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# The Electronic Document Management System (EDMS) Implementation Impact on PT XYZ Document Control Performance

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**Abstract:** The industrial revolution that occurred in the 1800s has become the core of human power substitution needs birth with engine power. This event is also a trigger for the organization to implement automation in its operations, so it can increase the process capacity and capability. The organization is also being forced to manage its operational and production strategies optimally so that all taken actions can be a sustainable competitive advantage to survive and develop. To support these achievement goals, the organization needs to apply and make efforts to oversee all activities and their duties, which are needed to maintain the level of desired advantage. Unfortunately, the application of management information systems to support the process and product quality control has brought a large number of documents and paperwork that must be managed and have their limitations. The most appropriate step for coping with this problem is to develop an Electronic Document Management System that can provide convenience. The study that was conducted at PT XYZ with a descriptive quantitative approach, aims to see the Electronic Document Management System's impact on the workload of administrative activities and to apprehend the provided efficiency opportunities. The study concluded that the use of an Electronic Document Management System at PT XYZ had a reduced impact on the workload of administrative activities carried out by the Document Controller (29.1%) and Document Administrator (17.6%). Optimization carried out on PT XYZ's Electronic Document Management System can provide opportunities to increase efficiency in the workload of administrative activities carried out by DC (72.7%), Unit Head (0.7%), and Document Administrator (59.8%); able to reduce or even eliminate the Lean waste (non-value added) in the document control activities, and can be an opportunity to increase the competitiveness of the organization.

**Keywords**: electronic document management system, document control, workload analysis, lean

## INTRODUCTION

The organization's development cannot be separated from its management development, which is increasingly fast, precise, effective and efficient. This is done not only

to increase the organization's operational productivity, but also to maintain its output quality, consistency, customer satisfaction, and always be superior to competitors. The organization is also being forced to grow continuously in order to equilibrate its external environmental changes while keep improving its performance and also its internal environmental stability. Various ways were used [1] to achieve this. Starting from work functions specialization, work tasks partition, up to the technology implementation in every supporting and production process stages. The industrial revolution that occurred in the 1800s has become the core of human power substitution needs birth with engine power. This event is also a trigger for organization to implement automation in its operations, so it can increase the process capacity and capability. The organization is also forced to maintain its operational and production strategies optimally so that all taken actions can be a sustainable competitive advantage in order to survive and develop. Furthermore [2], all made strategic decisions are also being expected to always be able to: develop the competitive advantages in differentiation, cost and response; determine the product standardization for gain the maximum product and minimize errors in the production process; discover and develop the new products successfully; produce the low cost quality products, by developing efficient processes that produce quality consistently; discover the production way that meet customer requirements and product specifications which is on cost and other managerial boundaries; create the high product flexibility; determine the strategic manufacture location for maximize profits; determine the effective layout for support the differentiation, low cost, fast response, and meet the organization's competitive needs; manage the workforce and design the work so that all employees can be empowered effectively and efficiently; determine the resources for the effective cost process realization; also manage the inventory so that is always optimal.

In order to support these goals' achievement [3], the organization needs to implement and make efforts to oversee all activities and their duties, which are needed to preserve the desired superior level. Including the quality policies' determination, also create and apply the planning, assurance, quality control and improvement. These quality control efforts must be carried out in an integrated way so that in can involve all people in the organization, ranging from top management to the organization's soft floor, about the quality realization and implementation of various aspects in the organization such as quality in product making, communicating, documentation, and its application in work, with the aim of giving satisfaction to customers and employees also achieving optimal organization development. The success of these efforts [4] is inseparable from good management information system implementation so that all procedures, work instructions, standards, and records which as organization intellectual properties and also needed for process and product controlling can be easily disseminated, applied, understood, controlled, and consistently keep the quality that set by organization from time to time. The good management information system implementation is also able to ensure that the specified work standards can be a record and work guidance for anyone in the organization, and always be updated to suit the organization development and needs.

