Comparative Analysis of Evaluation of Business Process Management Regarding Digital Transformation Using the COCOSO Method

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Abstract: Nowadays, business process management (BPM) contributes to the success of companies by ensuring that their processes are both effective and efficient. A comprehensive description of a business process can serve as a foundation for designing IT systems, ensuring data quality, establishing performance metrics, and implementing processes using Business Process Management Systems (BPMS), among other applications. Currently, many Iranian companies are also interested in evaluating their Business Process Management (BPM) practices. In recent decades, significant advancements in the digital realm have become increasingly vital for companies, making it essential to utilize these developments effectively to impact business processes. Consequently, the current research has ranked BPM measurement methods within the context of digital transformation, employing the COCOSO hierarchical analysis technique in Semnan Industrial Town. In this context, BPM measurement methods and measurement criteria with the digital transformation approach and data quality, are derived from a review of the research literature. Subsequently, an appropriate BPM evaluation method is identified using a multi-criteria decision-making approach. The results of this ranking indicate that BPM measurement models grounded in comprehensive quality management are the most appropriate. Additionally, a sensitivity analysis has been conducted to validate these findings.

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Keywords: BPM, Multi-criteria Decision Models, COCOSO Technique, Digital Transformation

1. Introduction

The rapid growth of technology, the diverse range of products in a competitive environment, and the significant changes in management theories—coupled with the limitations of natural resources and challenges in utilizing human resources—have compelled managers of both public and private organizations, regardless of size or sector, to seek effective solutions. To address these challenges and ensure their survival, they must adapt to these changes and developments while laying the groundwork for the advancement of their operations. Therefore, in this situation, appropriate tools are being developed to measure the performance of business process management using qualified data. Business Process Management (BPM) is notable for several reasons. Firstly, it encompasses a variety of distinct perspectives. Business managers are attracted to BPM because of its demonstrated capacity to enhance organizational performance, ensure regulatory compliance, and improve service quality. Industrial engineers see BPM as an opportunity to apply established manufacturing optimization techniques within service-oriented organizations. Information Technology (IT) specialists value Business Process Management (BPM) for offering a common language that facilitates engagement with business stakeholders. Additionally, business process automation technology that utilizes qualified data empowers IT specialists to implement and manage IT systems in a way that aligns with the organization's vision as perceived by business stakeholders. In essence, Business Process Management (BPM) is a multidisciplinary field that unites various communities (Dumas et al., 2018).

Business Process Management (BPM) involves the art and science of managing how work is executed within an organization to ensure consistent outcomes and capitalize on improvement opportunities. In this context, "improvement" can have different meanings depending on the organization's goals. Common objectives include cost reduction, faster execution times, and fewer errors. Improvement efforts can be one-time initiatives or ongoing processes. Crucially, BPM focuses not on enhancing individual tasks but on managing entire chains of events, activities, and decisions that collectively add value to the organization and its customers. These sequences are known as processes. So, these processes can be measured to evaluate data quality and business process management. This paper aims to analyze and rank different tools for measuring the evaluation methods of BPM.

2. Research Background: Business Process Management (BPM)

2-1. Business Process Management (BPM)

Business Process Management (BPM) is both an art and a science that involves managing how work is conducted within an organization to ensure consistent results and capitalize on improvement opportunities. The term “improvement” can have different meanings depending on the goals of the organization. Common improvement objectives include reducing costs, shortening execution times, and lowering error rates. While some improvement efforts may be one-time initiatives, others may be ongoing. Crucially, BPM is not just about enhancing individual tasks but overseeing entire sequences of events, activities, and decisions that collectively add value to the organization and its customers. These sequences are known as processes (Dumas et al., 2018). Business Process Management (BPM) is a management discipline that encompasses a suite of technologies designed to facilitate process-oriented management. It is an enterprise engineering paradigm that involves the design, implementation, control, and enhancement of business processes to improve an organization’s overall performance. Over the past decade, BPM has proven to be an effective method for imparting maturity and agility to organizations that adopt it. Business Process Management (BPM) involves the science and practice of overseeing how work is performed to ensure consistent outcomes and leverage improvement opportunities (Dumas et al., 2018; van der Aalst, 2013). It aims for efficient and effective execution, continuous management of business processes, and the enhancement of an organization’s BPM capabilities (Harmon, 2018; Rosemann and vom Brocke, 2015a, b). Processes which involve human and technological collaboration are sets of activities that co-create value (Dumas et al., 2018). Typically categorized into core, support, and management areas, processes can also be classified based on repetitiveness, knowledge intensity, interdependence, and variability (vom Brocke et al., 2016; Zelt et al., 2018b). Effective BPM implementation requires capabilities in several core areas: Strategic Alignment, Governance, Methods, IT, People, and Culture (Rosemann and vom Brocke, 2015c). Method- and IT-related capabilities are often organized according to the BPM lifecycle phases: process design, implementation, execution, monitoring, and improvement.

