Journal of Management, Social Sciences and Humanities, 2025, Vol. 05, Issue 02, 47 – 69
DOI: https://doi.org/10.4038/jmsh.v5i2.33

# Incorporating ChatGPT & Fuzzy Logic Mixed Approach for Mega Project Benefits Reasoning through Benefit Stratification & Realization: The COBIT Approach

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## ABSTRACT

Benefits are fuzzy and 85% emerging are intangible in nature, while the measurability is questionable. The potential of the technological projects in postmodern times is costly because it is subjected to risks, quality goals, *el al*. "COBIT," is applied to measure the intangible benefits through systematic fuzzy science. While the project costs are directly measurable and performance-oriented measures, the quality goals are part of the intangibility. This paper integrates the concept of stratification, COBIT, language models and benefit categorization with the ChatGPT benefit ascertainment. In the light of intangibility, the benefits are morphologically viewed with ambiguous nomenclature. The objective is to ascertain the extent to which intangibles are realized by integrating the concepts of fuzzy logic. The techniques of computing with words and numbers aid managers in ascertaining the fuzzy behaviors of project benefits. There are nine (9) fuzzy benefits identified through a systematic literature study. It paves a new scientific application to measure IT project benefits. It is still lagging whether we can ascertain the total benefit realization at project's end whilst using novel practical concepts where the uptake of benefits at P3M are rarely quantifiable. The approach is recommended for state and private sector mega-project benefit measurement at post-project governance from local and foreign exposures.

**Keywords**: Benefit categorization, ChatGPT, COBIT, fuzzy logic, intangible benefit, stratification.

## INTRODUCTION

Megaprojects are defined as very large-scale projects, often paid by the government and executed by large private companies or multinational corporations or joint ventures and are very costly, ranging from millions of dollars to billions of dollars, and

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the deliverable schedule is a minimum of 1 year, such as IT-based projects, and up to 30-40 years, such as defense capability projects, and track records showed that more than 30% are cancelled, over 60% are cost overruns, and the average cost overrun is 178% for large companies, 182% for medium companies, and 214% for small companies, and over 70% are schedule slippages of 5 years and 10+ years (Ghildyal and Chang 2016, 2017). Only 58% of target benefits incrementally enlargeable later attain the status of benefit achievement (Dwivedi et al. 2013).

To manage large, complex projects, the organization often uses divide and conquer into 3 levels known as PPP (Projects, Program, and Portfolio). These seminal projects impact government services, millions of civilians' lives and health, economics and the environment, and systematically derive both tangible observable deliverables and intangible future-oriented benefits, where the latter category is the focus of our study. The novel methodology of ChatGPT is the focus of measuring the intangible benefits yielding from mega projects of the government and the state (Atkinson, 1999). The gaps of the study are crisply classified into two folds, namely empirical gap and methodological gap, where the former is the observational lacunae of past studies that are done in the areas of fuzzy/ChatGPT combination and the latter gap is the lacunae in literature pertaining to the mechanism of using a fuzzy logic approach to dynamically test the realization of project benefits in the context of ChatGPT. The stages of benefit identification, realization planning, measuring, and benefit realization are the four (4) cores of benefit management from a fuzziness perspective of intangible, long-term, future-oriented, and auxiliary benefits.

The objective of the study is to ascertain the extent to which mega-project benefits are realized while utilizing a coupled novel methodology of ChatGPT & fuzzy inference logic. The paper addresses the research problem of identifying and realizing intangible project deliverables for fuzzy benefit reasoning by incorporating ChatGPT and combining fuzzy inference logic and novel AI technology with logical inclusion of COBIT & the concept of stratification. It aims to comprehensively and accurately identify and realize the intangible benefits emerging from the project, particularly mega projects, by incorporating ChatGPT to support fuzzy inference, linguistic interpretation of benefits, and crisp value generation for end-state benefits. The definition of ChatGPT-oriented fuzzy benefit reasoning is a linguistic platform that allows managers and scholars to logically identify, measure, and realize intangible project deliverables. These platforms provide an open and flexible medium to quantify the end-state benefits of a qualitative nature in a project, program, or portfolio. ChatGPT-oriented fuzzy benefit reasoning combines fuzzy logic such as CWW and CWN with modern novel AI technologies like ChatGPT. By considering both fuzzy benefit reasoning and the ChatGPT technique, the IT project benefit managers can comprehensively and accurately identify and realize the intangible benefits emerging

from the project in compliance with mega project benefit management (Wu et al. 2015). The study is contextualized for local projects, as it is an emerging field in the country with the investment in mega technology-driven projects from the perspective of the government with a future preparedness value. The stakeholders and beneficiaries are the public-private partnerships that invest in technology-oriented projects.

## LITERATURE REVIEW

Aubry et al. (2017), in their seminal work, have explained, in congruence with other studies, that project benefits are either direct benefits that are ascertainable or indirect benefits that are unascertainable (Shenhar et al. 2001). On the other hand, it has explained financial tangible benefits and non-financial intangibles. (Young et al. 2017). The combination of long-term, indirect benefits with long-term non-financial benefits from a project viewpoint is the focus of the current debate. There are profits/losses incurred in the project, but the measurability is subtle because the IT project losses incurred are resulting in negative financial returns progressively in the future. Futuristically, the benefit or disbenefit cannot be measured in a concrete, crisp manner but rather indirectly from a fuzzy perspective. The other notion is that the project is incurring different intangible benefits that are emergent, imminent, and auxiliary in nature (Hill, 2004).

