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REVIEW ARTICLE

Pro-Metrics

Technologies applied to information control in organizations: A review

Anthony Fasanando Panduro

Facultad de Ingeniería de Sistemas e Informática. Universidad Nacional de San Martín, Peru.
Email: afasanandop@alumno.unsm.edu.pe

ABSTRACT

In the contemporary global market, organizations face intense competition requiring the deployment of information technology (IT) for effective decision-making and to maintain market presence. This review article emphasizes the crucial role of information technologies in organizational decision-making processes. It outlines the evolution of data management tools, especially in the context of dynamic and contingent data management, and explores the adoption and implementation of technologies for information control within organizations. By analyzing various methodologies and results from existing research, the article illustrates the increasing reliance on IT to enhance organizational processes, decision-making, and overall competitiveness. Furthermore, it delves into the systematic review approach to understand the significance and application of information management technologies in organizational contexts, offering insights for entrepreneurs and academics. The review concludes with the assertion that proper information management through technology is vital for organizations to remain competitive in the ever-changing market landscape.

Keywords: information technologies, organizations, decision-making, information management, information control

INTRODUCTION

Currently, the use of technologies applied to information management has led to the development of new forms of communication in organizations and modern societies (Sghaier *et al.,* 2022). Therefore, organizations are trying to implement these technologies for information management in line with the progress of communication to enhance their processes within the organization. Edwards (2022) considers that the technologies used in information management have become a tool to increase the effectiveness and efficiency of inventory management, making them indispensable tools for management. These applied technologies are a means for companies to increase their productivity and competitiveness (Mengcheng & Tuure, 2022).

In this systematic review article, the aim is to expose the importance of using technologies applied in information management so that people interested in the topic, especially entrepreneurs and academics, have a general overview of the possibilities of use that can be given in companies in the country. This

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activity, according to Nazir & Kaleem (2021), contributes to technological growth and development within organizations. Farschtschi *et al.* (2022) indicate that companies operate in a highly dynamic and competitive environment, making it essential to control their information to remain competitive; therefore, according to Altmann *et al.* (2022), they seek alternatives in technologies applied to information management to evolve over time, reduce costs, and seek customer satisfaction. Additionally, according to Lukinskiy *et al.* (2022), data management technology tools have evolved along with the more intensive use of the concept of dynamic and contingent data management in any organization. One of the evolutions in technology tools can be found in expert systems that automate processes and work according to the assigned activities, helping to optimize resources (Walek & Fajmon, 2023).

On the other hand, Nayeri *et al.* (2022) point out that technologies in the application of information control are designed to provide information services to all employees of an organization related to decision-making in management. In this case, information is usually presented in the form of a general or special management report and contains information about the past, present, and future of the company. Our review, therefore, aims to analyze the importance of using technologies applied to information management through a systematic review, in which precise information is collected so that organizations can better understand the use of these technologies, helping decision-making to improve their processes and activities.

METHODOLOGY

The use of technologies is fundamental for information management in organizations, as they influence organizational decisions. Utilizing these technologies for decision-making allows leveraging information to manage logistical aspects for the benefit of the company in the short and long term (Zraková *et al.,* 2017). Thus, it becomes important to manage, collect, organize, manipulate, and analyze information in general terms, controlling the information of an organization for decision-making. Therefore, the following question arises: What importance do technologies applied to information management have in companies or organizations?

To answer this question, we rely on the methodology used by Chong *et al.* (2022), who exemplify how the methodology is used to obtain information on a specific topic through an orderly and systematic review essential for identifying technologies applied in information management. We conducted a systematic search in the databases of Google Scholar, IEEE Xplore, and ScienceDirect because they are accessible platforms for publishing articles related to information management, using selection criteria for articles in English and Spanish to ensure the reliability of the results.

RESULTS AND DISCUSSION

Organizations need to incorporate, as an integral part of their projects, the use of technologies applied to the control of their information throughout their trajectory in the market, in order to facilitate processes and decision-making (Edwards, 2022). According to Annie Rose Nirmala *et al.* (2022), information management systems, such as inventory management, are essential components, as they estimate the most important resources for each organization and ensure their proper functioning. According to Barratt *et al.* (2018), the dynamics of organizations continue to be relatively unexplored in terms of technologies to innovate in the market and remain competitive.

