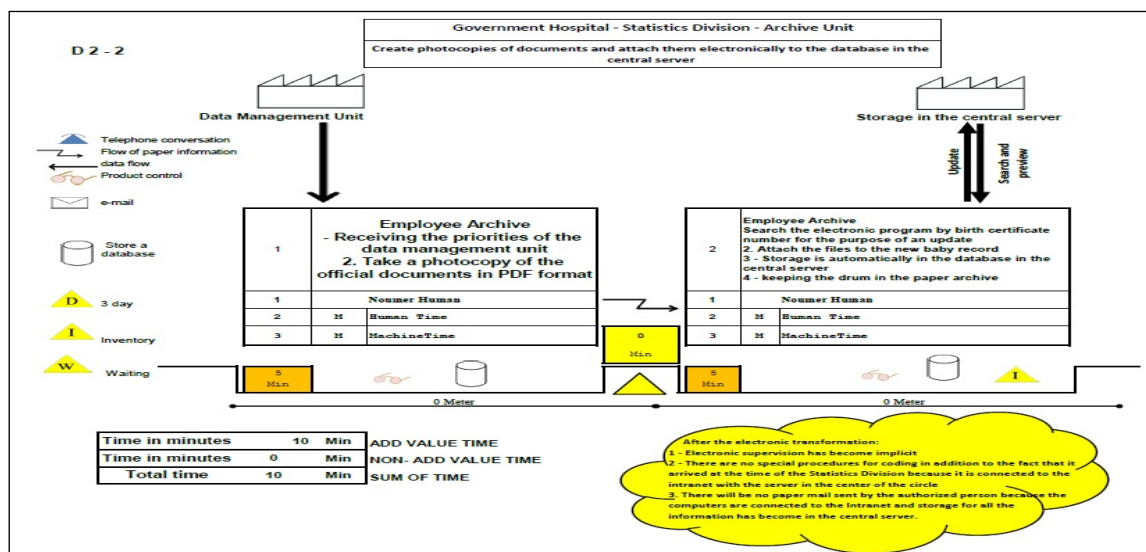
Source: Prepared by the researcher

Therefore, we see that the proposed stream maps for the organization of the birth certificate in the government hospital will be according to the following maps:



Value Stream Map D 1-2 (9) Data Management unit at the Government Hospital

Source: Prepared by the researcher



Value Stream Map D 2-2 (10) archive unit at the Government Hospital

Source: Prepared by the researcher

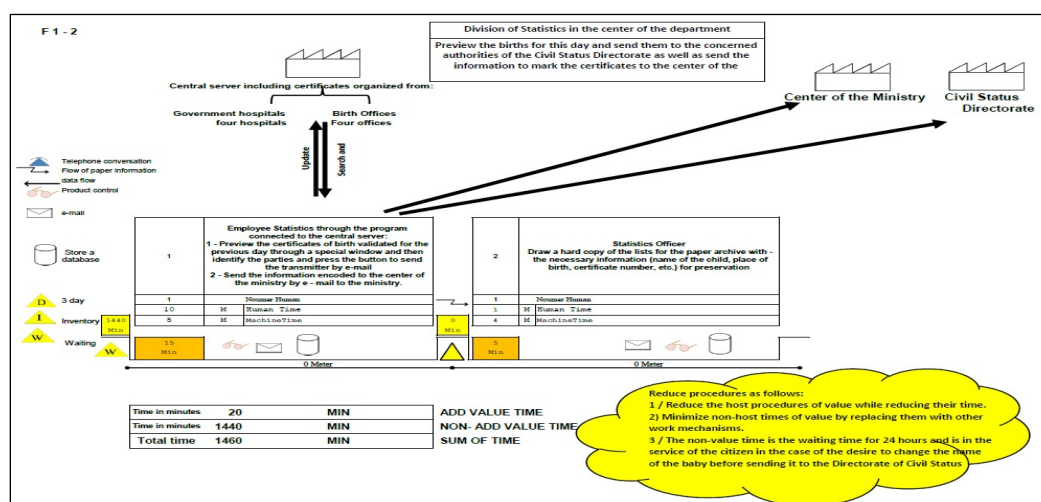
It is clear from the maps that the value stream and the times taken by the administrative procedures for the issuance of the birth certificate are reflected in the proposed reality, as illustrated in table (4).