These are subsequent benefits that are latent in nature that emerge over time and sometimes after the project has ended at the post-project governance phase (Zwikael et al. 2018). Goodwill, image, sentimental value, and reputation of an organization by project value may impact financial goals, ROI, profit, and cost savings. It is an intangible cost. Time, HR, stakeholders, and operation automation are project components that are intangible in nature with futuristic value that will determine the success of achieving the project goals, organizational mission, and objective of the enterprise (Badewi, 2016). A systematic literature review highlighted that the benefit as a concept and theory evolved from the 1950s to today through different projects. Today, the project benefit is viewed as a fuzzy concept, as benefits are uncertain and ambiguous. However, the project benefit is encapsulated in the fuzzy domain as a sphere of diversity and embedded in IT projects. Today there is much more provision and leap in scope to ascertain IT project benefits and their effective management through the benefits management approach, which is scientific and futuristic in nature. From seminal past studies to cases of novel nature and beyond, the field of benefit realization is focused on the betterment of project managers and IT expert specialists. In the field of technology and benefit evaluation, the benefit process needs to be ascertained from the core to the out-layers of target realization (Aubry et al. 2017).

COBIT (Control Objectives for Information and Related Technology), as a tool for IT governance, has been deliberated in the recent past with a call for potential research (De Haes, Van Grembergen, and Debreceny, 2013). Underpinned by ISO 38500 principles, COBIT comprises several components titled as 'principles,' namely, responsibility, strategy, acquisition, performance, conformance, and human behavior. The concept of stratification is a logical approach adopted to tier off a target from its original state of benefit to its end state of realization. It takes a target phase, transitionary incremental enlargement, and benefit achievement (Zwikael, 2018).

The theoretical significance is premised on two areas, namely the multi-criteria utility theory and the concept of stratification. The multi-criteria theory assumed that business and technological factors are both significant in IT-based systems and stakeholders are benefiting through the technological aspects like technical infrastructure. The concept of stratification enlightened that the benefit traverses through the stages of benefit transition, enlargement, and realization from its original point to target benefit realization. Hence, artificial intelligence accustomed the benefit to be realized at three stages from the ChatGPT system and the related fuzzy inference model. The study is contextualized to local and foreign organizational project settings. Firstly, the domestic infrastructure projects have multiple benefits that are intangible. Secondly, the foreign projects have impactful effects on domestic projects such as labor HR costs, intellectual costs, statutory regimes, operational automation infrastructure, technological value, and many similar aspects.

After 2020, there was a significant leap in scope from the socio-fuzzy logic into the large language models (LLMs). The large languages are comprised of the concepts of computing with words and computing with numbers in the larger domain of ChatGPT. Words are comprised of fuzzy inference linguistic identifiers and socio-fuzzy logic modules (Zadeh, 2021). Numbers are defined by crisp numericals that denote a meaningful fuzzy value for the project benefit realization level. Dwivedi (2022) expressed a positivist approach to the evaluation of mixed project benefits. He explained that the positive correlation between large language models and the fuzzy logic mixed approach in the realization and effective evaluation of project benefits has a significant impact on the benefit realization contexts for project success. However, the large languages have strata, namely project, program, portfolio (P3M), hybrid enterprise project benefits, and mixed portfolio project benefits that are incrementally realized at different stages. Appending to the argument, Aubry et al. (2021) and Zwikael et al. (2022) viewed that a mixed approach must be applied in order to ascertain the benefit realization in the modular application of the house of benefits. The identification, planning, monitoring, and realization of project benefits are the broader domain of ChatGPT under large language models, and the house of benefits helps to achieve the business goal. In evaluating the project benefits and measuring

the success of projects, the P3M and other mixed project benefits are dynamically assessed in coupled variances through the fuzzy logic inference system to obtain a dual effect output.

The LLMs are nevertheless a dependent factor on the project size, project cost, quality, and project benefit strategic value. Zadeh (2021) posited that computing with words and numbers has a direct effect on the interpretation of the extent to which the benefits are realized in the socio-context of businesses and enterprises. Finally, the house of benefits has a roof, pillars, corridors, and a basement, which are connoted to the benefit umbrella of P3M and mixed project benefits. From a hybrid perspective, the benefits are reduced to targets, outputs, outcomes, and project deliverables. Every ChatGPT input and output has an implied connotation with project success or failure because in complex enterprise projects the domains of technology and business play a crucial role. The subtle variances of project benefit realization can be thereby coded as “extremely high,” “high,” “moderately high,” “mediocre,” “somewhat mediocre,” “subtly low,” “very low,” & “extremely low.” The aborted project or declining project can be easily recognized through the LLMs, as the ChatGPT output is subtle but crisp and definite. The fuzzy benefits are uncertain, ambiguous, and difficult to measure (Young et al. 2022). But the scientific leap in scope gives a rationalized logic to effectively realize the project benefits and strategic value of projects through LLMs, ChatGPT, and a mixed approach.

