CRITICAL REVIEW OF ADVANCED DECISION-MAKING FRAMEWORKS/TECHNIQUES AVAILABLE TO MANAGERS IN BUSINESSES

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Abstract

The chief objectives of this study are to contribute to the existing knowledge and literature by conceptually reviewing some of the advanced decision-making frameworks and techniques available for supporting managers of establishment in their decision-making responsibilities and to investigate the extent of their utilization by business managers. Thus, various frameworks in decision making (such as the Analytic Hierarchy Process, DELPHI Method, Cynefin Framework, Decision Matrix Analysis, SMART, and MAUT, among others) were conceptually reviewed and found to be capable of supporting managers in resolving complex decision problems. The survey approach allowed the study to utilize primary data sources (mainly structured interviews and questionnaires) to retrieve pertinent data from managers of the ten randomly selected and notable enterprises in Nigeria. With the employment of T-Test Statistics in SPSS (ver. 25), the study found that there is limited familiarity and application of aforementioned advanced decision-making frameworks by managers of business enterprises in Nigeria – who instead were majorly familiar with the application of conventional decision approaches such as SWOT, PESTLE, et cetera. This explains the recommendation proffered by the study – for the sponsorship of business managers to on-the-job training, such as courses, workshops, conferences, seminars, webinars, symposiums, and other professional decision skills training, especially on those that would train and polish their skill on modern utilization of advanced decision making frameworks for solving decision problem in a complex environment.

***Keywords*:** Decision Frameworks/Techniques/Models, Business Managers, Analytic Hierarchy Process, DELPHI Method, Cynefin Framework, Decision Matrix Analysis, SMART, MAUT, Big Data Analytics, Chaos Theory.

Jel Codes

1. Introduction

Over the years, certain situations in organizations have proved to be uncertain and deciding on such uneasy situation reminds us, as individuals and as managers, particularly in the field of management and social sciences, the pertinent place of deploying conventional decision-making frameworks in solving such decision problem (Gluckman & Bardsley, 2016; Ali et al., 2023). In the aforementioned field, for instance, managers have overtime been confronted with investment-related decisions, decisions on the appropriate techniques for project evaluation and scarce resource allocation, decisions for dealing with insider trading, and many others (Atmaningrum et al., 2021; Drábek et al., 2020).

It is well understood that some decisions and problems could often prove challenging, complex, and difficult – and sometimes occasioned by death, bias, and unclear data or information. However, the limited available prior studies have proven that such a complex situation requires an advanced decision-making framework and techniques to solve such decision problems (Rowe et al., 2024). This underscores the potential of this research, which aims to contribute to the existing knowledge and literature by conceptually reviewing some of the advanced decision-making frameworks available for supporting managers of establishment in their decision-making responsibilities and investigating the extent of their utilization by business managers.

2. Literature Review

Following the aim of this research, the advanced decision-making frameworks selected will be reviewed here to identify the published application of the respective frameworks to the field of management and social sciences. There are as follows:

2.1 Cynefin Framework

The Cynefin framework is one of the consequential frameworks for decision-makers in their scrutiny and sense-making of complex situations and unclear alternatives (Snowden and Boone, 2007). It applies to different human endeavours. Particularly in the field of the study, the framework could be applied for financial risk mitigation. Snowden et al. (2007) underscore the framework's propensity to support the management of financial risk, viz-a-viz, segmenting these risks into prominent, complicated, chaotic, and complex domains. This argument was further corroborated by Kayes and Burnett (2014) who reiterated the framework's ability to aid risk identification analysis and mitigation. The practical application of the Cynefin Framework in financial risk mitigation underscores its potential and instils confidence in its utility in real-world decision-making scenarios.

In the optimal portfolio selection, Mulyadi and Anwar (2017) opined Cynefin's application in ensuring good portfolio decisions and enhanced investment performance of corporations. Chatterjee & Ghosh (2015), Zhang & Finlay (2019) and Finlay (2013) also stressed that the context and complex domains, particularly, could foster the development of models and frameworks for investment decisions, financial planning and financial strategy purposes.