2-2. Business Process Management methods

In the realm of BPM, considerable attention has been given to the development of methods, tools, and process modeling methodologies. This section provides a thorough overview of the rules and guidelines that govern the various stages of BPM, which often constitute the most concrete knowledge assets within the field. BPM methods can be categorized into three distinct levels. The first level comprises process-specific techniques that offer guidance on modeling, analyzing, animating, simulating, improving, or automating processes. The second level encompasses methods that address the entire business process lifecycle, although they may emphasize different phases of the lifecycle to varying extents. Notable examples of this category are Six Sigma and Lean Management. The third and most comprehensive level involves methods aimed at facilitating the enterprise-wide implementation of BPM as a core corporate capability.

The current state of BPM indicates that while the knowledge base for the first category of methods is well-developed, the second category is widely applied, albeit often with some gaps. In contrast, the third category of methodologies is still in the early stages of development. It is essential to acknowledge that Business Process Management (BPM) initiatives take place in various contexts, and a one-size-fits-all approach is unlikely to be effective. The comprehensive nature of this section highlights the considerable activity and interest in BPM methodologies, as well as the continuous need to refine and integrate them (Conger, 2015). In this paper, various methods for evaluating Business Process Management have been reviewed, and the results are presented in Figure 1.

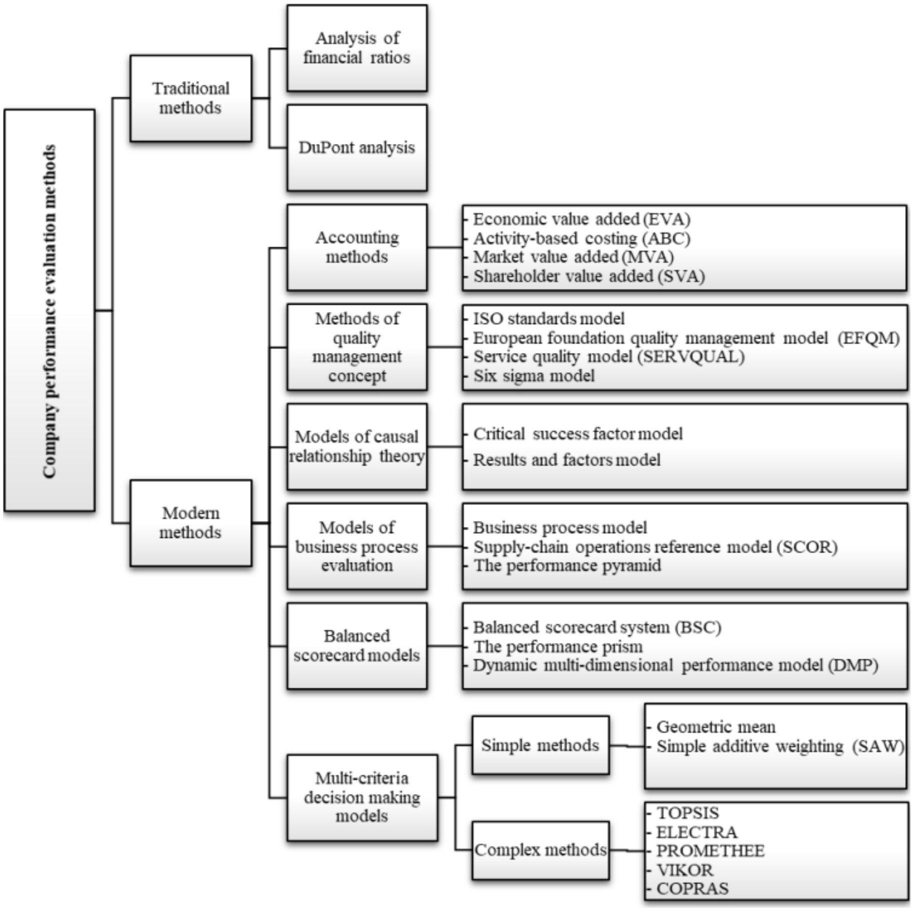

Figure 1. Classification scheme for performance evaluation methods (*Source:* Made by the authors based on Tangen, 2004, Kučinskienė et al., 2015, Bhasin, 2017, Chouhan, 2017)