The management information system implementation for support the product and process quality control has brought a big number of documents and paper works that must be managed and have their own limitations [5], such as: lack of storage area; damage, abuse, loss or even organization intellectual properties' thievery; a long mobilization; hardship of change, expensive budget allocation management; difficulty for communication, and cause environmental damage, either. So, it cannot be denied anymore that the management information system needed to manage data and information is not be answered by manual methods. The most appropriate step for the organization [6] is to develop a computer-based document management system which is able to provide a lot of convenience in [7] creating, approving, distributing, storing and withdrawing; saving the management time, increasing efficiency; facilitating the search and traceability needs; providing security in management, also facilitating in communication and collaboration. The electronic-based document management system implementation [8] is also useful for

reducing the non-value added activities, reduce the variability, reduce the cycle time of activities, simplify and even eliminate the work steps, increase the output flexibility, also increase the process transparency. In another side [9], the introduction of a new Electronic Document Management System in construction companies able to achieve such positive result as: increase team productivity by means of clear document management, increasing the documents' reliability and improving the quality of employees' work by reducing routine operations, increasing the information exchange efficiency with external contractors by accelerating data processing, etc.

Besides being able to reduce paper consumption [10], the organizations that want to still competitive in the future must be digitizing their processes, thus allowing their employees to work faster and more efficiently. Based on these considerations, many organizations began to leave the manual-based management information system and switched to the digital-based. PT XYZ is one of the companies that takes identical decision, where the document management system that applied for manage the quality, food safety, halal and also occupational health and safety implementation is carried out digitally. This electronic-based document management system needs to be further explored to ensure its impact on document control performance, as well as to apprehend the provided efficiency opportunities at PT XYZ document control activities.

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Taufiq (2013) [6], explains that management information system is a sub-systems collection that is integrated and collaborate with each other to assist the management in solving the problems and providing the quality information to management by processing the data with computer, so it has a value added and useful for users. In its implementation development [11], this system is specialized according to its function and purpose, such as electronic document control which is an application of Office Automation System and Knowledge Work System. According to The International Council of Achieves of Document Storage System [12], the Electronic Document Management System is an information system that is designed for purposes such as storage and retrieval of documents and is organized to monitor processes such as production, storage, and access to documents while maintaining their authenticity and citation capability.

The Electronic Document Management System [13] is also an effective technology for handling storage, which is aimed to ensure the reliability of document that processed internally in the organization. The electronic document control is not free from risks that cause the document sent, received, or even shared by organization without the rights for using them, contain the false or inappropriate information for organization objectives. Therefore [11], it is very important for organizations to take the necessary steps to control the document confidentiality, integrity, and availability, so the electronically document management is always suited to its implementation aims. Raynes (2002) explains, that [14] this system provides benefits such as authorizing modifications without any interruption from other users, allowing reviews without any format and content changing chances, ease on document history searching, ease on storage and distribution, ease on document searching with its key word, and gives an authority access as a security guarantee of Electronic Document Management System. In an addition [15], this system gives another advantage in registering and storing the data for retrieved in the future. Through the implementation, it was concluded that this product has benefit for a long-term archiving of historical and intellectual electronic documents. Anas & Salim [16] explain, that using EDMS in various organizations support in manage the Management of knowledge including helps in storage the electronic documents as a repository centered, protects the data and information security on documents by using the electronic signature, ease the electronic documents access by integrated automation system which is able to accessed by gadget, for easier knowledge sharing also users collaboration, ease to re-find, helps the organizations in owned information assets supervision, makes efficiency and effectiveness in business process,

helps for good organized documents, saving on storage space, reduce the organizations cost, also helps the organizations in achieve their organization goals.

