Knowledge Discovery and Administration Efficiency

Nnyeche, Theresa Chidinma and Dr. A.E. Bestman

Department of Office and Information Management, Faculty of Management Sciences
Rivers State University, P.M.B. 5080 Port Harcourt

Abstract: *This paper explores the crucial relationship between knowledge discovery and administration efficiency in organizational contexts. It delves into the definitions of knowledge, discovery, administration, and efficiency as provided by various authors. Emphasizing the significance of knowledge discovery, especially tacit knowledge held by experts, and the reasons behind the pursuit of administrative efficiency, this paper also examines the role of leadership in facilitating knowledge discovery and promoting efficient administration.*

Keywords: Knowledge, Discovery, Knowledge discovery, Administration, Efficiency, Administration efficiency

1.0   Introduction

There is a saying that knowledge is wealth and the extent one knows determines how far he or she will go in life. A lot of activities go on in the life of an individual, organizations as well as the society on daily bases. Some of these activities transcend time i.e it has gone on for a very long time. Some were there before we were born. Some came into existence in our presence and more will go on till when we have retired in the case of an organization and when we have died in the case of humans or organization. What sustains every generation and makes them prosperous is the ability to discover and utilize the various knowledge that abounds in their environs. The Holy Bible confirmed that the people perished because they lacked knowledge (Hosea 4 vs 6 KJV). The fact remains that knowledge abounds everywhere in the society but the ability to discover them for use is of great essence.

1.1   Statement of the Problem

Many a times in an organization, employers and managers of organization hire employees, send them on training and extra training. Most persons who do not understand the reason for those trainings, may consider it a waste of time and scarce resources but the truth remains that these trainings are geared to ensuring efficiency within the organization. Acquiring the required knowledge is necessary for efficiency in the organization. Sometimes, these trained employees

in the course of carrying out their own duties discover other better ways and techniques of carrying out that duty and this becomes additional knowledge to the organization. But the fact remains that most times when these employees have expertise on their job, some may want to seek for greener pastures and in so doing will migrate to other organizations and when this happens, the previous organizations are left to repeat the process over and over again. The truth remains that the monies spent to train those staff cannot be recovered from the leaving staff. Training a new set of employees requires resources (financial). The new techniques that the leaving staff developed in the course of doing their work if not tapped, goes with them. Therefore, this paper seeks to understand how managers can successfully to discover a new knowledge when it is created in an organization in order to trap or tap them for future use and administration efficiency.

1.2   Purpose of the Study

This paper seeks to understand how knowledge discovery can enable administration efficiency. The objectives include:

i)   To understand how data mining techniques can lead to productive efficiency.
ii)   To understand how visualization techniques can lead to productive efficiency.
iii)   How leadership can moderate knowledge discovery and administration efficiency.

1.3   The Conceptual Framework

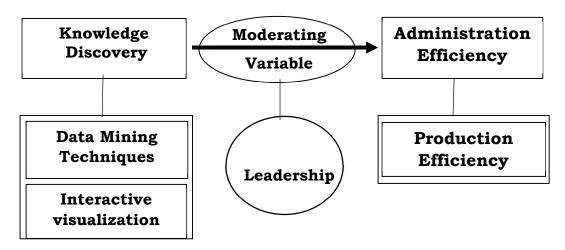The conceptual framework of data visualization and decision making

```
┌──────────────┐      ╭─────────────╮      ┌──────────────┐
│  Knowledge   │      │ Moderating  │─────▶│Administration│
│  Discovery   │      │  Variable   │      │  Efficiency  │
└──────────────┘      ╰─────────────╯      └──────────────┘
       │                     │                    │
┌──────────────┐        ╭─────────╮        ┌──────────────┐
│ Data Mining  │        │         │        │  Production  │
│  Techniques  │        │Leadership│        │  Efficiency  │
├──────────────┤        │         │        └──────────────┘
│ Interactive  │        ╰─────────╯
│ visualization│
└──────────────┘
```

Figure 1.1   *The Conceptual framework for the study*

Source: *Researcher's Desk Survey*

2. Literature Review

2.0   Theoretical foundation

The theoretical foundation of this paper is hinged on Maximilian Carl Emil Weber (1864 – 1920) theory of bureaucracy. Bureaucracy according to Troolin & Marshall (2021), is a management system that emphasizes structured organization with well-defined authority and positions. According to Hartzell & Burtler (2022), Max One of the principles Max Weber advocated is the Standard Operating Procedures. According to them, an organization must be hierarchical and must have well-defined rules to govern it and its members. Having a set of rules in place helps to reduce workplace hazards (Peek, 2023). It plays a crucial role in governance and development through policy making, implementation and advising (Troolin & Marshall 2021). That employees work for each level of management and therefore must be loyal to their superiors rather than the firm. Therefore, managers in these jobs are accountable for their employees' achievement. Going by the above, it then means that managers are responsible for the discovery and management of every knowledge produced within the organization.