3. Literature Review

Changes in the economy have led to traditional BPM being applicable to only approximately 30% of processes within organizations operating in the knowledge economy (KE) (Ukelson, 2010).

The remaining 70% of processes cannot be reduced to a mere routine repetition of predefined standard procedures (vom Brocke et al., 2016). However, there is currently no widely accepted theoretical framework that recognizes the majority of organizational processes in the knowledge economy (KE) as falling outside the scope of traditional business process management (Klun and Trkman, 2018; Zelt et al., 2018). In response to business demands, numerous concepts—particularly practical methodologies and software tools—have emerged over the past 15 years. These tools are designed to manage organizations whose operations, outcomes, and competitive positions depend more on flexibility and intensive knowledge utilization than on strictly adhering to predefined processes. These methodologies and tools have evolved in two primary ways: as extensions of earlier solutions derived from traditional BPM and as entirely new concepts based on the case-handling paradigm (van der Aalst et al., 2005). The article aims to explore this evolution and provide an overview of the current state of methodologies and software tools that have emerged as a result, while addressing two main research questions. Although companies can manage certain aspects of digitization and digitalization primarily through information systems, they must adopt holistic approaches to effectively navigate digital transformation.

Given the evolving nature and scope of digital transformation, which remains less understood in both research and practice (Bharadwaj, 2013; Drnevich & Croson, 2013). The following table presents the requirements for digital transformation in relation to BPM. As indicated in the literature review, there has been no research conducted on the ranking of BPM measurement methods. Furthermore, this article attempts to utilize an updated method, such as COCOSO, for ranking purposes.

Table 1. Requirements for Digital Transformation

Requirement	Description	Source
Digital Strategy	To undertake digital transformation, companies must develop a digital strategy that defines goals and actions while also considering governance and compliance.	Kohli and Johnson (2011), Sebastian et al. (2017), Hansen and Sia (2015), Park and Mithas (2020). Zhang et al. (2023), Proksch et al. (2024), AlNuaimi et al. (2022)

Requirement	Description	Source
Agility	In a dynamic environment, companies depend on flexible, adaptable, and responsive organizational structures supported by effective management.	Svahn et al. (2017), European Commission (2017), McKinsey & Company (2019), Rosemann and Brocke (2015), Legner et al. (2017), Mithas et al. (2013), Hansen et al. (2011), Dremel et al., (2017), Kohli and Johnson (2011), Sebastian et al. (2017), Hansen and Sia (2015), Kurniawan et al. (2021), AlNuaimi et al. (2022)
Digital Expertise	As tasks grow more complex, companies need to develop new IT-related skills and encourage specialization.	McKinsey & Company (2019), Rosemann and Brocke (2015), Legner et al. (2017), Mithas et al. (2013), Hansen et al. (2011), Dremel et al., (2017), Kohli and Johnson (2011), Sebastian et al. (2017), Hansen and Sia (2015), Baiyere et al. (2020), Bresciani et al. (2021), Kraus et al (2022)
IT Innovation	Companies need to consistently align their business structures with new technologies to leverage standardization and automation benefits.	Legner et al. (2017), Mithas et al. (2013), Hansen et al. (2011), Dremel et al., (2017), Kohli and Johnson (2011), Sebastian et al. (2017), Hansen and Sia (2015), Looy (2021), Bresciani et al. (2021), Vaio et al (2021), Van(2021)
Collaboration	Companies need to prepare their organizational processes to effectively utilize technology for connecting and collaborating with both internal and external stakeholders.	Legner et al. (2017), Mithas et al. (2013), Hansen et al. (2011), Dremel et al., (2017), Kohli and Johnson (2011), Sebastian et al. (2017), Hansen and Sia (2015), Janiesch et al (202), Tan et al (2021), Holopainen et al (2024)
Openness	For transformation sustainability, companies depend on cultivating an open-minded culture that fosters creativity and encourages risk-taking.	Rosemann and Brocke (2015), Legner et al. (2017), Mithas et al. (2013), Hansen et al. (2011), Dremel et al., (2017), Kohli and Johnson (2011), Sebastian et al. (2017), Hansen and Sia (2015), Abdulkader et al (2021)

