Digital data storage to reduce workplace density. Case study: Indonesian bureau of logistic, Jakarta

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ABSTRACT: In line with business development of an office, the need to hire additional employees increases. However, some office spaces cannot accommodate an increase in staff which therefore results in an increase in workplace density. Digital data storage in and off of premises can be used to change the physical storage of a business. The research method used is the qualitative method. Observation, data collections gained through field notes, and calculation of the physical data storage were carried out to obtain data. The aim of this research is to provide the data on the space saving calculation of workplace when using digital data storage by replacing the physical data storage. The result showed that the use of digital data storage can reduce high workplace density but no significant space was saved when using digital data storage off the premises versus on the premises.

Keywords: workplace density, digital data storage, space saving, reduced density

1 INTRODUCTION

Density is an object measure that is subdivided into a measure of social density and a measure of spatial density (Hayduk 1983). In the office, density means the calculation of space between the number of employees in the working area. Workplace density is also determined in the number of square meters needed by employees and the surrounding facilities to support the work. High workplace density faced by offices, which happens when the number of employees is greater than the expansion of the office area, leads to a reduction in workspace area per person.

Office density is divided into three points (Simmons 2018): high density that is around 7–14 m² per employee; average density is around 14–23 m² per employee; and spacious is 23–46 m² per employee. The Indonesian Bureau of Logistics states that in order to have an average density, 500 employees must have an approximate area of 11,500 m², and to have a spacious work place, those same 500 employees must have an area of approximately 23,000 m². Therefore, the Indonesian Bureau of Logistics, with its 17 floors and building area of 16,800 m³, has an average density.

Along with the growing development of the Indonesian Bureau of Logistics, the head office itself needs more space to accommodate its employees as it currently has inadequate working spaces, unergonomic spaces, lack of circulation, and lack of document storage. From the surveys conducted, paper documents are one of the main problems that the office is facing. Almost every room has its working area filled with documents that cannot be stored in the filing cabinets due to lack of space. Figures 1 and 2 show the office's inadequate working space.

In this digital era when digital products are a necessity, digital data storage for archiving and document storage is also essential. In addition, digital data storage makes an office more environmentally friendly. Electronic documents are more efficient than paper documents which require physical, and often bulky, filing cabinets in which to store them (Rotenstreich).

Saving documents in a digital archive such as a cloud server or an on-premises server is considered more efficient and effective as the files can be accessed in anywhere, at any time. They're also faster to access than paper documents (Raymond & Okoro 2013)

Digital data storage in an office is mostly divided into two methods: (1) cloud storage and (2) on-premises server (Seal 2019). If the office considers using a cloud server, the office doesn't even

Figure 1. Bulog office working area. Source : Personal Documentation

Figure 2. The density in the working space. Source : Personal Documentation

have to provide a place for data storage. For on-premise servers, the general size for the server room is a minimum of 2 m in length and 2 m in width (Darmansyah 2020). The common element that all on-premises server rooms need are racks for the hardware. The most common size for these racks is only 213 cm in height, 68 cm in width and 78 cm in depth. Knowing the size of the storage for an on-premises or even a cloud server that doesn't need space, one can imagine the wasted space that could be reallocated after the bulky filing cabinets are removed.

A good office layout aims to have its office administration as close as possible (Eyre 1989). To make an efficient and ideal working layout, the following things have to be considered: workflow, supervision, floor space, working space, hallways, proximity of workers ad-equipment, noisy machines, natural lights, privacy, and appearance. Modern office space optimization is heading toward a more connected, collaborative, and flexible work environment, which helps increase employee efficiency and productivity (Accruent 2018). By using digital storage in the office, it is expected that we will discover how much space can be saved if using digital storage on and off the premises.

2 RESEARCH METHODS

The research method used for this research is the qualitative approach. Data collections were also conducted in observation and field surveys in the main research location, which is the Indonesian Bureau of Logistics in Jakarta. The calculations considered are the circulation, office density, human mobilization, document storage, and other factors related to documents and filing.