Electronic document [17] which is controlled in Electronic Document Management System is an any form of electronic information that is created, forwarded, sent, received, or stored in analog, digital, electromagnetic, optical, or similar form, which can be seen, displayed, and/or heard by a computer or electronic system, including but not limited on writing, sound, image, map, design, photograph or the like, letter, sign, number, access code, symbol or perforation that has meaning or means or can be understood by people who are able to understand them. Electronically document control is a part of ISO 9001 Quality Management System implementation [18] which is aims to ensure the: suitability of identification and description (title, date, writer, or reference number); suitability of format (language, software edition or graphics) and media (paper or electronic); suitability of review and approval; control of distribution, access, storage and use; protective controls against risks of loss, damage, leak of confidentiality, and unintended use, control of change/revision, as well as the disposal and storage period of documented information, which are including the manuals, procedures, work instructions, standards, and records. The documented information that is created, approved, communicated, used and controlled in organization [19], [20] is a form of work planning system which is implemented in stages as presented in Fig. 1, and used as controlling, monitoring and ensuring tools, that all activities are always run effectively and efficiently according to the established standard.

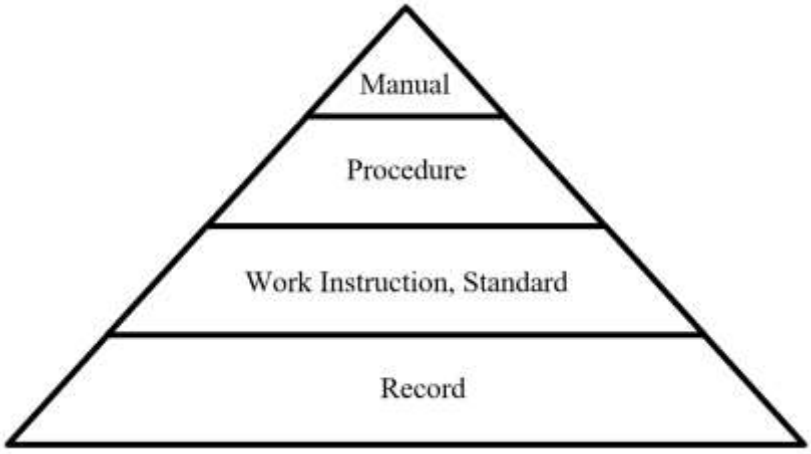


**Figure 1.** The Document Pyramid of Work Planning System (Soemohadiwidjojo, 2020)

Lean [21] was first time identified in the Toyota production system that aims to reduce or even eliminate various types of non-value added activities in manufacturing system that called as waste. National Institute of Standards and Technology Manufacturing (NISTM) defined Lean as a systematic approach to identify and eliminate waste through continuing improvement, flowing products on customer pulls in the pursuit of perfection. The various types of waste that identified through Lean are presented in Table 1.

**Table 1.** Different Types of Waste in Manufacturing [21]

| Waste Type | Brief Description and Examples |
|---|---|
| Over Production | Producing more than required. It includes safety stocks, work-in-process, finished goods etc. |
| Waiting | Waiting for awaiting approval, data, tools, equipment, or an operator. For instance, waiting for a machine, an operator, or handling equipment at a particular point in the process before or following an activity is completed. |
| Transportation | The distance that different assets—such as operators, parts, and handling equipment—travel from their accessibility to their point of use. An item moving from supplier to manufacturing facility or |

| | |
|---|---|
| | from warehousing to being assembled is an example. |
| Over Processing | Processing more than required. Example, finishing more than specifications. |
| Inventory | Any resource held in reserve due to uncertainty for use in future periods. This would be applicable to WIP, finished goods, and supplies in raw form. |
| Defects / Errors | Not meeting the customer specifications. Undersize or oversize dimensions of an item. |
| Excess Motion | Excessive product or resource movement brought on by a shoddy layout or a lack of coordination. |
| Underutilized People | Underutilization of highly skilled man power. Example, high skilled person doing low skill job. |

Many organizations around the world, ranging from manufacturing to service, have reported the operational and administrative benefits from the successful Lean principles implementation [21], such as: lead time reduction up to 90%, work-in-process inventory reduction up to 80%, quality increasing up to 80%, spatial usage increasing up to 75%, productivity increasing up to 50%. Administrative improvements that obtained from Lean implementation are: errors reduction in process sequences, streamlining in customer service functions, paperwork reduction, employee needs reduction, improvement gained from non-critical outsourcing, employee friction reduction, and work standard improvement. All organizations [22] want to strive to optimize management, including production management, strive to adjust processes in such a way as to reduce the cost of a product or service, and at the same time not lose, but rather improve quality. The universal recipe in this case is just the implementation of the principles of Lean production.