4. Research Methodology

In the present study, methods for measuring BPM which are considered from the review of the research literature are given in Figure 1. All these methods are considered as possible options. Then the criteria for choosing options should be defined. Considering that we live in an era where the issue of digital transformation is very important and many companies follow this approach, in this article we try to measure BPM based on this approach as well. These criteria have been obtained by reviewing the literature. Then, a questionnaire based on the standard of paired comparisons was designed and given to 30 industrial group managers. These managers were people who had at least 5 years of work experience and were working in a managerial position and were selected from among 420 factories located in Semnan Industrial Region who were willing to cooperate. In the calculations of this research, the COCOSO method presented by Yazdani et al. (2018) is used. This method is a method for calculations related to multi-criteria decision-making. Finally, sensitivity analysis is used to validate the method. The details of this method and its formulas are explained step by step in the next section. Based on this, the flowchart of the research is as follows.

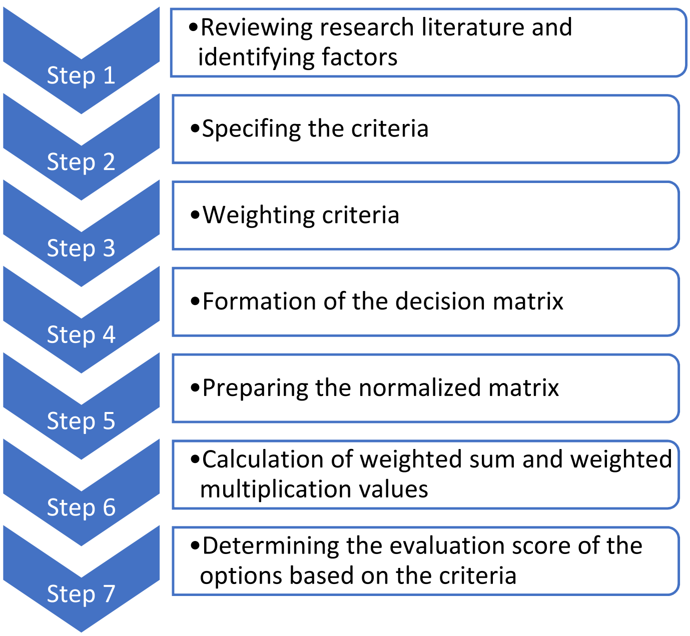

Figure 2. Research flowchart

5. Ranking of BPM measurement methods

5-1. Reviewing the research literature and identifying the options

As seen in Table 1, several articles in the field were reviewed and the result is that there are 7 categories of methods, which are as follows: Analysis of functional ratio, DuPont Analysis, Accounting Methods, Methods of quality management system concepts, Methods of causal relationship theory, Methods of business process evaluation, Balanced score card methods, and Multi-criteria decision-making methods.

5-2. Defining the criteria

At this stage, in order to be able to have a proper ranking in Business Process Management, we need to specify the appropriate criteria to evaluate them. Considering that the purpose of the article is to choose the right model according to the Digital Transformation approach, a literature review was conducted to determine what the basics of Digital Transformation include. As a result, the six factors mentioned in the following are the criteria for selection:

- ◇ Digital Strategy
- ◇ Agility
- ◇ Digital Expertise
- ◇ IT Innovation
- ◇ Collaboration
- ◇ Openness

5-3. Weighting the criteria

At this stage, using the opinions of experts, pairwise comparisons are made and weights are obtained based on the pairwise comparisons. Pairwise comparisons are in the form of the following table:

Table 2- Pairwise comparisons and obtained weight

	Digital Strategy	Agility	Digital Expertise	IT Innovation	Collaboration	Openness
Digital Strategy	1	1/4	1	1/2	1/3	¼
Agility	4	1	4	3	3	1
Digital Expertise	1	¼	1	1/2	1	1/3
IT Innovation	2	1/3	2	1	4	3
Collaboration	3	1/3	1	1/4	1	5
Openness	4	1	3	1/3	1/5	1
Weights	15	3.16	12	5.58	9.53	10.58
Normal weights	0.26857	0.0565	0.21486	0.09991	0.17063	0.1894

5-4. Formation of the decision matrix

At this stage, each factor is assigned a score based on established criteria, informed by expert opinions and ongoing meetings. The results of these grades are presented in the table below. It is evident that the scores listed in this table are derived from the average scores achieved for each criterion across all factors. The resulting matrix is called the decision matrix, and it serves as the primary tool for future calculations.