2.1   Elements of Knowledge Discovery
Merriam-Webster dictionary defined knowledge as the 'fact or condition of knowing something with familiarity gained through experience or association. Oxford dictionary defined it as 'the information, understanding and skills that you gain through education or experience.

John Dewey an American philosopher and educator as cited in Stanford Encyclopedia of philosophy (2018) stated that knowledge arises from an active adaptation of the human organism

to its environment. That human are social animals and are known as the most adaptive species. John Tyndall once said, that knowledge casts a light beyond its own immediate boundaries. That it is critical to social and economic activities as well as the developmental processes of every nation (Nath 2000). Knowledge gives control and power in numerous manufacturing areas. Companies, factories, and all organizations owners aim to benefit from their huge; recorded data that increases and expands very quickly to improve their business and improve the quality of their products (Shaaban, Khafagy, Elmasry, El-Beih & Ibrahim 2022).

Types of Knowledge
1. Tacit knowledge
2. Explicit knowledge
3. Groupware
4. Embedded knowledge

Tacit Knowledge
This type of knowledge has implicit meaning that it is not codified, but imbedded in the human brain. Therefore more difficult to express or extract and transfer. It includes personal wisdom, experience, insight and intuition. In extracting tacit knowledge, quantitative and qualitative tools and practices can be used. E.g surveys, questionnaires, individual interviews, group interviews, focus groups, network analysis, and observation. Information technologies can also be used to discover knowledge that exists in experts and communities of practice.

Explicit knowledge
This has to do with discovering knowledge in the already existing data and knowledge repositories (documents and other records). Information technology is very vital at this level of knowledge discovery considering the volume of data that one has to surf through. The tools needed to extract this type of knowledge includes intelligence gathering, data mining, and text mining.

Groupware
Groupware refer to software that allows multiple users to work together on one project while sitting locally or remotely with each other in real time. Collaborative application software are designed to help people working on a common task to attain these goals. Information technology systems, social networks, professional networks and path finders can help point to people who are considered experts. They can also help give indications of the knowledge these groups possess.

Embedded Knowledge
This has to do with the knowledge trapped inside organizational routines, processes, products and so on which has not been made explicit. To extract this type of knowledge will require observation, analysis, and use of reverse engineering and modeling tools.

The cornerstone of knowledge is global access to information and human resources, enrichment of information during different steps and an efficient mechanism for collective learning and

sharing of knowledge between nations, communities and individuals through bridging of gap between users and sources of information (Nath 2000).

The Oxford Language dictionary defined discovery as 'the action or process of discovering or being discovered. The Cambridge dictionary defined discovery as 'the act of finding something that had not been known before'. The doctrine of discovery came up when the European nations found non-European lands, and acquired property and sovereignty rights on those lands (Wex definitions team 2022). This doctrine originates from a series of public decree, letters and charters issued by the Pope of the Catholic Church (Papal bulls) as far back as 1400s.

It is said that "there is Gold in those mountains of data" due to the major development in the industrial environment and the existence of a large amount of data collected and recorded in data stores such as data warehouses, database management system, and from all interesting areas in factories or companies such as process design, product lifecycle, the materials used, marketing, scheduling, quality control, maintenance, sensors on machines, and selling processes to improve their business performance and get benefit from these huge data to achieve the best quality in their products, optimize process time, reduce running cost and time (Shaaban *et.al* 2022).

The discovery phase is the initial step in any project (IndiaNIC Infotech Ltd 2022). Discoveries can be done in several ways e.g by asking direct questions to people, sending them written questions or by requesting that people provide documents. According to Cook (2022), discovery is the first step in the knowledge management process. It is targeted at pinpointing the knowledge that is useful to the organization's goals, operations and bottom line. Critical thought and ideas are the major forces that propel innovation IndiaNIC Infotech Ltd 2022). It is important to note that not all stored information constitutes a knowledge asset (Cook 2022) and it can also be possible that a critical knowledge asset may be unnoticed owing to the large volume of data being considered (Cook 2022). So when plans are being thought out, a discovery phase should be considered not minding the size of the project.