Workload [23] is the amount of work that must be borne by an organizational position/unit and is the multiple result of work volume and time norms. According to Vanchapo [24], workload is an activity that must be completed by a worker in a certain time. So it can be concluded that workload is a process in which the worker completes the task or work group in normal position within the specified time frame. Workload analysis [23] is a management technique that is carried out systematically to process information about organization effectiveness and efficiency level based on work volume. O'Donnell and Eggemeier (1986) explained that [24] the workload measurements can be classified into (1) Subjective measurement, by measuring based on completing task that can be completed, (2) Performance measurement, involving the worker behavior observation, (3) Physiological measurement, determining the workload level through worker physiological responses aspect observation (pupil reflexes, eye movements, muscle activities, and other body responses' that can be measured) when performing a particular task/work.

## METHODS

This study was conducted with a descriptive quantitative approach, where the data obtained through interviews, field observations, and secondary data were measured, classified, and analyzed using the workload calculation instrument set by PT XYZ. The interview conducted was a semi-structured and unstructured interview which was adjusted to field conditions, respondent condition, and the need of study data collection [25]–[27]. The comparison results from workload calculation between before and after Electronic Document Management System implementation, is then used as a basis for identifying the PT XYZ document control work function improvement.

## RESULT AND DISCUSSION

### PT XYZ's Document Control

Figure 3. explains the document control flow process at PT XYZ that carried out by Document Controller (DC), which includes registration, copying, giving the special identity, distribution, storage, withdrawal, and disposal of manuals, procedures, work instructions, standards, and records. The document registration is carried out by creates the document draft according to the established format (Microsoft Word, Excel or Visio). Then, this draft is checked by DC to ensure the suitability of format, references, purpose of use, title, numbering and revision history. The passed draft is printed using a special paper that has mark and is only used by DC. Thus, all users can recognize that the documents which circulate with this paper are completely controlled by DC. The printed draft is then given back to the proposer in order to get the approval signatures and also its distribution list. Afterward, DC gives the issued date, copying, stamp the special identity on each pages according to its distribution list and to distinguish between original document (master document), controlled copy, uncontrolled copy and obsolete document. Figure 2. shown the special identity that used at PT XYZ document control.

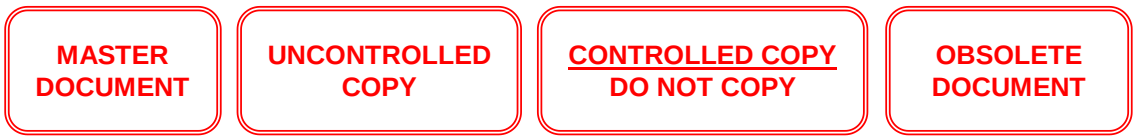


**Figure 2.** Document Identity given by PT XYZ Document Controller

Duplicated documents that have been given a special identity according to control needs are then distributed manually through each Document Administrators. Handover records that arise from this activity are used by DC as proof that the document has been received by the document user. Simultaneously, DC makes document withdrawal through Document Administrators that are declared invalid due to revisions or decided not to be used anymore. DC also assigns "Obsolete Document" status to the original that is revised or decided not to be used for further. New or revised documents that are distributed are then used and stored in a special place so that documents avoided from risk of loss, damage, confidentiality leakage, and unwanted use. Documents with "Obsolete Document" status are destroyed to avoid leakage of confidentiality and unwanted use.