**Project benefits stratifications**

Tangible benefits are monetary-oriented project deliverables of the mega projects that are measurable and calculable in terms of profit, returns, and financial equity (Zwikael, 2015). The non-financial, non-profit project benefits are rather fuzzy in nature, non-measurable, and not calculable. This is a salient feature of the project benefits of mega projects because it has a futuristic value (Thiry, 2015). The following tabulation explains the different categories of the benefit underpinned by the literature relating to the mega-project benefit approach.

**Table 1:** Stratification of a project in the light of AI through a systematic review of literature

| Target sets | *Tier of the strata* | *Author nomenclature* | *Rationale for fuzzy logic coupling* |
|---|---|---|---|
| **t1:** Performance<br>**t3**: Capability | Project level | Aubry et al. 2017 | CWW, CWN |
| **t2:** HR Cost | Program | Zadeh, 2016 | CWW |
| **t4:** Operation automation<br>**t5**: Customer | Portfolio | Zwikael et al. 2018 | CWW, CWN |
| **t6**: RoI<br>**t7**: Value for money | Enterprise | Dwivedi et al. 2013 | CWW, CWN |
| **t8:** Stakeholders | Mixed portfolio | Young et al. 2017 | CWW |

**Source:** Developed by Author

## METHODOLOGY

The study provides for a novel methodological approach. It involves the application of fuzzy logic, which is an extended AI technique. Fuzzy logic is the application of logic to quantify intangible benefits (Dwivedi et al. 2013). The logic is beneficially used to quantify and measure qualitative intangible benefits. Fuzzy logic couples two or more variables to derive a common benefit effect. The dualistic effect results in the formulation and reduction of the benefit into tangible benefit variations. There are five distinct extents to which the benefit is actualized, namely, very low, low, moderate, high, and very high. These capacities are useful to derive the benefit from the perspective beyond the economic contexts. ChatGPT is a sovereign scientific method that couples the AI modulations and the fuzzy logic to provide a linguistically meaningful crisp benefit realization. The methodological limitation can be observed in that it does not position itself in any particular philosophical paradigm or method, such as mixed method. The fuzzy ChatGPT approach is a novel method to measure long-term intangible project benefits. Hence, the generalizability of the methodology for other managerial research is questionable (Dwivedi et al. 2013).

### Application of novel scientific technique

Artificial intelligence (AI) as an advanced theory is a novel application to many enterprise projects. AI, as connoted in the conceptual and empirical viewpoint, is the ability of a computer to do functions typically performed by humans, as the activities require human intelligence and cognitional power to solve complex analytical issues (Zwikael et al. 2018). The advanced techniques constituting AI can be aptly utilized in the mega-project benefit approach. The technologies of AI, such as natural language generation, decision management, robotics, biometrics, and cyber defense,

among many other utility approaches of AI, can be used to identify, measure, and realize benefits emerging from projects (Koutroumpinas et al. 2021).

**Fuzzy logic approach**

The fuzzy inference is illustrated from a reasoning perspective that incorporates both natural languages and crisp numerical aspects, constituting a logic of new fuzzy rules. This is premised on the seminal norms of scholars such as Deshpande et al. (2016) & Zadeh et al. (2016) and applied to the practical settings of the defense project of nonprofit orientation.

**Control Objectives for Information and Related Technology**

COBIT could be useful as a business- and policy-driven tool. Scholarly definitions hold that COBIT supports regulatory compliance, organizations to increase value attained from IT, and assurance of alignment of business and IT (Debreceny, 2006; Larsen et al., 2006; Ridley et al., 2004). On the other hand, industrial definitions by governance bodies emphasize that COBIT is an IT governance framework that enables managers to reconcile the gap between organizational control requirements, technical issues, and business risks (IT Governance Institute, 2007b). A broader, liberal interpretation of COBIT states it as a clear policy development tool and an enterprise-wide good practice for holistic IT controls—more than 200 control mechanisms (2007a). This framework is important, as many process-level implementations of business initiatives and control mechanisms are covered under domains of COBIT.

The fuzzy logic model is displayed with its coupled benefits (twined—combined effect), fuzzy rules, and fuzzy output.

**Rule 1:** stakeholder expectation is ‘low’ & Operation automation is ‘high,’ then we can linguistically express the level of total benefit realization of ‘sometimes.’

**Rule 2:** stakeholder expectation is ‘low’ & Operation automation is ‘medium,’ then we can linguistically express the level of total benefit realization of ‘seldom.’

**Rule 3:** stakeholder expectation is ‘low’ & Operation automation is ‘low,’ then we can linguistically express the level of total benefit realization of ‘never.’

**Rule 4:** stakeholder expectation is ‘medium’ & Operation automation is ‘high,’ then we can linguistically express the level of total benefit realization of ‘on most occasions.’

**Rule 5:** stakeholder expectation is ‘medium’ & Operation automation is ‘medium,’ then we can linguistically express the level of total benefit realization of ‘sometimes.’

