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Complexity identification in hybrid management intelligence system and its impact on customized throughput

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Abstract: Businesses and corporate organizations are moving towards the use of advanced technology and information management systems in creating sustainable growth and customized throughput. Present day decision makers and managers are thus in a quest for real-time information in facilitating effective decision. The paper presents the use of hybrid management intelligence system in effecting decisions and its association with organizational performance. Furthermore, the use of hybrid intelligentsia such as business intelligence and knowledge management system in improving organizational performance is the current practice at different managerial levels. The complexities associated with management intelligence systems are identified and discussed. The effect of hybrid management intelligence system on organizational and customized throughput are discussed and presented in the paper.

Keywords: Hybrid Management Intelligence; Knowledge Management; Business Intelligence; Organizational Performance

1. Introduction

Hybrid management intelligence systems aims to provide efficient management processes in taking the growth of an organization a step further than it was. Such intelligentsia systems are achieved through mixed-model management systems. Variety in management systems brings in challenges which may complicate processes used for customized throughputs. To manage the challenges, the understanding of hybrid managemnt intelligence system and its effect on customized throughput is required [1]. The study on effect of hybrid management intelligence on customized throughput exposes its influence on the management intelligence system performance. Thus the complexity embedded in the intrinsic structure of management intelligence system and the uncertainties associated to management operations are exposed. Rebuilding confidence in management processes and styles requires the use of an integrated management intelligence system [2]. The success probability for management intelligence system in delivering the desired customized throughput reveals the second complexity that may be inherent in the use of hybrid management intelligence system.

The collective capacity of integrated management intelligence system provides management the intellectual capacity and cooperation required to create, invent and innovate custom processes. Hybrid management intelligence is the determining factor towards human development, creativity and competitiveness in an organization. Hybrid management intelligence may be defined as the capability of management intelligence to adapt business processes in meeting the desired objectives and throughputs [13]. The more management system becomes dynamic and nonlinear, the more hybrid management intelligence is of fundamental importance to the modern society [3]. While digital technologies and advanced information systems provides more powerful tools in augmenting management strategies, it is essential to comprehend how hybrid management intelligence affects throughput at various stages in an organization. The interrelations that exist between different management intelligentsias may not be intuitive in their style of delivery. Integrated management intelligence system delivers information and provides ways of implementing deliverable actions.

Hybrid management intelligence in the present day dynamic business environment provides the necessary technique and technology required by managers to make stra-

tegic and tactical decisions [2]. Creating sustainable growth and development through the implementation of management intelligentsias gives an organization the desired competitive edge. Integrated data base managements systems that support hybrid management intelligence facilitate management system adaptability to future configurations in organization management and throughputs. Reconfiguration of management intelligence to suit decisive throughput brings about change in the dynamic business environment.

In this paper, the complexity in integrated intelligent management systems is extended to hybrid management intelligence system in determining the growth of an organization through customized throughput. Serial and parallel intelligent management architectures and decision mixes are investigated. The investigations propose growth through adequate throughput model from hybrid intelligentsia. The complexities in integrated management intelligence system are applied to both throughput driven and hybrid management systems. This work is more relevant to present day decision makers and managers in various dynamic business environments and organizations.

2. Solving Intelligentsia Interoperability Problem

The hybrid management intelligence system shares crucial objective with vast amount of data management embedded in the different knowledge management systems. It aims at maximizing real-time information required in efficient management systems. Its purpose does not lie in the standardization of data format as there are efficient database management systems. Thus there are management complexities to information exchange and integrated management intelligence. Different management ontologies reflecting diverse information management and dissemination systems emerge from the collection of various data base and knowledge management systems. The objective of hybrid management intelligence system in effecting customized throughput in an organization is to provide pivotal management intelligence system rather than imposing unique management ontology [3]. Thus private and public enterprises benefit from the rich pragmatic solutions provided by hybrid management intelligentsia [22].