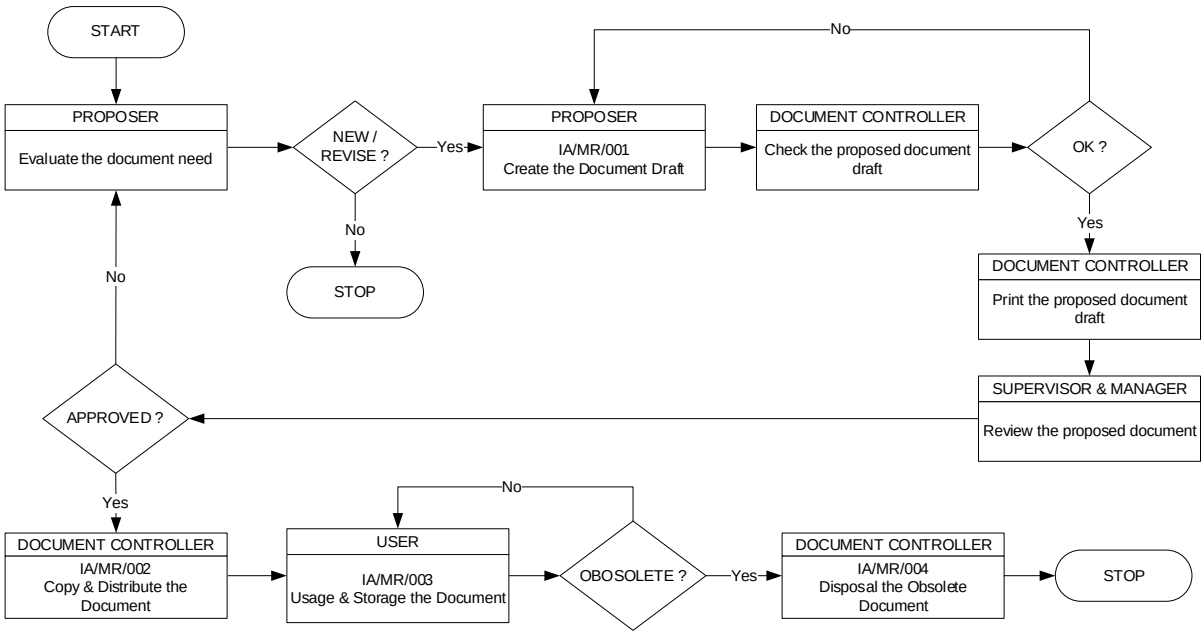

**Figure 3.** PT XYZ's Document Controlling Flow Process

**Implementation of EDMS**

Document control using EDMS at PT XYZ is intended to change the work steps of distributing, using, storing and destroying controlled documents those were previously carried out manually into electronic through an Electronic Document Management System called E-Doc System (Electronic Document System). Users of this system are divided into two namely (1) Admin, users who can create data banks, upload electronic documents, grant and change access to view and download controlled documents in PDF format, and change in database status. (2) User, the person who can only view and download documents in PDF format according to the access granted by the Admin. In this case, DC PT XYZ acts as Admin, while the all document users act as User.

Electronic documents uploaded into the E-Doc System are soft file documents in Microsoft Office Visio, Word, or Excel format according to the terms of document creation, as well as approved documents in PDF format. The DC then populates the document information fields, sets the distribution destination, creates keywords for document search, and determines the document status. After all this information is determined, the electronic document can automatically be accessed by User through their own personal computers. Controlled documents downloaded from the E-Doc System will be given an "UNCONTROLLED COPY" watermark along with each user's unique identity. So that DC does not need to withdraw the documents physically printed by users, and traceability in the field can still be done properly. When there is a change in the active status of the document due to revision or withdrawal, the DC will change the active status of the document in the E-Doc System, so that the User cannot access this electronic document. Thus, electronic documents that are declared invalid can avoid unwanted use. Fig 4. provides an overview of PT XYZ E-Doc System appearance and the features used in it.