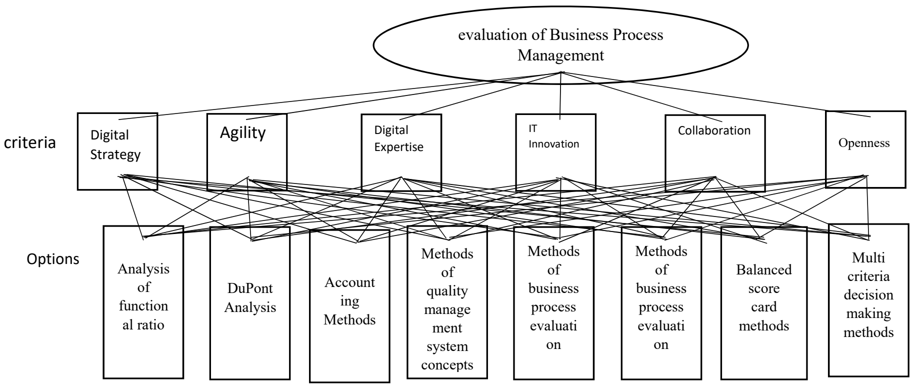

Figure 3. Research model

Based on the above figure, the decision matrix of the problem was prepared by collecting experts' opinions, the result of which is given in following table.

Table 4. The decision matrix of the problem

criteria and options	Digital Strategy	Agility	Digital Expertise	IT Innovation	Collaboration	Openness
Analysis of functional ratio	1	2	1	1	2	2
DuPont Analysis	1	2	1	1	2	2
Accounting Methods	2	3	2	2	2	1
Methods of quality management system concepts	6	4	5	7	8	7
Methods of causal relationship theory	4	5	4	4	7	7
Methods of business process evaluation	3	4	3	5	7	6
Balanced score card methods	5	5	2	6	7	8
Multi criteria decision making methods	4	3	2	3	5	4
Max	6	5	5	7	8	8
Min	1	2	1	1	2	1
Weights	0.26857	0.0565	0.21486	0.09991	0.17063	0.1894

5-5. Preparing the normalized matrix

In this step, the decision matrix must be normalized. This normalization is based on the relationships outlined below the decision matrix. The first relationship applies to positive criteria, while the second relationship pertains to negative criteria. In the following equations, max X_{ij} and min X_{ij} represent the maximum and minimum values of each criterion column, respectively. This normalization ensures that all values are scaled between 0 and 1. The calculations are based on the following formula:

Equation 1. calculations for the profit factor

$$r_{ij} = \frac{x_{ij} - \min\limits_i x_{ij}}{\max\limits_i x_{ij} - \min\limits_i x_{ij}};$$

Equation 1. calculations for the cost factor

$$r_{ij} = \frac{\max\limits_i x_{ij} - x_{ij}}{\max\limits_i x_{ij} - \min\limits_i x_{ij}},$$

Table 5. Normalized decision matrix

criteria and options	Digital Strategy	Agility	Digital Expertise	IT Innovation	Collaboration	Openness
Analysis of functional ratio	0.0000	0.0000	0.0000	0.0000	0.0000	0.1429
DuPont Analysis	0.0000	0.0000	0.0000	0.0000	0.0000	0.1429
Accounting Methods	0.2000	0.3333	0.2500	0.1667	0.0000	0.0000
Methods of quality management system concepts	1.0000	0.6667	1.0000	1.0000	1.0000	0.8571

criteria and options	Digital Strategy	Agility	Digital Expertise	IT Innovation	Collaboration	Openness
Methods of causal relationship theory	0.6000	1.0000	0.7500	0.5000	0.8333	0.8571
Methods of business process evaluation	0.4000	0.6667	0.5000	0.6667	0.8333	0.7143
Balanced score card methods	0.8000	1.0000	0.2500	0.8333	0.8333	1.0000
Multi criteria decision making methods	0.6000	0.3333	0.2500	0.3333	0.5000	0.4286