Hybrid management intelligentsia brings together information and data from competitive intelligence, business intelligence, knowledge management and strategic intelligence thereby providing a universal intelligence for decision making. In addition to the amalgamation of information and interoperability of intelligence systems for diverse systems, hybrid intelligentsia also has the following independent objectives:

• The creation of reliable and real-time information dissemination system,

• The development of robust management decision making process which exploits the vast data base systems in the management intelligentsia,

• The establishment of intelligent management tool for self-monitoring and self-reference in an integrated management intelligent system.

2.1. Intelligentsia Reliability and Throughput

For many business management systems, it is essential to predict processes such as the business intelligentsia system's reliability and availability to decision makers. Business intelligentsia reliability is the probability that an intelligence system will generate the desired throughput over a specified time period while the availability of business intelligentsia system is the probability that the intelligence system is giving the desired throughput at any giving time. Business intelligentsia reliability models compares management intelligence configurations based on the matrix of throughputs desired by the organization. Customized throughput models combine hybrid business intelligentsias in order to optimize business process throughputs within the specified period. The flexibility of an integrated management intelligence system facilitates high-level decision making process with specialized support from the different business intelligence systems. Thus having business intelligentsia reliability analysis and optimization support features are necessary. Management intelligence reliability analysis allows managers and decision makes to ask "what if" questions regarding various management intelligentsias and be able to make defendable management decisions that may pose a threat to throughput. Realistic analysis of business intelligentsia is paramount in an integrated management intelligence system representing the interactions and interdependencies that exist between the various management intelligentsias. Intelligentsia reliability analysis facilitates the detection of potential management bottlenecks, fatal flaws, failure mechanisms and system incompatibilities that may be present in the different intelligentsias.

2.2. Intelligentsia Risk and Liability Analysis

The use of different management intelligence system in an organization in facilitating timely decision making process and customized throughput may be associated with some risks and vulnerability. Thus risk and failure analysis are essential in the implementation and use of hybrid management intelligentsia in effecting customized throughput. Management intelligentsia analysis places emphasis on failure probability prediction of the management intelligence system. The prediction analysis predicts risks which may severely lead to the dysfunction of the management intelligence system. Liability analysis exposes areas in which the desired management intelligence system may be vulnerable to. Liability analysis focuses on the identification and reduction of management intelligence system disruptions. These analysis provide the required information intelligence system redundancy and specification features thereby evaluating the risk and efficiency of the system.

2.3. Strategic Intelligentsia Planning

Strategic planning requires that the management intelligence system develops and evaluates one or more unconventional strategies in the identification of the best management strategy that produces the greatest throughput for the organization [19]. Strategic planning dependency on complex and uncertain management systems implies that resolutions derived from such system may be inconclusive [9]. Thus managers are left to their intuition for critical decision making. Hence effective management of projects and planning process requires an efficient strategic intelligence process included in the management intelligence system. This will allow the organization to be robust in adapting to market dynamics, conditions and potential disruptions.