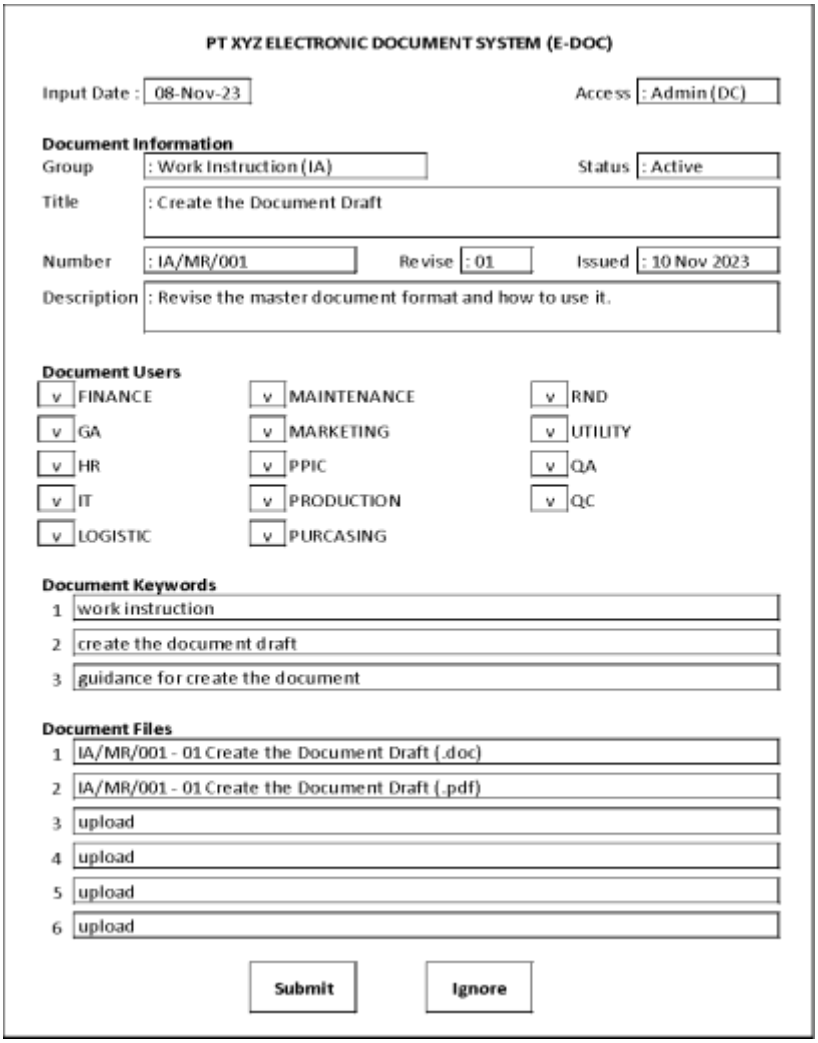


**Figure 4.** The PT XYZ's EDMS (E-Doc System) Illustration

### Identification Impact of EDMS

The use of E-Doc System at PT XYZ document control has a reduction impact on the workload of administrative activities carried out by DC up to 29.1% and Document Administrator up to 17.6%. This efficiency arises due to the activities reduction or elimination on: duplicating of documents up to 66.6%, retrieving of controlled documents up to 100%, handing over of controlled documents up to 100%, updating of document databases up to 40%, and disposing of obsolete documents up to 100% which are non-value added activities in PT XYZ's document control.

Based on the E-Doc System function review result, this Electronic Document Management System can still be improved in performance so that most of the manual activities carried out in document control can be reduced or even eliminated. Activities that will be affected through the optimization of PT XYZ's E-Doc System function are: submitting of document drafts up to 50%, submitting of document withdrawal up to 50%, printing of document drafts up to 100%, retrieving of documents up to 100%, handing over of documents up to 100%, delivering of approved documents up to 92.9%, handing over of approved documents up to 100%, printing and scanning of approved documents up to 100%, retrieving of controlled documents up to 100%, handing over of controlled documents up to 100%, updating of document database up to 40%, and disposing of obsolete documents up to 100%. Thus, there will be significant efficiency in the workload of

administrative activities carried out by DC up to 72.7%, Unit Head up to 0.7% and Document Administrator up to 59.8%.