5-6. Calculating the weighted sum and weighted multiplication values

In this step, based on the following relationships, the weighted sum (S) and weighted multiplication (P) values for each option are calculated. In the two relationships below, W_j is the weight of the criteria that is entered as an input into the COCOSO method. This weight can be calculated directly from the point of view of the decision maker or by methods such as Shannon's entropy, AHP, BWM method, etc. The values of Si are actually obtained from the SAW method and the values of Pi from the Waspas method, which are as follows:

Equation 3
$$S_i = \sum_{j=1}^{n} (w_j r_{ij}), P_i = \sum_{j=1}^{n} (r_{ij})^{w_j}$$

Table 6. Values of weighted sum and weighted multiplication

criteria and options	Digital Strategy	Agility	Digital Expertise	IT Innovation	Collaboration	Openness
Analysis of functional ratio	0.0000	0.0000	0.0000	0.0000	0.0000	0.0271
DuPont Analysis	0.0000	0.0000	0.0000	0.0000	0.0000	0.0271
Accounting Methods	0.0537	0.0188	0.0537	0.0167	0.0000	0.0000
Methods of quality management system concepts	0.2686	0.0377	0.2149	0.0999	0.1706	0.1623
Methods of causal relationship theory	0.1611	0.0565	0.1611	0.0500	0.1422	0.1623
Methods of business process evaluation	0.1074	0.0377	0.1074	0.0666	0.1422	0.1353
Balanced score card methods	0.2149	0.0565	0.0537	0.0833	0.1422	0.1894
Multi criteria decision making methods	0.1611	0.0188	0.0537	0.0333	0.0853	0.0812

And the sequence and exponential weight calculations are in the form of the following table:

Table 7. Sequence calculations and exponential weight of the decision matrix

criteria and options	Digital Strategy	Agility	Digital Expertise	IT Innovation	Collaboration	Openness
Analysis of functional ratio	0.0000	0.0000	0.0000	0.0000	0.0000	0.6917
DuPont Analysis	0.0000	0.0000	0.0000	0.0000	0.0000	0.6917
Accounting Methods	0.6490	0.9398	0.7424	0.8361	0.0000	0.0000
Methods of quality management system concepts	1.0000	0.9774	1.0000	1.0000	1.0000	0.9712
Methods of causal relationship theory	0.8718	1.0000	0.9401	0.9331	0.9694	0.9712
Methods of business process evaluation	0.7819	0.9774	0.8616	0.9603	0.9694	0.9383
Balanced score card methods	0.9418	1.0000	0.7424	0.9819	0.9694	1.0000
Multi criteria decision making methods	0.8718	0.9398	0.7424	0.8960	0.8885	0.8517

5-7. The seventh step: Determining the evaluation score of options based on strategies

In this section, the points of options are obtained based on 3 strategies from the following 3 relationships. The first relation expresses the arithmetic mean of WSM and WPM scores, while the second relation expresses the relative scores of WSM and WPM compared to the best. The third relationship is a compromise between WSM and WPM models. In this relationship, λ is determined by the decision maker, but in the case of 0.5, it has a lot of flexibility.

Equation 4

$$K_{ia} = \frac{P_i + S_i}{\sum(P_i + S_i)}$$

$$K_{iB} = \frac{S_i}{\text{Min}S_i} + \frac{P_i}{\text{Min}P_i}$$

$$K_{ic} = \frac{\lambda(S_i) + (1-\lambda)(P_i)}{(\lambda \text{max}S_i + (1-\lambda) maxP_i)}$$

Based on the formulas above, relevant calculations were made and as a result, the factor of lack of management commitment was identified as the most important inhibiting factor in the implementation of comprehensive quality management. The details of the calculations are given in the table below.