Knowledge Discovery
Knowledge discovery is the process of extracting useful knowledge from data. According to Tarud (2022), knowledge discovery is defined as the procedure of extracting useful information from a larger database or data set. Knowledge discovery is a process of information extraction and agglomeration (Bendoly 2003). It is a popular method of collecting information from data sources and refining it for more targeted usage. These obtained results showed that the decision maker can easily use any of the discovered knowledge based on the optimal solutions in their determined clusters (Salem, Hegab, Rahnamayan, & Kishwy 2022). According to Shahbazi & Yung-Cheol (2022), Knowledge discovery architecture demonstrates the incomplete knowledge of the local sites based on the merged information and distributed data.

Sheard, Ceddia, Hurst, & Tuovinen, 2003 as cited in Nilashi, Minaei-Bidgoli, Alghamdi, Alrizq, Alghamdi, Nayer, Aljehane, Khosravi & Mohd (2022), stated that educators acquires feedback (knowledge) from the students' learning experiences in traditional teaching contexts through face-to-face interactions with students, making the continuous assessment of their teaching

possible. Decision-making regarding classroom processes includes observation of the students' behaviors, analysis of historical data, and estimation of the efficiency of educational methods as well as when students work in electronic contexts (Nilashi et.al 2022). It is no more a doubt that the volume of data collected daily in the databases far exceeds our ability to reduce and analyze using the traditional or analogue techniques especially those collected with technological devices.

Knowledge Discovery Techniques
1. The Probabilistic approach
2. The Statistical approach
3. The Classification approach
4. The Bayesian approach
5. The Pattern Discovery and Data Cleaning
6. The Decision Tree Approach
7. The Deviation and Trend Analysis
8. The Hybrid Approach
9. The Neural Network method
10. The Genetic Algorithms methods

The Probabilistic approach: This approach in knowledge discovery is best when planning, in diagnostic systems as well as in control system.

The Statistical approach: This method uses the rule discovery approach which basically dependent on data relationship to determine transactions.

The Classification approach: This approaches groups data based on their similarities or classes. It is also the oldest as well as the most widely used form of knowledge discovery technique.

The Bayesian approach: It is used when the uncertainty associated with an outcome can be expressed in terms of a probability especially in diagnostic systems.

The Pattern Discovery and Data Cleaning: This method is applied by reducing a large database to a few pertinent and informative records thereby removing redundant and uninteresting data and simplifying the pattern of identifying and cleaning relevant data.

The Decision Tree Approach: This method requires the use of production rules, acyclical graphs and classified data to predict models that may be appropriate for either classification or regression techniques.

The Deviation and Trend Analysis: This knowledge discovery technique filters important data by detecting patterns especially in temporal database. It is suitable in the analysis that has to do with traffic on large telecommunication network.

The Hybrid Approach: This technique is also known as multi-paradigmatic approach. It is combination of more than one approached in the process of knowledge discovery.

The Neural Network method: This technique is useful in pattern recognition.

The Genetic Algorithms methods: This techniques is similar to neural network technique but more powerful than it. It is also used in classification.

Steps in Knowledge Discovery Processes
According Karan (2023), the following are the steps involved in knowledge discovery processes.
   1. Understanding the data set.

2. Data Selection
3. Cleaning and Pre-processing
4. Data transformation
5. Select the appropriate data mining task
6. Choice of data mining algorithms
7. Application of data mining algorithms
8. Evaluation.

Leadership

The oxford language dictionary defined leadership as the action of leading a group of people or an organization. Leadership according to McKinsey (2022) is a set of behavior used to help people align their collective direction, to enable them execute strategic plans, and to continually renew an organization. It is a fact that leaders are not born but made. This is because everybody is a potential leader as long as he or she is able to undergo the necessary tutelage required to assume the position of leadership. Every leader must be able to influence his or her subordinate positively. The source of influence whether formal or informal does not matter what matters is that the leader is able achieve the organizational target at the end of the day. In organization, the word leadership is also called boss, controller, dean, director, executive, head, manager, principal, superintendent, commander, general, officer etc (Eikenberry 2013).

According to Tara-Lee (2023), leadership is and will continue to be a critical factor or component in developing a successful and effective work culture.

Administration

The Oxford language dictionary defined administration as 'the process or activity of running a business, organization etc. or the day-to-day administration of the company. It can also be defined as the management of public affairs, government agencies etc. The word administration has been defined by various authors as cited in Nwanisobi & Christopher (2020). This includes: E. N. Gladden as 'to care for or look after people, to manage affairs, etc. He posited that it is a determined action taken in pursuit of a conscious purpose.