There exits significant correlation between strategic planning and management intelligence in that strategic planning reveals the level of implementation and hybrid management intelligence overall performance. Thus, affirming the importance of strategic planning towards increased customized throughput, information exchange and business management alignment as shown in Fig.1 [6]. Strategic planning gives decision makers and managers the avenue in which management intelligence capabilities, opportunities and risks are systematically evaluated. Furthermore, strategic planning also provides the organization with goals and objectives defining strategy, thereby integrating the different available intelligentsias for organizational growth [7]. Thus strategic planning is positively associated with integrated management intelligence and hybrid management intelligence. One important aspect of strategic planning lay in its use in determining information distribution modes and ensures that the information exchange between management and consumers are not too far apart. The integration of information exchange in strategic planning contributes significantly towards the competitive state of an organization [8].
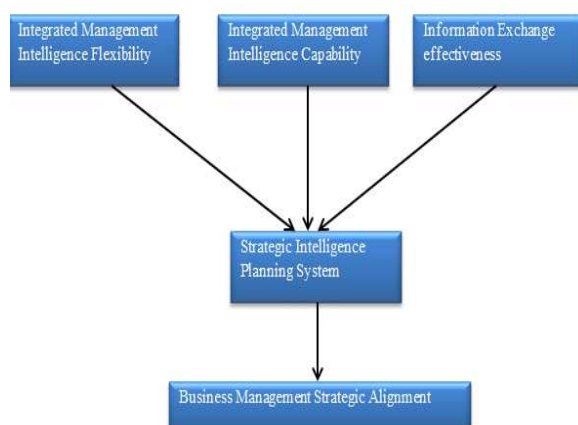
management. In a varying management landscape, the need for quality and reliable data cannot be over emphasized. Several organizations however are falling short of harnessing their data in real-time due to lack of adequate integrated management intelligence system [4]. Several management decision activities require increasingly vast amount of accurate data representing current dynamic business environment. Thus the need for good and reliable data is as a result of the following [4]:

• Increased emphasis on integrated management intelligence and risk management,

• Growing demand on strategic reporting, and

• The search for an ice-breaker in difficult business environments.

The various intelligence systems form a complex and interconnected web of data generating systems as indicated Fig. 2. In such network, multiple data sources may be acquired from outside sources while valuable information is stored in the independent intelligence systems within the organization. Given that real-time data is the key asset and lifeblood of an effective decision making process, data management process aims at controlling, protecting and maximizing the value derived from real-time data in order to achieve and sustain competitive advantage at the market [5]. Ensuring efficient data management system involves the use of current technology, processes and data interchangeability culture. This will ensure that decision makers are aware of the organization's current standing at the market place. With increasing volumes of data acquired from different systems, and the need for compliance at different dissemination levels, an organization requires the consolidation of the data systems and sources through robust data management system.
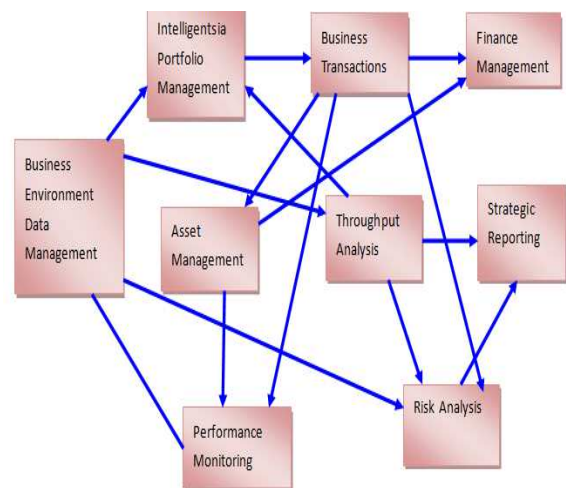

Figure 2. Complex and Interconnected Data System

Figure 1. Strategic Intelligentsia Planning Model

3. Data Management Paradigm

The vital component required for business process management and integration of business intelligentsias is data

4. The Influence of Hybrid Intelligentsia on Organizational Performance

Management intelligentsia monitoring and improvement has become the growing phenomena which comprises var-

ious management processes such as strategic reporting, business intelligence, competitive intelligence, knowledge management, strategic intelligence and artificial intelligence. Thus the reliance on conventional ideas cannot be effectively used as benchmark for performance monitoring of management intelligentsia systems [10]. Hybrid intelligentsia through efficient data management system provides the efficacy required in management decision making process. Furthermore, the use of hybrid intelligentsia such as business intelligence and knowledge management system in improving organizational performance is the current practice at different managerial levels [21]. Organizational improvement through analytical techniques embedded in integrated management intelligence provides valuable decision-making information for customized throughput. Due to the complexities that exist between the different management intelligentsias, organizations often enhance their competitive advantage and performance through standardized management operations. Thus, the use of hybrid management intelligentsia as a decision support system provides distinct competitive advantage and performance [10].