**Table 2.** PT XYZ's EDMS Impact Identification

| No. | Document Control Activities | Work Volume (/month) | Without E-Doc System | | | | Efficiency (%) | | | | | | Waste Type Identification | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cycle Time (Minutes) | Work Duration (Mnt/day) | | | Current E-Doc System | | | Optimized E-Doc System | | | | | | | | | | |
| | | | | DC | Unit Head | Admin | DC | Unit Head | Admin | DC | Unit Head | Admin | a | b | c | d | e | f | g | H |
| 1 | Creating of document drafts | 111 | 180 | | 908,2 | | | | | | | | | | | | | | | |
| 2 | Submitting of document drafts | 139 | 2 | | 12,6 | | | | | | 50,0 | | | v | | v | | v | | v |
| 3 | Submitting of document withdrawals | 10 | 2 | | 0,9 | | | | | | 50,0 | | | v | v | v | | v | v | v |
| 4 | Checking of document drafts | 149 | 3 | 20,3 | | | | | | | | | | | | | | | | |
| 5 | Registering of document drafts | 149 | 2 | 13,5 | | | | | | | | | | | | | | | | |
| 6 | Revising of document drafts | 28 | 60 | | 76,4 | | | | | | | | | | | | | | | |
| 7 | Printing of document drafts | 139 | 6 | 37,9 | | | | | | 100,0 | | | | v | | v | v | v | | v |
| 8 | Retrieving of the documents | 139 | 14 | | | 88,5 | | | | | | 100,0 | | v | v | v | | | v | v |
| 9 | Handing over of documents | 149 | 3 | 20,3 | | 20,3 | | | | 100,0 | | 100,0 | | v | | v | | v | | v |
| 10 | Requesting of documents approval | 139 | 30 | | | 189,5 | | | | | | | | | | | | | | |
| 11 | Delivering of approved documents | 139 | 14 | | | 88,5 | | | | | | 92,9 | | v | v | v | | v | v | v |
| 12 | Handing over of approved documents | 111 | 3 | 15,1 | | 15,1 | | | | 100,0 | | 100,0 | | v | | v | | v | | v |
| 13 | Copying and scanning of approved documents | 111 | 3 | 15,1 | | | 66,6 | | | 100,0 | | | | v | | v | v | v | | v |
| 14 | Retrieving of controlled copy documents | 111 | 14 | | | 70,6 | | | 100,0 | | | 100,0 | | v | v | v | | | v | v |
| 15 | Handing over of controlled copy documents | 111 | 3 | 15,1 | | 15,1 | 100,0 | | 100,0 | 100,0 | | 100,0 | | v | | v | | v | | v |
| 16 | Updating of document database | 111 | 5 | 25,2 | | | 40,0 | | | 40,0 | | | | | | v | v | v | v | v |
| 17 | Disposing of obsolete documents | 124 | 3 | 16,9 | | | 100,0 | | | 100,0 | | | | | v | v | v | v | | v |
| Total | | | | 179,6 | 998,1 | 487,7 | 29,1 | | 17,6 | 72,7 | 0,7 | 59,8 | | | | | | | | |

a. Over Production
b. Waiting
c. Transportation
d. Over Processing
e. Inventory
f. Defects / Errors
g. Excess Motion
h. Underutilized People

That efficiency impact are the opportunities that are gained from Lean implementation on PT XYZ's E-Doc System, where the performance improvement of the Electronic Document Management System is able to reduce or even eliminate waiting time from waits the previous administrative process; document transportation; over processing of activities that do not provide added value; physical inventory of documents; defects/errors during create, printing, duplication, handover, use, storage, or disposal; excess motion from person in charge of administration; and underutilized people waste from those in charge of administration. Waste of underutilized people is an opportunity to increase the competitiveness of PT XYZ, considering that DC and Document Administrator are individuals who have passed the selection of PT XYZ candidates where the process includes mastery of the use of Microsoft Office Word and Excel software. This expertise can be utilized optimally in making and revising draft documents that have been carried out by the Unit Head. The results of impact identification and efficiency opportunities from PT XYZ's Electronic Document Management System implementation are presented in Table 2.