**Rule 6:** stakeholder expectation is ‘medium’ & Operation automation is ‘low,’ then we can linguistically express the level of total benefit realization of ‘seldom.’

**Rule 7:** stakeholder expectation is ‘high’ & Operation automation is ‘high,’ then we can linguistically express the level of total benefit realization of ‘always.’

**Rule 8:** stakeholder expectation is ‘high’ & Operation automation is ‘medium,’ then we can linguistically express the level of total benefit realization of ‘on most occasions.’

**Rule 9:** stakeholder expectation is ‘high’ & operation automation is ‘low,’ then we can linguistically express the level of total benefit realization as ‘sometimes.’

## Case study for incorporating ChatGPT

In this section, we provide ChatGPT output for the benefit dimensions. These include:

- Quality of the project
- Cost
- Performance
- Human resources
- Operation automation
- Value for money
- Stakeholders
- Capability
- Customers

The following approach implicates the incorporation of ChatGPT into intangible benefit analysis.

The benefit dimensions include quality of project, cost, time, HR, performance, operation automation, capability, customer, value for money, and stakeholder. For each benefit dimension there are three key questions identified; ChatGPT answers are generated from the programmed system and stored systematically as a ChatGPT output. In the context of AI technologies, the emerging new domain is the method of ChatGPT. It is a systematic computer-based methodology that computes scenarios expressed by language into human-intelligible words and ideas. Typically, this mechanism is processing computer intelligent data into human intelligent expression. The output of ChatGPT is computing with words that can be user-friendly for business managers, employees, and customers.

## ChatGPT outputs and fuzzy logic calculations

**Table 1a:** Fuzzy Logic calculation in the light of ChatGPT

| Type of project benefit factor | Fuzzy logic | Fuzzy output |
|---|---|---|
| Cost & Performance | Cost & performance can be represented in 9 rules with a dualistic variable effect. | 5 variances of the rules for benefit realization. |

**Source:** Developed by Author

The tabulation explained that there are 9 fuzzy rules and 5 variances of output that can be ascertained in the benefit realization framework.

## ChatGPT and Benefit categorization

There is a wider application between the benefit categorization and the application of ChatGPT. The connection between project, program, and portfolio, along with the ChatGPT outcomes, is essential to understand in the industry. This is premised on the rationale that the outcomes of ChatGPT are based on the time of project tier that provides the root for such ChatGPT benefit outcomes. The project is a significant asset of the company that is aligned directly with the dominant objective. The program is a related project, whilst the portfolio is a non-related project with diverse benefits for the organization and stakeholder. In this light the nine benefits can be associated with the benefit outcome and the benefit categorization of P3M (Project, Program, and Portfolio). In salient situations it can be observable that the ChatGPT output is related to enterprise or mixed portfolio levels. This is an extended application of the concept.

**Table 2:** Mapping of benefit and ChatGPT

| Benefit of interest | ChatGPT output | Benefit categorization |
|---|---|---|
| Quality of the project | Measuring quality | Project-level |
| Cost | Cost investment | Program-level |
| Performance | Focus on improving the outcome | Project |
| Human resources | Capitalizing on HR optimally | Program |
| Operation automation | Benefits of Operation automation | Portfolio |
| Value for money | Indicators of value for money | Enterprise |
| Stakeholders | Interest groups of a project | Mixed portfolio |
| Capability | The project's focus on capability | Project |
| Customers | Customer orientation of the project | Portfolio level |

**Source:** Developed by Author

## RESULTS AND DISCUSSION

In the context of project benefit management, COBIT is an essential framework. It assists enterprises to create meaningful business value from IT by striking a trade-off between benefit realizations and optimizing risk level and resource usage. The generic principles and enablers of COBIT are advantageous for enterprises of different sizes with extents of IT usage and purposes of incorporation—commercial, non-profit, or in the public sector—management, and a relationship between portfolio components and COBIT principles, which need to be logically mapped in the backdrop of challenges in benefit management as described in Table 3