In auditing practices, Cynefin was also found relevant in ensuring effectiveness in audit work, because of Cynefin's "sensor" and "probe" features and support decision-making (Humphreys & Jones, 2018; Kurtz & Snowden, 2003). Ananthanarayanan and Srinivasan (2020) argued that it could support auditors in evaluating audit risk by assessing the adaptability of Cynefin in auditing practice and found its ability to enhance effectiveness in practice. This adaptability of the Cynefin framework not only makes it a versatile tool but also reassures its utility in various decision-making contexts, instilling confidence in its application.

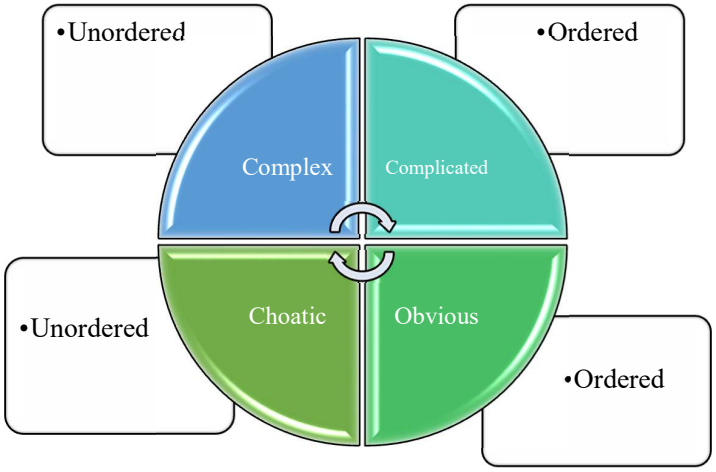


Figure 1: Snowden (2007)'s Cynefin framework.

2.2 Decision Matrix Analysis (DMA)

Decision Matrix Analysis (DMA) is another structured framework for assisting managers in handling decision problems. The technique was qualified by DiRoberto *et al.* (2016) as a quantitative model that assists managers by using an array of criteria to rank the choices available to them. The application of DMA has been demonstrated by Hau *et al.* (2020) – who further developed a DMA-inspired financial and economic model posited to aid the solving of real-life and practical decision problems of organizations. Xu *et al.* (2008) further opined that such a framework could manage "strategic conflict" by using its graph model to suggest preferred or appropriate choices.

2.3 Chaos Theory

Chaos theory provides a framework to understand and navigate turbulent markets and industries. Businesses often operate in environments marked by uncertainty and rapid change, such as technological disruptions or fluctuating consumer preferences. Organizations can use chaos theory to predict trends and make informed strategic decisions by identifying patterns within seemingly random data. Levy (1994) demonstrated the application of chaos theory in

shaping competitive strategies thereby identifying patterns within market dynamics. This helps businesses to predict competitor actions and adjust their strategies effectively. Stapleton, Hanna, and Ross (2006) emphasized chaos theory's relevance in diagnosing and solving supply chain hitches. They illustrated how seemingly minor changes, such as a delay at one node, can amplify throughout the entire network, leading to significant bottlenecks.

2.4 Analytic Hierarchy Process

Analytic Hierarchy Process (AHP) is a model for measuring quantifiable and intangible sets of criteria, viz-à-viz the structure of hierarchies and the deployment of experience and knowledge to solving a given decision problem (Vargas, 1990). This model cum framework has found application in the field and practice in many areas. Shaverdi *et al.* (2014), in their study, demonstrated how AHP could be applied to the assessment and analysis of an organization's financial performance and used seven company cases from Iran's petrochemical industry to suggest how the model could help in solving a problem - "fuzzy multiple criteria decision-making (MCDM)".

In a similar study, Taleby *et al.* (2022) argued that AHP can be applied in the ranking requisite knowledge and skill areas (leadership, strategic management, communication, analyzing, personality, increasing capabilities, and general accounting skills) for a successful career by finance, business, and accounting graduates. The study found that strategic management skills are the zenith of these skill areas.

Other published applications, such as Bhattacharya *et al.* (2017), suggested deploying this model for the effective allocation of scarce resources and optimization in portfolio management. On the other hand, Koç & Burhan (2015) demonstrated with Carglass Turkey the relevance of AHP in store management and problem location with given quantifiable and intangible criteria.

2.5 DELPHI Method

The Delphi method was initially developed as a tool for a research survey. Since then, researchers have deployed it to source vital data through structured group discussions and expert interviews (Goodman, 1987). Lilja et al. (2011), as well as Abu-Musa (2004), have posited that the technique could be adaptable for the same reason as aforementioned in the measurement of probable risk in the Accounting Information System (AIS) and in the development of a strategy to mitigate such.