In Peru, both public and private entities establish improvement policies by proposing internal development strategies that consider technologies as an integral part of this process; however, the evidence from the present review, as shown by Pérez-Reyes & Tovar (2020), indicates that since 2006 companies have not improved their efficiency in the market, suggesting that they operate dysfunctionally, hindering their proper functioning as an organism. It is imperative to recognize that the lack of use of technologies that help in information management implies the need for basic knowledge related to technological tools, where each organization must have a specialist in charge of handling these issues.

Model	*Atop1*	*Atop5*	P	R	Measure F
CNN	0.295	0.569	0.296	0.240	0.252
LSTM	0.510	0.789	0.477	0.410	0.403
RCNN	0.597	0.857	0.608	0.529	0.543
CLSTM	0.612	0.851	0.595	0.585	0.578
BLSTM	0.619	0.853	0.636	0.576	0.587
ServeNet	0.631	0.874	0.631	0.602	0.608
ServeNet-BERT	0.681	0.905	0.668	0.653	0.654
CARL-Net	0.715	0.890	0.703	0.689	0.691

Table 1. Comparison of classification results. Source: Tang *et al.* (2021).

Information by category	CNN	LSTM	RCNN	CLSTM	BLSTM	ServeNet	ServeNet-BERT	CARL-Net
e-commerce	0.248	0.689	0.679	0.704	0.732	0.715	0.734	0.783
Pictures	0.234	0.506	0.554	0.694	0.615	0.677	0.615	0.720
Actions	0.606	0.591	0.571	0.651	0.809	0.650	0.926	0.931
Chat	0.348	0.381	0.522	0.788	0.667	0.896	0.667	0.750
Telephony	0.143	0.451	0.651	0.620	0.626	0.613	0.703	0.732
Medical	0.182	0.556	0.800	0.633	0.727	0.700	0.615	0.579
Backend	0.095	0.069	0.114	0.364	0.286	0.383	0.533	0.588
Trips	0.371	0.719	0.758	0.716	0.771	0.766	0.857	0.871
Domains	0.452	0.000	0.827	0.812	0.827	0.788	0.909	0.941
Data	0.118	0.000	0.222	0.259	0.242	0.340	0.367	0.468
Internet of Things	0.000	0.000	0.322	0.375	0.278	0.526	0.667	0.750
Transport	0.442	0.702	0.762	0.753	0.791	0.707	0.800	0.782
Government	0.414	0.631	0.687	0.710	0.796	0.773	0.785	0.769
Marketing	0.077	0.364	0.240	0.357	0.364	0.428	0.240	0.600
Files sharing	0.428	0.250	0.560	0.500	0.606	0.555	0.588	0.500
Enterprise	0.273	0.376	0.374	0.448	0.429	0.520	0.600	0.642
Cloud	0.276	0.494	0.545	0.591	0.613	0.627	0.606	0.630
Games	0.269	0.605	0.776	0.790	0.740	0.686	0.829	0.867
Finance	0.412	0.581	0.664	0.677	0.709	0.699	0.767	0.796
Time	0.540	0.857	0.784	0.800	0.808	0.823	0.877	0.806
Payment	0.416	0.687	0.700	0.719	0.739	0.687	0.744	0.759
Science	0.484	0.743	0.708	0.718	0.781	0.785	0.791	0.772
Email sending	0.083	0.661	0.741	0.808	0.716	0.758	0.916	0.893
Project management	0.170	0.059	0.522	0.586	0.553	0.667	0.678	0.630
Other	0.000	0.000	0.049	0.119	0.078	0.078	0.097	0.226
Tools	0.268	0.379	0.481	0.446	0.461	0.520	0.572	0.586
Database	0.093	0.000	0.244	0.311	0.325	0.310	0.339	0.464
Storage	0.000	0.100	0.400	0.631	0.516	0.649	0.520	0.628
Bank	0.307	0.000	0.647	0.489	0.628	0.650	0.722	0.789
Development of real-state applications	0.098	0.000	0.146	0.178	0.263	0.228	0.454	0.536
Real-state	0.238	0.684	0.769	0.789	0.762	0.700	0.826	0.775
Bitcoin	0.231	0.476	0.571	0.449	0.577	0.654	0.710	0.847
Messaging	0.500	0.769	0.760	0.784	0.811	0.751	0.811	0.824
Communication media	0.069	0.076	0.100	0.240	0.296	0.385	0.536	0.606