Table (4) shows the number of procedures and time elapsed for the issuance of the certificate of birth in the government hospital and up to the three beneficiaries of the future situation

The main actions from	Service direction to	The result	No. procedure s	Elapsed time		
				add value	Non_add value	all
Birth in the government hospital	Related to the certificate	Receiving relevant copies of official reviews	2	8	5	13
	Division of Statistics	Provide statistics with birth certificates after coding	4	18	5	23
	Directorate of Civil Status	To issue the national card	5	38	1445	1483

Source: Prepared by the researcher

For the above maps, a stream map of the Statistics Division is added to the center of Karbala Health Department, where it will inspect the information flowing from all the outlets and sent to the directorates of civil status according to the geographical area of the residence of the new born also send the information encoded by the program automatically to the center of the ministry, according to the following map:



Value Stream Map F 1-2 (11) Division of Statistics at the centre of the department

Source: Prepared by the researcher

As seen from table (5) The efficiency of the service for the future situation:

Table (5) Ratio of service efficiency in future status (proposed)

The main actions from	Service direction to	efficiency
Birth in the government hospital	Related to the certificate	61.5%
	Division of Statistics	78.3%
	Directorate of Civil Status	2.6%

Source: Prepared by the researcher

4.3 Discussions:

The results obtained are shown in the chart (12) for the Times of value and planned (13) for non-value-adding times, as Table 6 shows the number of actions, the rate of improvement and the efficiency ratio as follows:

A. In the case of childbirth in the State hospital until the delivery of the relevant copy:

- 1- Reduced number of actions from 3 to 2 administrative action.
- 2- The value of the add time decreases from 12 minutes to 8 minutes, an improvement rate of 33.3%.
- 3- Low non-value time from 10 minutes to 5 minutes, an improvement of 50%.
- 4- The service efficiency ratio increased from 54.5% to 61.5%.

B. In the case of childbirth in the State hospital until the information encoded reaches the Statistics Division at the Center of the Department:

- 1- Reduced number of actions from 9 to 4 administrative action.
- 2- The value of the add time decreases from 162 minutes to 18 minutes, an improvement rate of 88.9%.



3- The non- add time of the value is reduced from 44685 minutes to 5 minutes, an improvement rate of 99.9%.

4- The service efficiency ratio increased from 0.4% to 78.3%.

C. In the case of childbirth in the State hospital until the official copy of the birth certificate to the Directorate of Civil Status:

1- Reduction in the number of actions from 19 to 5 administrative procedures.

2- The value of the add time decreases from 352 minutes to 38 minutes, an improvement rate of 89.2%.

3- The non- add time of the value decreased from 23200 minutes to 1445 minutes, an improvement rate of 93.8%.

4- The service efficiency ratio increased from 1.5% to 2.6%.

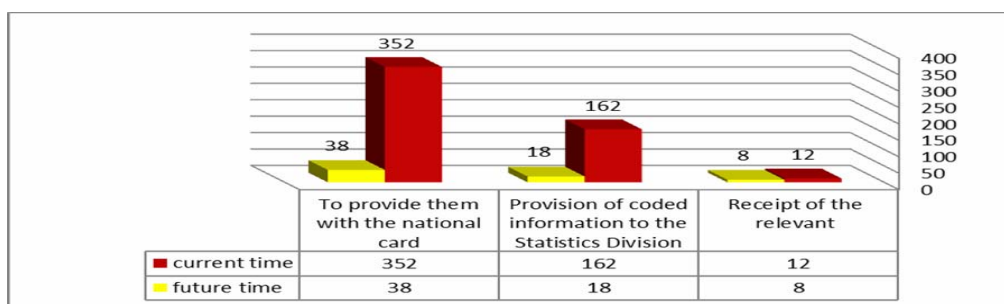


Figure (12) Diagram illustrating the improvement in the add time of birth value in the Government hospital

Source: Prepared by the researcher

Table (6) Comparison between the number of procedures and the efficiency of the service for the current situation and the future status of childbirth at the Government hospital

The main actions from	Service direction to	current situation		Future situation	
		No. procedures	Efficiency %	No. procedures	Efficiency %
Birth in the government hospital	Related to the certificate	3	54.5%	2	61.5%
	Division of Statistics	9	0.4%	4	78.3%
	Directorate of Civil Status	19	1.5%	5	2.6%