Table 8. Final calculations and ranking

Final Ranking	K	Ranking	Kc	Ranking	Kb	Ranking	Ka	Alternatives
8	0.8611	8	0.1041	8	2.0000	8	0.0199	Analysis of functional ratio
7	0.8686	7	0.1041	7	2.0000	7	0.0199	DuPont Analysis
6	4.2338	6	0.4796	6	9.8608	6	0.0916	Accounting Methods
1	17.0468	1	1.0000	1	43.8575	1	0.1909	Methods of quality management system concepts
3	13.9425	2	0.9299	3	35.3203	2	0.1775	Methods of causal relationship theory
4	11.9897	4	0.8816	4	29.9848	4	0.1683	Methods of business process evaluation
2	13.9926	3	0.9236	2	35.4936	3	0.1763	Balanced score card methods
5	9.6041	5	0.8147	5	23.5242	5	0.1556	Multi criteria decision making methods

6. Discussion and conclusion

Considering the novelty of the COCOSO method and the need to verify the results, this section employs sensitivity analysis. The purpose of sensitivity analysis is to examine how variations in the data impact the model and its outcomes.

Undoubtedly, any alteration in the data of the decision matrix—specifically, a change in the scores of the options relative to the criteria—will lead to a shift in the results. Consequently, the examination of this matter will not yield a definitive outcome. Therefore, the change in weights can provide a comprehensive analysis of the method's sensitivity. To achieve this, Yazdani et al. (2018) generated 48 random data points based on five weights derived from the primary weights, as presented in Table 8. In this table, the randomness of certain weights has been altered in some instances, while others remain unchanged at their original values, ensuring that the total sum of the weights equals 1.

Table 9. Data table created for sensitivity analysis of the method

Randomly generated weights						
Test 1	0.1102	0.2854	0.1424	0.08	0.1256	0.2564
Test 2	0.1102	0.2854	0.1876	0.08	0.0804	0.2564
Test 3	0.1102	0.2134	0.2144	0.08	0.1256	0.2564
Test 4	0.1102	0.4194	0.0536	0.08	0.0804	0.2564
Test 5	0.1108	0.4194	0.1256	0.0794	0.0084	0.2564
Test 6	0.1012	0.2134	0.3316	0.089	0.0084	0.2564
Test 7	0.1019	0.4194	0.2144	0.0883	0.1256	0.0504
Test 8	0.1015	0.2854	0.3482	0.0889	0.1256	0.0504
Test 9	0.1055	0.2134	0.3482	0.0849	0.1256	0.1224
Test 10	0.1002	0.4194	0.1876	0.09	0.0804	0.1224
Test 11	0.1002	0.4194	0.3316	0.09	0.0084	0.0504
Test 12	0.1802	0.1292	0.1424	0.3002	0.1256	0.1224
Test 13	0.1802	0.1275	0.1256	0.3019	0.0084	0.2564
Test 14	0.1802	0.2888	0.0584	0.2966	0.1256	0.0504
Test 15	0.1802	0.2519	0.0536	0.2995	0.1644	0.0504
Test 16	0.1802	0.2154	0.0416	0.298	0.0084	0.2564

Randomly generated weights						
Test 17	0.1802	0.1799	0.0536	0.2995	0.1644	0.1224
Test 18	0.1802	0.3526	0.0536	0.2996	0.0804	0.0336
Test 19	0.2302	0.0454	0.0536	0.25	0.1644	0.2564
Test 20	0.2302	0.2854	0.0752	0.25	0.1256	0.0336
Test 21	0.2309	0.2854	0.0584	0.2493	0.1256	0.0504
Test 22	0.2309	0.2514	0.0536	0.2493	0.1644	0.0504
Test 23	0.2309	0.2134	0.1472	0.2493	0.1256	0.0336
Test 24	0.2302	0.0454	0.0536	0.25	0.1644	0.2564
Test 25	0.2302	0.2134	0.0584	0.25	0.1256	0.1224
Test 26	0.2462	0.1794	0.0519	0.1017	0.1644	0.2564
Test 27	0.2462	0.4194	0.1288	0.0916	0.0804	0.0336
Test 28	0.2462	0.2134	0.2899	0.1513	0.0656	0.0336
Test 29	0.2462	0.1294	0.1413	0.1011	0.1256	0.2564
Test 30	0.2462	0.2634	0.0559	0.1227	0.0554	0.2564
Test 31	0.2462	0.4194	0.0188	0.1008	0.1644	0.0504
Test 32	0.2462	0.1294	0.3456	0.1028	0.1256	0.0504
Test 33	0.2462	0.1294	0.1845	0.1031	0.0804	0.2564
Test 34	0.1466	0.2134	0.0196	0.1996	0.1644	0.2564
Test 35	0.1466	0.4194	0.0752	0.1996	0.1256	0.0336
Test 36	0.1466	0.4194	0.0584	0.1996	0.1256	0.0504
Test 37	0.1466	0.2134	0.0584	0.1996	0.1256	0.2564
Test 38	0.2054	0.2854	0.0584	0.0688	0.1256	0.2564
Test 39	0.2054	0.2854	0.0196	0.0688	0.1644	0.2564
Test 40	0.2054	0.2854	0.2812	0.0688	0.1256	0.0336
Test 41	0.2054	0.1294	0.2144	0.0688	0.1256	0.2564
Test 42	0.2054	0.1294	0.3316	0.0688	0.0084	0.2564
Test 43	0.2054	0.1294	0.3484	0.0688	0.1256	0.1224
Test 44	0.2054	0.4194	0.0196	0.0688	0.1644	0.1224
Test 45	0.1449	0.4194	0.0584	0.1293	0.1256	0.1224