Information by category	CNN	LSTM	RCNN	CLSTM	BLSTM	ServeNet	ServeNet-BERT	CARL-Net
Security	0.094	0.165	0.547	0.627	0.512	0.559	0.644	0.691
Analytics	0.102	0.000	0.322	0.227	0.454	0.444	0.522	0.591
Entertainment	0.095	0.100	0.154	0.228	0.476	0.312	0.470	0.474
Imágenes	0.348	0.000	0.300	0.258	0.228	0.454	0.437	0.385
Video	0.410	0.673	0.796	0.816	0.763	0.766	0.826	0.829
Sports	0.642	0.750	0.835	0.864	0.873	0.905	0.903	0.905
Education	0.277	0.562	0.637	0.774	0.657	0.683	0.711	0.711
News service	0.000	0.400	0.560	0.545	0.522	0.571	0.461	0.500
Searching	0.187	0.178	0.387	0.467	0.407	0.400	0.538	0.574
Shipping	0.341	0.873	0.889	0.898	0.902	0.943	0.784	0.784
Music	0.410	0.706	0.709	0.779	0.762	0.753	0.886	0.857
Events	0.000	0.333	0.683	0.686	0.667	0.706	0.789	0.829
Reference	0.057	0.169	0.212	0.240	0.246	0.230	0.379	0.387
Social	0.243	0.479	0.546	0.639	0.538	0.571	0.507	0.635
Cartography	0.365	0.680	0.726	0.677	0.708	0.743	0.736	0.813
Advertisement	0.160	0.602	0.609	0.701	0.681	0.667	0.698	0.729
Media	0.252	0.403	0.543	0.578	0.587	0.608	0.654	0.691

Table 2. Results of the comparison of the value of the F measure in each category. Source: Tang *et al.* (2021).

According to the results provided, the importance of using technology for information management is recognized, making it crucial to understand data management in detail within each organization. Next, we describe the methods for classifying and embedding information (texts) to verify their effectiveness:

1. CNN (Convolutional Neural Network):
   - CNNrand: Uses randomly initialized word embeddings.
   - Non-static CNN: Uses pre-trained word embeddings (Liu & Chen, 2022).
2. LSTM (Long Short Term Memory):
   - The LSTM model defines the last hidden state as the representation of all text. It is experimented with pre-trained word embeddings (Tang *et al.,* 2021).
3. ServeNet:
   - Stack 2D CNN and BLSTM deep neural networks to extract features from service descriptions for service classification (Yang, Ke, Wang, & Zhao, 2019).
4. ServeNet-BERT:
   - Combine the original ServeNet and introduce the service name as input to the model (Yang *et al.,* 2020).
5. CARL-Net:
   - Integrates co-attentive representation learning and prior thinking (Ng *et al.,* 2022).
6. RCNN:
   - Improves the feature extraction process of CNN feature with a circular idea. It stores information directly in the word representation through context and uses the word window to extract features from the text (Sambhara, 2020; Li *et al.,* 2021).
7. C-LSTM:
   - It is a combination of CNN and LSTM to learn the features of sentences. It uses CNN to extract advanced sentence representations from pre-trained data and remaps the extracted features as sequential input of LSTM to obtain the sentence representation (Kara, 2021; Li *et al.,* 2021).
8. B-LSTM:
   - It is a bidirectional LSTM commonly used in text classification. It uses word embeddings previously trained in BiLSTM (Liu & Chen, 2022).

FINAL CONSIDERATIONS

In this article we present a systematic review on the importance of technologies for information management in organizations. The review methodology that we adopted allowed us to obtain a complete and updated vision of the tools related to the objective of the study. During the development of the review, we highlighted that many companies lack trained personnel to manage their information and improve decision making in their organization. With the rapid growth of services, it is necessary to discover, compose and manage an organization's information effectively. This becomes a new challenge for companies to remain competitive. Therefore, adopting the use of technological tools is of utmost importance. Recently, it has been shown that an information management and service classification model based on a deep neural network can help distinguish and improve term use processes in an organization. ■

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