**Table 3:** Challenges in benefit management in light of ChatGPT with the COBIT framework

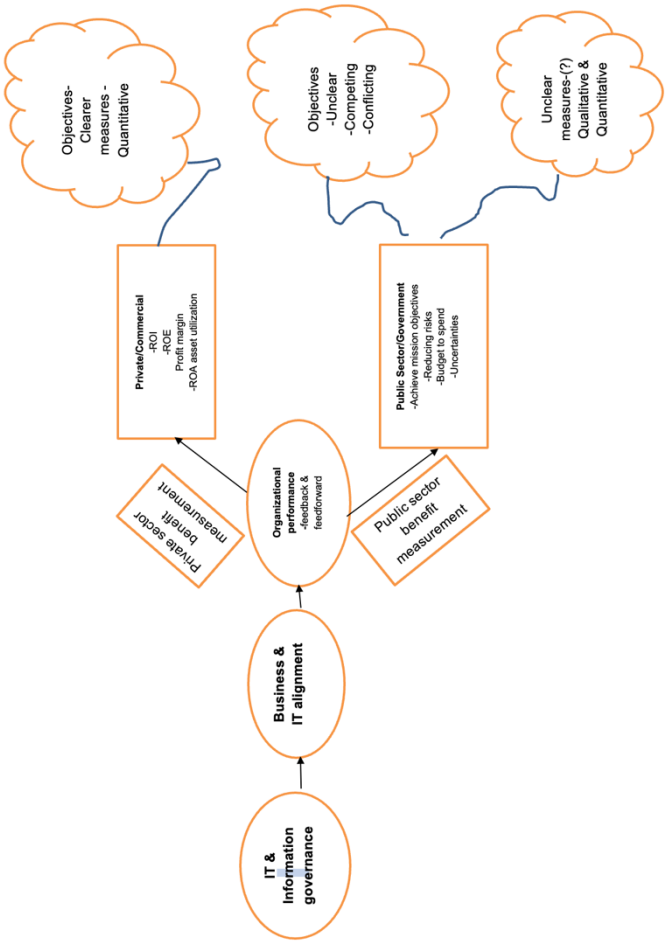
| Challenges in Benefit management | COBIT principles | Benefit management area = COBIT enablers |
|---|---|---|
| **Fundamental error in identifying intangible benefits** | Strategy, performance | B6=human resource cost<br>B4=performance<br>B7=capability |
| **Lack of identifying intermediate benefits** | Conformance, performance | B10 = return on investment<br>B11 = value for money<br>B3=profit/loss |
| **Lack of benefit reporting on SMART objectives** | Human Behaviour, performance, conformance, strategy | B5=Time<br>B6=human resource cost<br>B8=operation automation |
| **Minimum post-project governance controls** | Responsibility, human behavior, conformance, acquisition | B2=Cost saving<br>B8=operation automation |
| **Inclusive management of change** | Human Behaviour, performance | B6=human resource cost<br>B9 = customer engagement<br>B12=Stakeholders |

**Source:** Developed by Author

While a new paradigm of IT project benefit governance is emerging, it can be enabled through the application of principles of ISO 38500 using the COBIT framework. We address challenges in benefit management, displaying how ISO principles can be used. Subsequently, we combine COBIT to show how strategic IT benefit governance can be formulated. This serves as a step towards the use of extant frameworks for the purpose of IT project governance in the context of benefit management.

Project managers can gain wisdom regarding benefit implementation challenges, standardized processes, and IT benefit governance. Starting at the portfolio-level (or any other solicited level) of benefits, a clear strategic governance mechanism can be established. Scholars can view this governance approach from the perspective of creating dynamic project governance capabilities (Pavlou & El Sawy, 2010) or organizational learning ladders (Cibborra & Andreu, 2010), which today is a practical reality in holistic benefit management (Aubry et al., 2017). The principles of ISO 38500 form capabilities, and the COBIT components provide the routines and work practices for project-based companies. It sustains the overall core capability of the organization in terms of IT project benefit governance.

**Figure 1:** Benefit measures in public and private sectors




**Source:** Developed by Author

While fuzzy logic explains the mechanism to facilitate the qualitative, non-measurable benefits into quantified terms, this logic is a sound approach to impute computer-driven language to the ChatGPT method. The crisp value that is fuzzified in the model of fuzzy inference is intelligent to be expressed in quantified numeric as discussed in the computing with numbers approach.

Natural language generation is a multimodal approach that would use AI to convert data to readable content. The language generation will enable the transfer of CWN, which is machine-readable data, into CWW, which is human-intelligible information (Lad et al. 2008). This is a benefit computational approach that requires AI intervention because it helps to resolve benefit issues of intangible measurability, accountability, performance, and investment in organizational change (Aubry et al. 2014; Ward et al. 1996).

Initiatives for addressing challenges associated with benefit identification in the defense innovation project are:

- Establish the realistic nature of the benefit, including what is a benefit and the form it takes.
- The computational approach of using AI to generate meaningful benefits aligned with the total benefit realization.

In natural language generation there is a conversion of Computing with Numbers into Computing with Words (Zadeh, 2016). Therefore, the systematic approach will generate fuzzy benefit descriptions rather than crisp evaluative project benefit measures. However, AI is a generative application that can diagnose the benefit and classify and identify in order to achieve benefit realization. There is a notion that intangible benefits are more fuzzy than crisp in nature (Young et al. 2017; Kock et al. 2013). The following diagram represents the tabulation of computational benefits for the AI application engine in Fuzzy Inference System.

**Table 4:** Benefit computation for AI engine

| Component variable | Fuzzy | Crisp | Computation AI value |
|---|---|---|---|
| **Financial goals** | | X | Binary, 1 or 0 |
| **Cost saving** | | X | Binary, 1 or 0 |
| **Profit/loss** | | X | Binary, 1 or 0 |
| **Time** | | X | Binary, 1 or 0 |
| **HR cost** | X | | Qualitative data |
| **Performance** | X | | Qualitative data |
| **Capability** | X | | Qualitative data |
| **Operation automation** | X | | Qualitative data |
| **Customer** | X | | Qualitative data |
| **RoI** | X | | Qualitative data |
| **Value for money** | X | | Qualitative data |
| **Stakeholder** | X | | Qualitative data |

**Source:** Developed by Author

### The Application of Concept of Stratification to the ChatGPT approach

The concept of stratification (CoS) absorbs the target into a system and connects it to a transitionary process. The target is categorized into target benefit, target incrementalism, and target reachability. In ChatGPT the transition of input into an output process involves the transitionary approach of converting a fuzzy benefit into a meaningful output. Let us assume the benefit is a realistic long-term profit, the Chat GPT input is regarded as the target that is subject to incremental enlargement. The process of incremental enlargement develops into several stages and is finally executed as an end benefit that gives responses to how long-term profit is achieved in the enterprise.