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Randomly generated weights						
Test 46	0.1449	0.4194	0.0416	0.1293	0.0084	0.2564
Test 47	0.1449	0.4194	0.1472	0.1293	0.1256	0.0336
Test 48	0.1449	0.4194	0.2644	0.1293	0.0084	0.0336
weights	0.1449	0.2854	0.3482	0.0455	0.1256	0.0504

Based on each of the 48 cases, the calculated weight was placed in the model and the ranking of the factors was observed. The results of these tests are shown in Figure 3, and as can be seen, the model has shown good resistance to changes. For example, the 4 factors have maintained their ranks in 48 tests exactly without any changes, and most options have maintained their ranks despite the random changes in weights.

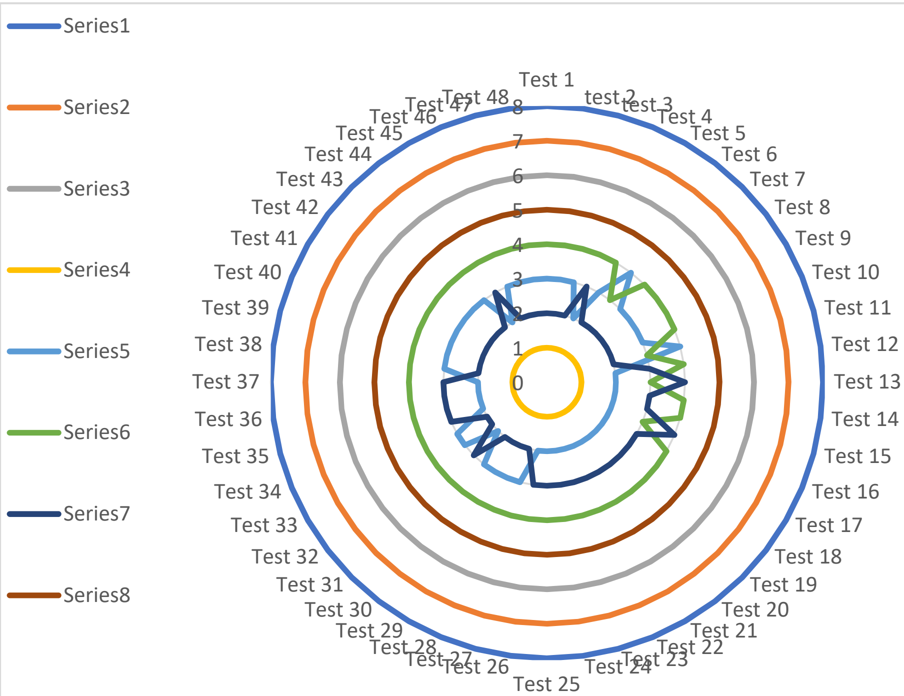

Figure 4. Sensitivity analysis of results

As seen in this research, an attempt was made to determine the appropriate method for evaluating BPM for companies. Considering that we live in an era where the issue of digital transformation is very important and many companies follow this approach, in this article we try to measure BPM based on this approach as well. Comprehensive quality management systems such as EFQM and INQA are the most suitable models, because these models are constantly updated and the important requirements of the day are updated in them.

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