Source: Prepared by the researcher

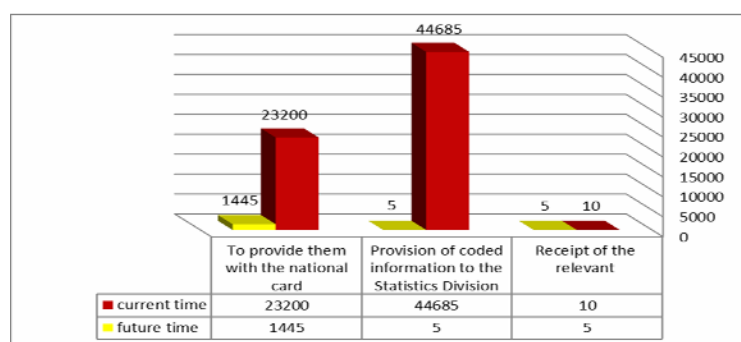


Figure 13 diagram showing improvement in the non- add time of birth value at the Government hospital

Source: Prepared by the researcher



Also, it is possible to clarify the redesign of the service provided after comparing the current status diagram with the future status diagram as shown in Figure (14) and Figure (15):

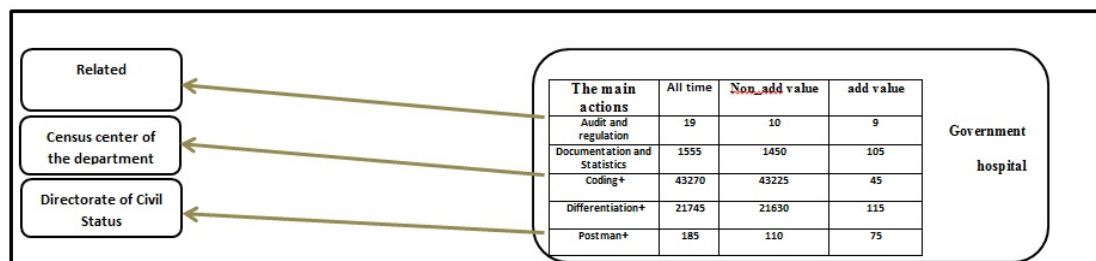


Figure 14 The main value flow chart for the delivery of the birth certificate and its delivery service in the current situation

Source: Prepared by the researcher

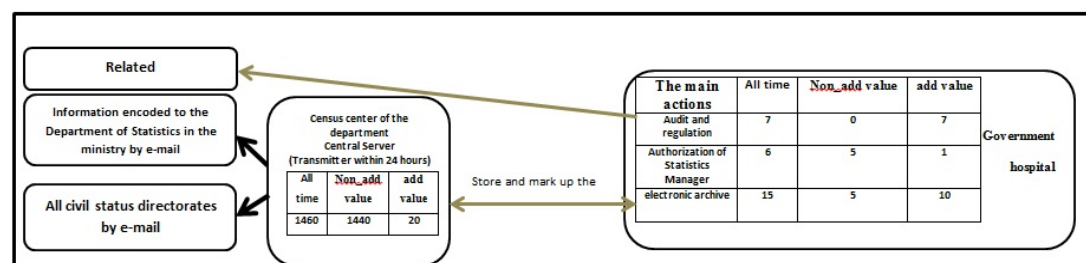


Figure 15 The main value flow chart for the delivery of the birth certificate and its delivery service in the future situation

Source: Prepared by the researcher

5. Conclusions And Recommendations

5.1 Conclusions :

1. The practical side proved that the tool value stream maps are appropriate in multi-action service delivery aspects and can be applied to several administrative problems involving waste and have an active role in redesigning the service provided.
2. The use of the value stream map in the current study has been shown to be an efficient and effective tool in service organizations to enable them to identify and address waste from reducing wait time and improve the efficiency of service provided to reviewers. Redesigning the service described in future stream maps reduced the number of procedures, Also, it helps to have a desire for an electronic transformation of transforming the organization of the birth certificate into an electronic archiving organization.

5.2 Recommendations:

1. Redesigning the service in order to improve management information systems by designing stream maps and testing their results and comparing them with the current situation to eliminate waste of all types while minimizing the number of procedures.



2. To increase the efficiency of the service provided in the health field by removing or decreasing the non-value-added times (waiting times and Movements times) and supporting the centralization of work in the compilation of encoded information and its access to the Statistics Division in real time as well as a unified transmission of the official version to the Directorate of conditions Civil multi-transmitter allowance results in a reduction of the value-added times.

3. The results of the value stream map are dependent on the extent, involvement and ability of the personnel involved and the support of senior management.

4. Open channels of communication between the administration and its staff to understand their problems and to listen to their views and suggestions concerning the support of the organization and contribute to improve it to continue continuous improvement.

5. Conducting research and studies on the actual state and needs of the community of actual health services in order to meet the patient's requirements and to be highly qualified and smooth in providing the necessary service.

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