The following Table 5 mapped the target stratification and the process of ChatGPT as follows:

**Table 5:** Stratification and ChatGPT Intertwined

| Target process | ChatGPT |
|---|---|
| Target | ChatGPT input |
| Incremental enlargement | Process |
| Target realization | ChatGPT Output |

**Source:** Developed by Author

### Interplay between ChatGPT & COBIT Approach

The output of ChatGPT can be reframed into the COBIT aspect in order to ascertain the behaviors of the benefits in real-time environments. As the benefits are oriented towards technology and related aspects, we can recognize a clear association between the output of ChatGPT and the COBIT framework. In a dynamic changing environment The responsibility principle involves employees knowing their obligations regarding IT demand and supply. Strategy is the business game plan aligned with IT possibilities. While IT investment should be beneficial, it should be executed on a business case with regular monitoring. Performance is achieved when the IT system yields benefits and supports the business. It is mandatory that the IT systems comply with regulations in a timely manner, known as conformance. IT governance is an organizational process that recognizes the intervention of people, denoted by the principle of human behavior.

The tabulation explains the correlation between fuzzy benefits and the ChatGPT perspective to the COBIT framework.

**Table 6:** Fuzzy COBIT rationale

| Fuzzy benefit | COBIT element | Justification |
|---|---|---|
| Quality of the project | Strategy | quality goal is aligned with the project's objectives |
| Cost | Conformance | The project goals must be aligned to achieve the cost objectives |
| Performance | Performance | The project yields IT benefits |
| Human resources | Human behaviour | Governing the IT project requires the intervention of people resources |
| Operation automation | Acquisition | The benefits of IT must be monitored regularly |
| Value for money | Strategy | The outcomes must be financially valued |
| Stakeholders | Human behaviour | The central focus of the project is to sustain the needs of interest groups |
| Capability | Responsibility | The employees of the project know their responsibility towards the project goals |
| Customers | Strategy | The plans are aligned with the IT possibilities. |

**Source:** Developed by Author

The following tabulation Table 7 represents the adoption of ChatGPT in mega-project benefit realization. It is a depiction of benefits, ChatGPT input, and output. In the mega projects and benefit evaluation, the ChatGPT outputs are vital in order to ascertain the extent to which the benefits are realized.

**Table 7:** Adopting Chatgpt in Mega Project Benefit Evaluation

| Benefit srl. No. | Intangible benefit dimension | As input to ChatGPT | ChatGPT output |
|---|---|---|---|
| 1. | Project Quality Goals | Are there any measuring techniques of project quality that you are aware of? | Iron triangle approach: the methodology of interconnecting cost, time, scope to measure the project quality.<br>Agile project management approach: a combination of intrinsic quality, extrinsic quality, and the project iron triangle to measure the project quality.<br>360-degree approach: a holistic approach of combining people, systems, technology, and processes to measure the project quality. |
| 2. | Cost | In your opinion, what areas of the project should the cost investment focus on? | Ordering of the infrastructure for the project to be initiated: Pre-project stage with benefit identification and planning<br>Training and user-friendliness of the project software applications for employees and customers: benefit monitoring and realization<br>Post-monitoring of the project and its deliverables: post-project benefit governance |
| 3 | Performance | In your opinion, on what areas should the project focus in order to improve its performance? | Tangible deliverables including monetary budget investment, strategic financial goals<br>Intangible deliverables including futuristic value, future sustainability and post-project goals<br>Quasi-tangible deliverables include the best interests of stakeholders, employees, sponsors, future investors, and project clients. |

**Source:** Developed by Author

In this phenomenal context, the ChatGPT method for the fuzzy benefit approach in mega projects is ascertained in the following scientific approach as tabulated in Table 8.