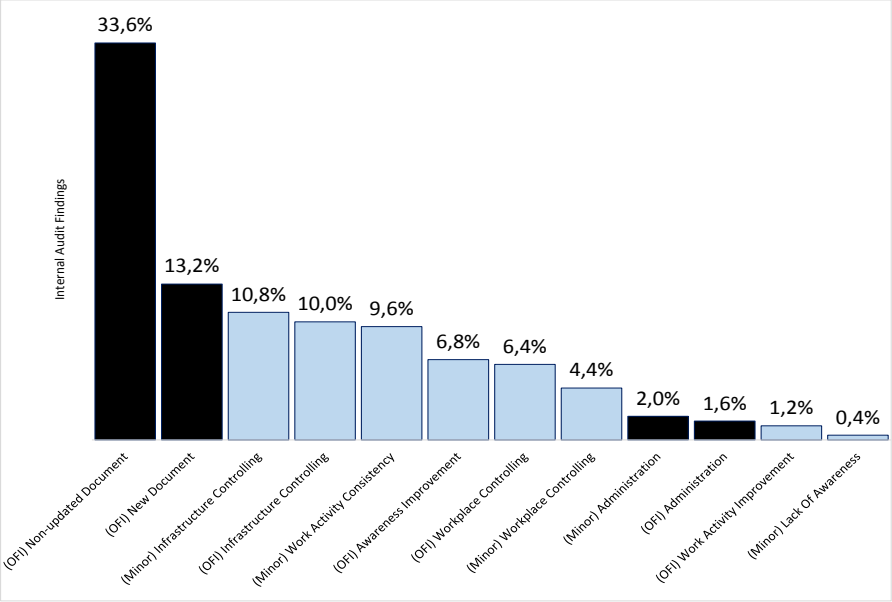

**Figure 5.** PT XYZ's Internal Audit Findings in 2022 – 2023

The opportunity to optimize the DC and Document Administrator competency is also emphasized by the results of PT XYZ's internal audit in the period 2022 – 2023 presented in Fig 5, where the findings of documents that need to be created or need to be revised are ranked highest (50.4%) which is included: Opportunities for Improvement in the Non-updated Document category (33.6%), Opportunities for Improvement in the New Document category (13.2%), Minor in the administration category (2.0%); and Opportunities for Improvement in Administration category (1.6%).

## CONCLUSIONS

Based on this study, it can be concluded that: (1) the use of Electronic Document Management System at PT XYZ can provide efficiency to the workload of administrative activities carried out by DC document control up to 29.1% and Document Administrator up to 17.6%. (2) This efficiency arises due to the reduction or elimination of activities: duplicating of documents by 66.6%, retrieving of controlled documents up to 100%, handing over of controlled documents up to 100%, updating of document database up to 40%, and disposing of obsolete documents up to 100%. (3) Optimization carried out on PT XYZ's Electronic Document Management System can provide opportunities to increase efficiency in the workload of administrative activities carried out by DC up to 72.7%, Unit Head up to 0.7% and Document Administrator up to 59.8%. (4) The efficiency opportunities that can be obtained from optimizing PT XYZ's Electronic Document Management System occur in submitting of document drafts up to 50%, submitting of document withdrawals up to 50%, printing of document drafts up to 100%, retrieving of documents up to 100%, handing over of documents up to 100%, delivering of approved documents up to 92.9%, handing over of approved documents up to 100%, printing and scanning of approved documents up to 100%, retrieving of controlled documents up to 100%, handing over of controlled documents up to 100%, updating of document database up to 40%, and disposing of obsolete documents up to 100%. (5) Efficiency opportunities obtained from optimizing PT XYZ's Electronic Document Management System are able to reduce or even eliminate waiting time from waits the previous administrative process; documents transportation; over processing of activities that do not provide added value; physical inventory of documents; defects/errors during create, printing, duplication, handover, use, storage, or disposing; excess motion from person in charge of administration; and underutilized people waste from those in charge of administration. (6) Waste of underutilized people is an opportunity to increase the competitiveness of PT XYZ, considering that DC and Document Administrator are individuals who have passed the selection of PT XYZ candidates where the process includes mastery of the use of Microsoft Office Word and Excel software.

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