The collection method that was used includes primary and secondary data. The primary data were obtained through field surveys and observations, while the secondary data was obtained from literature, books, and journals that give data researching information about digital data storage. Data collection through observation is carried out to obtain primary data while the secondary data is gained through the written sources. From the field survey, the data used is only data from the 6th, 9th, and 10th, floors because the activities on these floors are main focus of the office, its where the administration works, and they're the floors the the highest density.

3 RESULT AND DISCUSSION

3.1 *Physical data storage and digital data storage*

Paper documents, which are not considered green and efficient nowadays, are still common in the Indonesian Bureau of Logistics office. Document storage or archive storage can be found in every floor of the office. Figure 3 is a picture of the over capacity and how documents are stored.

Figure 3. The document storage in the Indonesian Bureau of Logistics. Source: personal documentation

When using cloud data, physical data is completely unnecessary. If indeed the physical documents are still needed, they will only be kept for one year. Data that is older than one year will only be available in electronic form. Thus, overcapacity archive storage can be avoided. Figure 4 shows an example of on-premises data storage.

The benefit of using digital data storage is that workers have unlimited access to files, and files can be accessed at any time, and from anywhere. In addition, the minimum space required for using on-premises data storage is around 2 m².

3.2 *Space saving using digital data storage*

As mentioned from the field survey, the data used is only data from the 6th, 9th, and 10th floors. The required spaces in the office are shown in Table 1.

Table 1 shows that the archive room is mostly available on every floor. If the archive room was taken away and changed into cloud data, then the archive room and circulation space could be converted into employee work space. The calculations are shown in Table 2.

Figure 4. Server room, on-premises data storage. Source: pinterest

Table 1. Indonesian Bureau of Logistics office space for working area only and document/archive storage.

Floor	Working area (m ²)	Circulation (m ²)	Archives Room and Circulation (m ²)	Total Area (m ²)
6	692.32	175.696	34.67	902.686
9	721.76	161.678	129.883	1013.321
10	707.63	118.6	52.962	879.192

Table 2. Space saved calculation.

Floor	Space Saved (m ²)
6	34.67
9	129.883
10	52.962
Total	217.515

Table 3. The working space with storage room added as a working space.

Floor	Working area (m ²)	Archive room (m ²)	Total (m ²)
6	692.32	34.67	726.99
9	721.76	129.883	851.643
10	707.63	52.962	760.592

3.3 Space density calculation after using digital data storage

The office is utilizing 15 out of the building's 17 floors and each floor has around 33 persons or workers occupying it. The area needed for average density of 33 workers is around 735.79 m² on every floor. But for the spacious area, they would need 1103.68 m² for every floor. If the 6th, 9th, and 10th floors can save space around 217.515 m², then the space saved from the other floors would be around 1087.575 m².

Tables 3 and 4 show that by changing the archive room into a working space it could upgrade the density from dense to average. From the result it can add around 0.2–0.5% area of space.

Table 4. The working space ratio after using digital storage in space density.

Space Density	Space needed Per person	Space needed for 33 persons	Existing working area 6 th , 9 th , 10 th floors	Working area after using digital storage calculation
High Density ratio	7–14m ²	231–462 m ²		
Average ratio	14–23 m ²	462–735.79 m ²	692.32 m ² 6 th floor 721.76 m ² 9 th floor 707.63 m ² 10 th floor	726.99 m ² 6 th floor
Spacious ratio	23–46 m ²	759–1103,68 m ²		851.643 m ² 9 th floor 760.592 m ² 10 th floor

4 CONCLUSION

The purpose of using digital data storage instead of physical data storage is that it would increase the work space in the Indonesian Bureau of Logistics' head office. In fact, based on the calculation this step will save around 217 m² on the 6th, 9th, 10th floors in total. Having on-premises data storage will save approximately 213 m², adding around 0.1–0.5 % of workable office space. As an alternative, using both physical and digital data storage in the office still saves space but it is not optimal. The result of using digital data storage off-premises is an option for offices that need more space for its employees. As a result, having more space for the office means that space density will decrease. In this case, the average density ratio turns into spacious density.

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