**Table 8:** ChatGPT approach in the context of benefit realization.

| ChatGPT coding | FUZZY IMPLICATION FIS Rules | Benefit modeling realization |
|---|---|---|
| Computing with words In your opinion is there enhanced operational automation as expected by stakeholders? As given by ChatGPT | Rule 1: If stakeholder expectation is 'low' & Operation automation is 'high,' then we can linguistically express the level of total benefit realization of 'sometimes.' | The degree of benefit realization is "sometimes" and quantified as = 3 on the continuum of benefit realization from 1 to 5. |
| | Rule 2: stakeholder expectation is 'low' & Operation automation is 'medium,' then we can linguistically express the level of total benefit realization of 'seldom.' | The degree of benefit realization is "seldom" and quantified as = 2 on the continuum of benefit realization from 1 to 5. |
| | Rule 3: stakeholder expectation is 'low' & Operation automation is 'low,' then we can linguistically express the level of total benefit realization of 'never.' | The degree of benefit realization is "never" and quantified as = 1 on the continuum of benefit realization from 1 to 5. |
| | Rule 4: stakeholder expectation is 'medium' & Operation automation is 'high,' then we can linguistically express the level of total benefit realization of 'on most occasions.' | The degree of benefit realization is "on most occasions" and quantified as = 4 on the continuum of benefit realization from 1 to 5. |
| | Rule 5: stakeholder expectation is 'medium' & Operation automation is 'medium,' then we can linguistically express the level of total benefit realization of 'sometimes.' | The degree of benefit realization is "sometimes" and quantified as = 3 on the continuum of benefit realization from 1 to 5. |
| | Rule 6: stakeholder expectation is 'medium' & Operation automation is 'low,' then we can linguistically express the level of total benefit realization of 'seldom.' | The degree of benefit realization is "seldom" and quantified as = 2 on the continuum of benefit realization from 1 to 5. |
| | Rule 7: stakeholder expectation is 'high' & Operation automation is 'high,' then we can linguistically express the level of total benefit realization of 'always.' Rule 8: stakeholder expectation is 'high' & Operation automation is 'medium,' then we can linguistically express the level of total benefit realization of 'on most occasions.' | The degree of benefit realization is "always" and quantified as = 5 on the continuum of benefit realization from 1 to 5. The degree of benefit realization is "on most occasions" and quantified as = 4 on the continuum of benefit realization from 1 to 5. |
| | Rule 9: stakeholder expectation is 'high' & Operation automation is 'low,' then we can linguistically express the level of total benefit realization of 'sometimes.' | The degree of benefit realization is "sometimes" and quantified as = 3 on the continuum of benefit realization from 1 to 5. |

**Source:** Developed by Author

In the paradigm of fuzzy logic there are fuzzy linguistic identifications in five (5) variances where the benefits are realized. These are always, on most occasions, sometimes, seldom, and never. There are further many aspects of the intangibility of benefits that can be measured in the scope of the five variances of fuzzy benefit evaluation. Further, there are nine fuzzy rules that can be developed in the context of fuzzy inference logic modelling. The combined and coupled effect for the twinned benefits in the fuzzy model is depicted in Table 9.

**Table 9:** Fuzzy Reasoning for Stakeholder Value & Operation Automation in Order to Impute for ChatGPT

| **Project types** | **Project 1 (Project relating to overall organizational objectives)** | **Operational Aspect** |
|---|---|---|
| **Basic** | Fuzzification | T8 (Stakeholder value) & t4 (operation automation) by IT expert opinions |
| | Inference Rules | There are nine (09) rules. Computing with words gives a qualitative combined aggregate effect. Computing with numbers deterministically gives interpretative meaning to realized words |
| | Output | Temporarily processed information as to how a project element is performing in terms of benefit realization. |
| **Mixed/hybrid** | Addictive aggregation | Project 1 produces 5 possible degrees of benefit realization. Project 2 produces 5 possible degrees of benefit realization |
| | Aggregated Output | Benefit realization is perceived from an enterprise benefit point of view of the project. Ex: e-governance of a military authority |
| | De-fuzzification | Computing with Numbers (CWN) is translated to Computing with Words (CWW) |
| | Final output | The benefit is denoted by a qualitative notification corresponding to a coded quantified value. Transforming fuzzy output to crisp values |

**Source:** Developed by Author

**Table 10:** Artificial intelligence-oriented benefit approach for ChatGPT modeling

| Method of AI | Illustration | Application to benefit realization | Benefit example |
|---|---|---|---|
| **Learning** | Oriented | Oriented | The benefit of crisp nature and benefit of fuzzy nature like profit and stakeholders respectively, how it impacts benefit realization. |
| **Reasoning** | The logical process of drawing inferences most appropriate to the situation. | The computer system will generate reasons, either deductive or inductive, in order to justify the benefit realization using both mathematics and logic. In deductive reasoning, the truth of the premises guarantees the truth of the conclusion. In inductive reasoning, the truth of the premise lends support to the conclusion without giving absolute assurance. | The IT manager reasons that “the benefit-PC3 profit can be realized at the project level or portfolio level. It is not observed in the project; therefore, it is realizable at the portfolio level.”<br><br>“Previous project loss was caused by failure to quantify the benefit; therefore, this year’s project loss was also caused by failure to quantify the benefits.” |
| **Language** | A system of signs having meaning by convention. | Productive language can develop and sustain a variety of sentences. Large systems like ChatGPT can respond fluently in human language to questions and statements. | If operation automation is high & profit is high, what is the level of benefit realization? |

**Source:** Developed by Author

However, from a practical point of view, defense is perplexed on how to implement the AI methods along the five imperatives. The primary barrier is the fact that most benefits are difficult to quantify, and therefore the AI techniques and methods would be beneficial to better realize the stated benefits.