5. Business Intelligence

Business intelligence is a system that is designed to provide real- time decision support to managers and decision makers. Business intelligence through business operation management creates value to various management processes. Business intelligence extracts data from data warehouse, transforms information and makes the information available at various dashboards for process implementation [11]. Business intelligence provides the necessary tools required by management and decision makers in enhancing the competitive advantage of the organization. Integration of business intelligence into management intelligence improves the quality and speed of decision making, and maximizes the productivity level of managers and the organization as a whole [12]. Thus in [13] three elements of an intelligence system are identified. They are:
- The ability to predict business situations,
- The ability to adapt to business conditions, and
- The ability to take necessary actions.

The adaptive nature of business intelligence makes it possible to combine prediction, adaptability and optimization into management intelligence system in answering two critical questions for organizational growth: "what is most probable to occur in the future? And what is the best action right now for growth and development?" [13]. In order to design such management system, the concepts of prediction, adaptability and optimization needs to be grasped by managers and decision makers. Thus there is need to understand the importance of real-time information and knowledge as they provide managers and decision-makers evidence of current and future business trends.

The main objective of management intelligence as the category of business intelligence is to support and provide

performance monitoring system for decision making in an organization. The decision making support function of management intelligence in creating customized throughput in an organization makes it possible for managers to make accurate predictions on organizational growth. This increases the level of preparedness and forecasting capabilities of market trends. Real-time information gives decision makers the edge on which they can create value while evaluating operational processes.

6. Knowledge Management

The systematic management of knowledge through an enterprise management system in creating, collecting, organizing and transfer of information defines knowledge management system. In [18] it is also defined as the management of business activities used in an enterprise system in knowledge production and innovation [18]. The key elements of a management intelligence enterprise manager are shown in Fig. 3. Making real-time and efficient decisions requires that managers are furnished with information generated from various business processes within an organization. Smooth business processes are influenced by smart knowledge management system. Knowledge management incorporates activities of value creation, development and application of business knowledge in enhancing organization performance [14]. The creation of knowledge from the analysis of data stored in the data warehouse is a direct move to sustainability in an organization. Knowledge management serves to enhance the competitiveness of an organization and increase the level of development and information management at the organization. Knowledge management strategies improve management responsiveness to business processes and innovation thereby maximizing the wealth of data available to the organization [16].
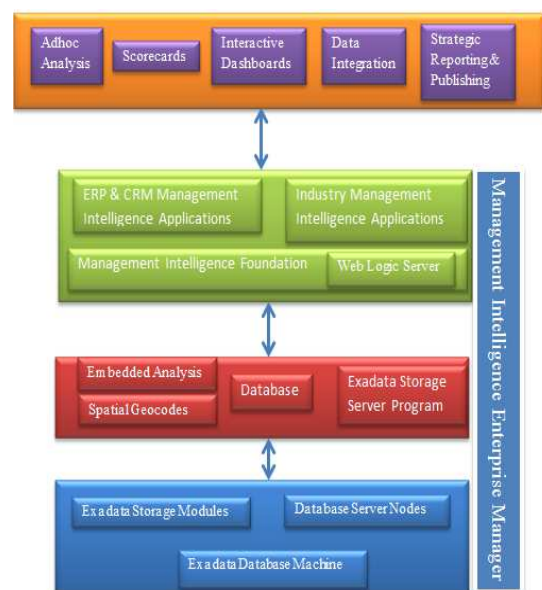

Figure 3. Management Intelligence system key Elements

In order to resolve the complexities that exist in management intelligence systems, [17] proposed the use of a multi-agent system to resolve the flow and sharing of information across different systems. In the multi-agent collaboration system, each agent retains their specific function and shares required information through an integrated workflow control system. Thus the use of multi-agent system in distributed knowledge management system ensures that there is identification, acquisition, storage, distribution, development, maintenance and reuse of structural information [17].