Felix A. Nigro said administration is the organization and use of men and materials to accomplish a purpose. Herbet A. Simon posited that administration is the activities of groups cooperating to accomplish common goals. John V. Veig said administration means a determined action taken in pursuit of conscious purpose. That it is a systematic ordering of affairs and the calculated use of resources, aimed at making those things happen which we want to happen and simultaneously preventing development that fail to square with our intentions. He went further to state that means marshaling of available labour and materials in order to gain that which is desired at the lowest cost in energy, time and money.

Types of Administration

According to Kishan, (2023), who defined administration as the process of managing and organizing resources to achieve a specific goal or objective? He identified the following are the various types of administration.

1. Public administration
2. Private administration

3. Non-profit administration
4. Government administration
5. Corporate administration
6. Educational administration
7. Healthcare administration

Public administration: Has to do with the management and coordination of public resources to achieve societal goals. It is critical factor in democratic governance owing to the fact that public resources are meant to be used to satisfy the needs of the citizens. In public administration, principles that guides it includes accountability, efficiency, transparency, effectiveness and so on.

Private administration: Has to do with the management and coordination of resources in privately owned organizations. It involves allocating their resources in a manner that maximizes profits and achieves organizational goals. The main goals of private administration are the maximization of profit, balance the interest of stakeholders as well as be innovative, effective and efficient.

Non-profit administration: Deals with the management and coordination of resources in the organizations that operate for a social or public purpose rather than profit making. They provide social services, education, support social justice and so on.

Government administration: Is saddled with the responsibility of managing and coordinating the resources of government agencies and departments at the federal, state and local levels. They must collaborate with their stakeholders to develop effective strategies for goals achievement.

Corporate administration: This is also known as corporate management and it has to do with coordination and overseeing the day-to-day operations of the company so that organizational goals are achieved. Like private administration, its focus is on profit making i.e the maximization of profit for its shareholders.

Educational administration: This is also called education management. It is management and coordination of resources in educational institutions be it at the primary, secondary or tertiary level. Its major focus is on education, learning and development of students in a bid to make a better society.

Healthcare administration: This is also referred to as healthcare management. It is saddled with the responsibility of managing and coordinating the resources in the healthcare sector. The key goal of the healthcare administrators on patient well-being i.e quality care, effective medications, accountability, quality improvements, abiding to laid down laws and regulations etc.

Functions of Administration or Administrators

The function of administrators according Walters (1959) includes:

1. Planning
2. Organizing
3. Managing or Directing
4. Appraising

5. Controlling

Efficiency
The Cambridge dictionary defined efficiency as the quality of working well in an organized way, without wasting time or energy. Efficiency is the ability to perform well or achieve a result without wasted energy, resources, effort, time or money. Mark Zuckerberg and other notable leaders as cited in Hubtek (2023) stated that efficiency goes beyond cutting jobs, although that is sometimes inevitable. That one has to focus, re-engineer, break, fix, and ultimately become more efficient in doing more with less and that implementing technology when and where it makes sense is critical to thriving amid crisis. According to Duru, Fu, & Nimo (2023), gaining knowledge provides solutions to manufacturing problems, but in any case, knowledge acquisition without a proper understanding of the method can lead to implementation failure.

Administration Efficiency
Administration efficiency is the capacity of an organization, institution, or business to produce desired results with a minimum expenditure of energy, time, money, personnel, material, etc. (USARAD 2011).

Erumebor (2023) posited that the new administration, working with stakeholders, needs to develop an agenda for economic and social inclusion. At the heart of such agenda must be improving the lives of the average Nigerian. This agenda must also include a practical strategy on how to structurally transform the economy, moving labor and economic resources from low productivity sectors to high productivity sectors.

The Nigerian government's policy weaknesses in creating a conducive environment for sustainable business led to poor development and job losses (Nwokorie & Adiukwu, 2020). The informal sector in Nigeria faces various obstacles and policy incentives that could support and enhance it (Etim & Daramola, 2020).

Knowledge Discovery and Administration Efficiency
Efficient administration is essential to the survival of any organization and this has to be done with all the accuracy required at all levels of the organization because activities within an organization usually have ripple effects. Managers and Administrators needs to define what comprises knowledge in their respective domains in the first place and must have the ability as well as those of their team members (Indeed Editorial Team 2023). Though detecting knowledge especially when it is in tacit form is usually complex, administrators of organizations need to have greater understanding of what their organization's experts actually know in order to tap and store them for use and reuse.

Conclusion
Knowledge discovery is very vital in every organization. A manager's prowess is usually weighed by his ability to effectively mine and manage the various knowledge that are embedded in his or her subordinates to the achievement of organizational goals leading to administration efficiency. This then affirms that leadership is a factor in ensuring that knowledge is discovered which invariably leads to efficiency in administration within the organization.