The technique has also been argued to be relevant for predicting stock price volatility, possible crises, and other trends in a stock market (Kuo *et al.*, 2015; Bhattacharya *et al.*, 2017; Kumar *et al*., 2018).

Henderson and Mauldin (2010) opined that the Delphi method assists in forming accounting standards by retrieving feedback from stakeholders, sample opinions, and consensus.

2.6 Multi-Attribute Utility Theory

Multi-Attribute Utility Theory (MAUT) is another decision-making framework that can significantly support analysing and examining of credit risks, possible business failure predictions, and company financial performance using financial metrics like financial ratios.

Zeghal *et al.* (2017) demonstrated how financial ratios like profitability, liquidity, and solvency could be aggregated using MAUT to predict creditworthiness and financial sustainability. Sun *et al.* (2014) applied MAUT in conjunction with machine learning models to enhance the predictive accuracy of corporate failure analysis. Their study emphasized the importance of incorporating financial and market-based variables into decision models.

Wang *et al.* (2017) demonstrated how MAUT can be used in conjunction with financial ratios to rank firms within an industry based on overall financial health. The study highlighted the flexibility of MAUT in accommodating quantitative and qualitative data.

2.7 Simple Multi-Attribute Rating Technique

Simple Multi-Attribute Rating Technique (SMART) shares some similarities with MAUT. However, prior studies have proved the latter to be more seamless, especially in its application for portfolio optimization purposes and risk evaluation. For instance, Wang *et al.* (2020) demonstrated that SMART streamlines the portfolio optimization process by reducing the computational complexity associated with traditional optimization models while maintaining robust decision quality. This is particularly relevant when decision-makers must evaluate multiple criteria without overly sophisticated mathematical tools. Also, Wang *et al.* (2020) proved that SMART simplifies risk evaluation processes in industries like banking and insurance, where multiple risk dimensions must be considered concurrently.

2.8 Big Data Analytics (BDA)

Managers have increasingly used Big Data Analytics (BDA) in recent times. According to Davenport (2014), this leverages BDA to analyze the enormous mass of structured and unstructured data (e.g., market surveys, social media, emails, *et cetera*) to obtain valid information that will ensure they make data-driven decisions for fostering organizations progress and goals accomplishment. According to Jeble *et al.* (2017), this business progress comes in the form of increased turnover, profits, customer and client base, operations, and market share price.

Over the years, this tool has been proven to be utilized for various other purposes, including risk examination, business financial performance examination, detection and prevention of fraud and errors, *et cetera* (Ngai *et al*., 2011; Griffith *et al*., 2014).

The intense competition in today's market and the modelling capability of BDA have further made it indispensable when market and industry-related estimates are sought, like when customers' preferences, market patterns, and other trends are craved (Hastie *et al*., 2019; Kaplan, 2016). BDA has also been found to foster Decision Support System frameworks (Osuszek *et al*., 2016). Zharas and Hamada (2022) suggest that this technique works better with the following advanced analytics in *Figure 2* below:

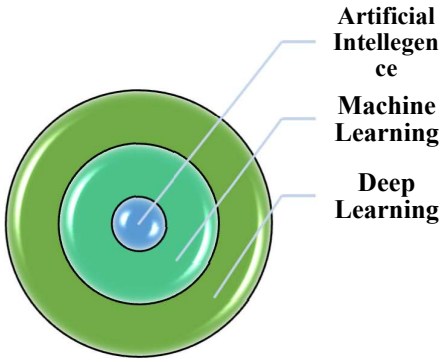


Figure 2: Advanced analytics for Big Data Analytics.
Source: Authors' Analysis from Zharas and Hamada (2022).

From the figure above, Zhu *et al.* (2006) and Cascio & Montealegre (2016) especially underscore the pivotal place of AI's incorporation into BDA for a more enhanced outcome in investment risk management, competitive and productive advantage, and generally for actualizing corporate goals for organizations.

2.9 Summary of the Review

Summarily, the above literature review has given sufficient conceptual evidence that the highlighted decision-making models/techniques/frameworks are veritable tools in the hand of business and financial managers for aiding them in making data-driven decisions, and in solving complex decision problems in their organizations.