6.1 Business Performance Management

In preparing an organization for the next phase of advancement, the collection prior information and analysis or previous decisions and through are deemed necessary. Practical implementation of checks and balances in management intelligence systems requires that techniques, metrics and technology be used to monitor the performance of management businesswise [15]. The key performance indicators chosen by the organization are guide lines for the business performance management system. In [15] optimum performance can be achieved through a closed loop process which includes:
• Goal setting and aims definition,
• Strategy to achieve defined objectives,
• Performance evaluation against goals and objectives, and
• Corrective actions and adaptability of business processes.

Business performance management is the key element enabling effective business management and attainment of business objectives. The business performance monitoring process implements the required flexibility and agility in the fully integrated management intelligence system. Thus business profitability and growth are dividend of an effective business performance management system. Business performance system combines business intelligence with attributes of strategic intelligence and planning in creating the desired throughput. Business performance management allows the organization to plan and forecast with greater precision thereby aligning financial operations and business operations. Thus profitability is created through comprehensive and fully integrated management intelligence system.

6.2. Management System Architecture and Decision Mix

Given that there are n database architectures as shown in Fig. 3 and for each database there are different variants X_i. The combination of data from the database variants is feasible and regarded as distinct decision-making variant [19]. This can be extended to and setting tactically unfeasible combinations as zero. Thus the number of variants for decision making is modeled as:

$$N = \sum_{i=1}^{n} X_i \tag{1}$$

Suppose that the need for customized throughput using N variants of databases is independent. The fraction of the total decision towards customized throughput attached to each database variant is y_j where

$$\sum_j y_j = 1 \tag{2}$$

For $j = 1,....,N$ and $Y = (y_1,...y_N)$ represents the decision mix for the database variants.

In considering serial, parallel and hybrid management intelligence architectures, the flow of knowledge and information are time dependent system factors. For n^k knowledge systems at management intelligence system k, T^k is the information turnaround time for $k = 1,...,n$. Given that B_k represents the number of intelligence modules at management system k, the number of intelligence modules at the management system is given as:

$$n^k = \|B_k\| \tag{3}$$

The integration of the different modules is given as:

$$N^k = \sum_{i \in B_k} X_i \tag{4}$$

The set of decision variants $P(v)$ on decision making fraction y_v^k containing variant v is given as:

$$y_v^k = \sum_{j \in P(v)} y_j \tag{5}$$

Thus managers and decision-makers can choose and make informed decisions based on decision faction variant d_m modeled as:

$$H^k = -\sum_{m=1}^{M} d_m \log_2 d_m \tag{6}$$

Thus serial management intelligence system is given as [1]:

$$H_{serial} = \sum_{i=1}^{n} H^i = -\sum_{i=1}^{n} \sum_{v=\Delta}^{X_i} y_v^i \log_2 y_v^i \tag{7}$$

And the parallel management intelligence system is given as [1]:

$$H_{parallel} = -\sum_{i=1}^{n} \sum_{v=\Delta}^{N} \left(\frac{y_v^i}{n}\right) \bullet \log_2\left(\frac{y_v^i}{n}\right) = -\sum_{j=1}^{N} y_j \log_2 y_j + \log_2 n \tag{8}$$

7. Conclusion

In this paper, the complexity identification associated with management intelligence system as applied to serial, parallel and hybrid management intelligence architecture is discussed. The impact on customized organizational throughput based on business intelligence and knowledge management systems were evaluated. Business intelligence and knowledge management system formed an integral part of the hybrid management intelligence system.

The integrated solution provided by the hybrid management intelligence system as indicated in Fig.3 allows managers and decision makers to have access to information through interactive dashboards strategic reporting, publishing and data integration systems. Thus informed decisions are made in effecting customized throughput in the organization. The inability of line managers and decision makers to venture into new management systems may be ascribed as one of limitations of hybrid management intelligence implementation.

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