REFERENCES

Bendoly, F. (2003). Theory and support for process frameworks of knowledge discovery and data minig from erp systems. *Journal of information management, 40 (7) 639-647.* https://www.sciencedirect.com

Cambridge Dictionary. https://www.dictionary.cambridge.org

Cook, A. (2022). Steps of the knowledge management process: how to develop it. An article of knowledge-management-process 101 https://tettra.com

Cabena, P., Hadjnian, P., Stadler, R., Verhees, J., & Zanasi, A. (1998). Discovering data mining: from concept to implementation. A book published by abebooks. https://www.abebooks.com

Duru, C.C., Fu, C., & Nimo, M. (2023). Influence of knowledge management enablers and processes is a sustainable manufacturing performance in Nigeria. *European journal of sustainable development research 7(3) 2542-4742.*

Etim, E., & Daramola, O. (2020). The informal sector and economic growth of South Africa and Nigeria: A comparative systematic review. Journal of Open Innovation: Technology, Market, and Complexity, 6(4), 134. https://doi.org/10.3390/joitmc6040134

Eikenberry, E. (2013). A leader by any other name. an article of leadership, personal and professional development. http://wwwkevineikenberry.com

Erumebor, W. (2023). Nigeria in 2023: bridging the productivity gap and building economic resilience. A book commentary on improving workforce development and stem education. https://www.brookings.edu/articles/nigeria

Hartzell, S. & Burtler, J. (2022). Max Weber's Theory of Bureaucracy. https://www.study.com

https://www.en.m.wikipedia.org

Hubtek (2023). 2023: the year of efficiency. An article of Hubtek providers of tech-enabled talent, training, and automation solutions provider for Companies in North America. **https://www.linkedin.com**

Indeed Editorial Team (2023). Strategies for effective administrative management. https://www.indeed.com

Karan, R. (2023). Knowledge discovery in database in data mining. https://www.shiksha.com

Kishan, R. (2023). Types of Administration. An article published by   socialworkin   in *https://www.socialworkin.com*

Marshall, R. & Troolin, A. (2021). What is bureaucracy?   https://www.study.com

Nilashi, M., Minaei-Bidgoli, B., Alghamdi, A., Alrizq, M., Alghamdi, O.,   Nayer, F. K., Aljehane, N. O., Khosravi, A. & Mohd, S. (2022).   Knowledge discovery for course choice decision in massive open online courses using machine learning approaches. *Journal of   expert systems with applications (199)*   *https://www.doi.org10.1016/j.eswa*

Nwanisobi, B.C. & Christopher, I.C. (2020). Definition of public   administration: various scholar. *American international journal   of business management (aijbm) 3(9), 56-61.* *https://www.aijbm*

Nath, V. (2000). Knowledge Networking for sustainable   development. *www.cddc.vt.edu*

Nwokorie, E. C., & Adiukwu, I. K. (2020). Hospitality and tourism   entrepreneurship: Administrative barriers in Imo State, Nigeria.   Turizam, 24(1), 13-32. https://doi.org/10. 5937/turizam24-   22955

Oxford Language Dictionary. Leadership.

Peek, S. (2023). The management theory of max weber.   https://www.business.com>articles

Shahbazi, Z., & Yung-Cheol, B. (2022). Knowledge discovery on   cryptocurrency exchange rate prediction using machine learning   pipelines.

Salem, A., Hegab, H., Rahnamayan, S., & Kishwy, H.A. (2022). Multi-   objective optimization and innovation-based knowledge   discovery of sustainable machining process. Journal of   manufacturing systems (64), 636-647,   *https://doi.org/10.1016/j.jmsy*

Shaaban, A.G., Khafagy, M.H., Elmasry, M.A., El-Beih, H., & Ibrahim,   M.H.   (2022). Knowledge discovery in manufacturing datasets   using data mining techniques to improve business performance.   *Indonesian journal of electrical engineering and computer science   (26), 3, 1736-1746.*

Tarud,   J.   (2022).   The   importance   of   knowledge   discovery.   *https://www.koombea.com/blog/knowledge-disovery*

Tara-Lee, G. (2023). Leadership trends that will transform your work   culture. http://www.linedin.com

USARAD (2011). Administrative efficiency. An article of experts in medical   and   radiologic imaging.   *https://www.xmri.com>dictionary*

Wex definition team (2022). Doctrine of discovery. *https://www.law.cornell.edu*

Walters, J. E. (1959). Basic administration: the process of planning,   organizing, managing, appraising, and controlling.   *https://www.amazon.com*