Cynefin framework has been revealed to be a consequential framework for decision-makers in their scrutiny and sense-making in complex situations and unclear alternatives, by the polarization of choices into complex, chaotic, complicated and obvious nodes. This framework has found application particularly in financial risk management.

Decision Matrix Analysis (DMA) is another structured and quantitative model that could assist managers in handling decision problems, and managing strategic conflict by using graph model and certain criteria to suggest preferred or appropriate choices.

More also, Chaos theory is another framework reviewed. It could be applied by managers to support them in understanding and navigating turbulent markets and industrial uncertainties, such as technological disruptions or fluctuating consumer preferences. This model has been found to be applicable in forecasting trends and make informed strategic decisions by identifying patterns within seemingly random data.

At some point, a manager in business could be required to demonstrate the juxtaposition of knowledge and experience in his decision making. And Analytic Hierarchy Process (AHP) has proven to be applicable and supporting model for manager in such role. AHP model supports managers' informed decision by measuring quantifiable and intangible sets of criteria, viz-à-viz the structure of hierarchies and the deployment of experience and knowledge to solving a given decision problem.

The Delphi method is another vital technique review, and has shown to be applicable by business managers in many ways, such in supporting predicting movements in stock prices and other stock market-related trends, market crises, and the estimation of risk in the Accounting Information System (AIS). The model has also been revealed to be applicable in a research survey in the field of finance, economics, management, accounting, et cetera, especially when vital data are sought for through structured group discussions and expert interviews.

However, when this data sourced and retrieved become massive, managing and analyzing them to support managers' decision making becomes difficult and problematic because of the size. This is where Big Data Analytics (BDA) becomes inconsequential for managers in business decision making. BDA is found to be applicable managing and analyzing enormous mass of structured and unstructured data so as to support managers with valid information that will ensure they make data-driven decisions for fostering organizations progress and goals accomplishment.

Finally, Multi-Attribute Utility Theory (MAUT) and Simple Multi-Attribute Rating Technique (SMART) have both been found to have demonstrated applicability in credit risks management, portfolio risk evaluation, possible business failure predictions, and evaluation of companies' financial performance (with the aid of financial ratios metrics.

3. Methodology

Due to the nature of this research – being a conceptual review and not requiring an expo-facto approach and quantitative data – a survey research design was deployed. Primary data sources were utilized to deploy the design. The juxtaposition of the questionnaire and structured interview with one selected manager from each of ten randomly selected and notable enterprises in Nigeria (West African Glass Industry, Nexans Kabelmetal, Flight Aluminium Manufacturing, Tiger Foods Limited, COMETSTAR, Kris & Kris Industry Nig. Ltd., General Cotton Mill Limited, Solchez International, Industrial & General Insurance, and Berger Paints)

ensured the right and credible data were retrieved – particularly as it pertains to the determination of practical applications of advanced decision making (ADM) frameworks in solving decision problems in companies, as compared to the more conventional decision making (CDM) frameworks.

The data retrieved was analyzed using T-test statistics aided by SPSS (ver. 25) to help assess the difference between responses regarding the use of given decision-making frameworks and those for standard bench responses.

4. Results and Discussions

The concise representation of the study's result from data analysis can be seen in the figures and tables below:

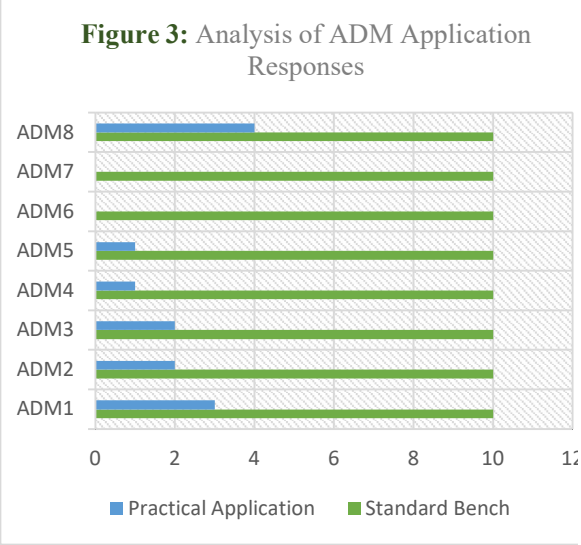


Figure 3: Analysis of ADM Application Responses

Where:

ADM1: Cynefin Framework

ADM2: Decision Matrix Analysis

ADM3: Chaos Theory

ADM4: Analytic Hierarchy Process

ADM5: DELPHI Method

ADM6: Multi-Attribute Utility Theory

ADM7: Simple Multi-Attribute Rating Technique

ADM8: Big Data Analytics

Source: Authors' Analysis based on field Survey (2024)

Therefore, from the analysis of data from t-test statistics, the following results were obtained:

Table 1: One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Standard/Bench Response	8	10.0000	.00000[a]	.00000
ADM Utilization by Managers	8	1.6250	1.40789	.49776

a. t cannot be computed because the standard deviation is 0.

Source: Authors' Analysis from SPSS (ver. 25)

Table 1 discloses the descriptive statistics of two variables, each containing 8 cases. The mean, standard deviation, and standard error mean for the standard and bench response are 10.0000, .00000a, and .00000, respectively, whereas those for the actual application of ADM techniques are 1.6250, 1.40789, and .49776, respectively.

Table 2: One-Sample Test

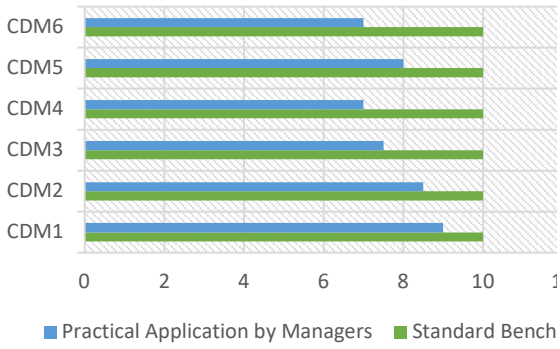
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Average_Utilization_by_Case_Managers	3.265	7	.014	1.62500	.4480	2.8020

Source: Authors' Analysis from SPSS (ver. 25)

In *Table 2*, the actual results of t-test statistics were presented. At a 5% significant level, it gave a T_value of 3.265. However, the p-value (Sig. value = .014) being less than the significant level (0.014 < 0.05) revealed the minimal adoption or application of aforementioned advanced decision-making frameworks in their day-to-day decision-making and in solving decision problems. Furthermore, the structured interview suggested the factors associated with unfamiliarity and insignificant training on the skills and intricacies for applying such frameworks in solving real-life complex decision problems.

However, further analysis of the data retrieved disclosed that greater adoption and familiarity by managers were found for relatively conventional frameworks such as SWOT, PESTLE, Competition Mapping, Decision Tree Analysis, et cetera. This is evidenced in *Figure 4* below and the T-test result in *Table 3* – which gave a much higher t-value (23.500). See *Figure 4* and *Table 3* below:

Figure 4: Analysis of ADM Application Responses



Source: Authors' Analysis based on field Survey (2024)

Where:

CDM1: SWOT

CDM2: PESTLE

CDM3: Porter's Five Forces

CDM4: Competition Mapping

CDM5: Sensitivity Analysis

CDM6: Decision Tree Analysis

Table 3: One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Average_Utilization_by_Case_Managers	23.500	5	.000	7.83333	6.9765	8.6902

Source: Authors' Analysis from SPSS (ver. 25)

5. Conclusion and Recommendation

5.1 Conclusion

This study has provided a critical review of some of the frameworks, techniques and models in decision making (such as the Analytic Hierarchy Process, DELPHI Method, Cynefin Framework, Decision Matrix Analysis, SMART, and MAUT, among others) that are capable of supporting managers in resolving complex decision problems. Thus, the findings from this study have influenced the conclusion that there is limited familiarity and application of aforementioned advanced decision-making frameworks by managers of business enterprises in Nigeria – who instead were majorly familiar with the application of conventional decision models such as SWOT, PESTLE, *et cetera*.

5.2 Recommendations

The recommendation of this study was influenced by its findings and conclusion. To foster improved data-driven decision, business performance and overall corporate goals accomplishment, managers of all levels of organizations should be sponsored, at intervals, to partake in on-the-job training, such as courses, workshops, conferences, seminars, webinars, symposiums, and other professional decision skills training, especially on those that would

train and polish their skill on up-to-date or modern utilization of advanced decision making frameworks for solving decision problem in a complex environment.

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