## RESEARCH FINDINGS

The COBIT framework has a significant effect on understanding the behavior of the fuzzy benefits that emerge from the ChatGPT model. The benefit realization infers a predecessor method of benefit categorization. The categorization of the target stated benefit into project, program, portfolio, and hybrid approach aids the effective classification of project benefits in light of COBIT. The concept of stratification ascertained that the target, incremental enlargement of benefit, and its target achievement are accustomed to the project ChatGPT approach of input, process, and output, respectively.

The ChatGPT-integrated fuzzy benefit reasoning system combines fuzzy logic in project benefit with modern technologies to accurately ascertain the benefit realization. In measuring the project, the system incorporates features such as natural language, fuzzy reasoning, and neural networks, among others. The performance of the ChatGPT-based benefit reasoning system is evaluated on the fuzzy logic benefit model and compared against the global ranking benchmarks of IT projects of PMI by the IT project managers of the public and private sectors. The results demonstrate that ChatGPT-based based fuzzy benefit reasoning accurately identifies and comprehensively realizes the intangible benefits in the mega-project benefit approach.

The light of ChatGPT invoked few benefit categorization and management-related issues. In the fuzzy, uncertain business environment, the project may incur expenses intangibly. They were fundamental errors in identifying intangible benefits, lack of potential to identify the intermediate benefits, and lethargy towards inclusive benefit management of benefit identification, planning, monitoring, and realization. The IT manager faced constraints when executing project benefit reporting to stakeholders.

Limitations include the reliance on the public sector, non-profit-oriented benefits, and their realization. Moreover, the incomplete and desperate nature of the fuzzy reasoning techniques may hinder the effective benefit realization in light of the inherent difficulty to quantify the benefits and the need to explore the impact of socio-fuzzy consensus on the ChatGPT fuzzy benefit system. The existing system has its limitations in scholarly domains, such as limited utilization among the academic communities, as wider application is evidenced in practitioner communities. The proposed ChatGPT system aims to address these limitations by combining fuzzy logic with novel AI technologies. AI, despite its novelty and industrial applicability, is imbued with few ethical aspects, which need attention and caution when benefit measurement is evaluated. Accordingly, the human cost factors, legal effects, and health effects of using AI need to be contractually underpinned through guarantee clauses in project contracts. This will minimize the impact and legal effect of breach of contractual terms and liabilities. For example, does the project see long-term futuristic value and benefits if the human resources and intellectual labor are being exploited or replaced?

Implication of the findings and practical applications express that IT project benefit managers in state and private, including public-private contractual projects (PPPs), can adopt the modular-based approach to ascertain long-term, fuzzy, intangible, auxiliary, and futuristic benefits that are indirectly measurable and calculable. Practical utility value is observable in the infrastructure projects, private-defense projects, real-time development projects, and service utility projects that require

benefit evaluation to justify the project investment to its stakeholders beyond the traditional financial benefits like monetary returns (ROI) or equity returns, including financial goals. Today project benefit managers and project IT experts' belief is plausible that financial benefits are rarely relevant in evaluating the measure of project benefit realization. Policy makers can gauge whether the project should focus on the financials or not, and if they decide to analyze the intangibles, then they determine the benefits and realization through the lenses of non-financials. From post-project governance perspectives, the benefit realization and evaluation of fuzzy target benefits can be identified and analyzed, thus benefiting managerial decision-making. The approach developed in the paper has a future orientation, future value, and futuristic purpose with benefit preparedness.

## CONCLUSION AND FUTURE DIRECTIONS

In the context of novel AI techniques, it is essential to infer the target benefit stratification, benefit categorization, and COBIT, which are vital components that go to the root of the IT project. It aligned the benefit with the organization's dominant objectives. AI helped to perceive the different fuzzy benefits in a systematic way underpinned by CWW and CWN. ChatGPT is an underpinning arrangement where the mega project benefits approach is sustained as the fuzzy logic benefit realization is actualized with apt pertinent chatbots of technological background. Today AI has impacted IT managerial decisions across enterprises, and stakeholders are accounting for the benefit-risk through supportive technological arrays like language, machine learning, and perceptional views. However, the challenge continues to indulge as to whether novel technologies like AI and its counterpart can effectively measure benefit realization while the fact remains that the majority of socially oriented nonprofit benefits are rarely measurable and difficult to quantify.

The future directions include implementing ChatGPT on big data networks using fuzzy benefit reasoning and incorporating socio-fuzzy consensus approaches to benefit realization in light of AI technologies and in light of AI to enable the use of natural language-based algorithms in effectively measuring intangible benefits. The benefit realization from the intangible benefit perspective is a future researchable area not only for the project manager but also for the other stakeholders who are rather potential users of IT projects. The project, program, and portfolio have fallen short of the value of ChatGPT and its inherent features that could be explorable in the future in light of the fact that the benefits of quality goals, cost, time, and risk are rarely measurable and are emerging benefits that must be realized. The contribution of the study to the research in the field is seen in the form of a novel combined methodology of fuzzy logic and the ChatGPT approach to benefit measurement.

**ACKNOWLEDGMENT**

The study pledges its thanks to the Department of Defense of the Government of Australia and the Ministry of Defence of the Government of Sri Lanka. Also the aerospace corporate sector of Sri Lanka and foreign corporations in the industry.

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