

Selection of Information System Strategy Recommendations in Information Technology Company

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Abstract. This study aims to determine recommendations for information systems and information technology strategies and sort the information system's implementation based on company needs. The research data was obtained from the results of questionnaires, interviews, and official company documents. There are currently some problems in using information systems and information technology in the company, such as business activities that are not optimized with the information system, company information systems that do not provide optimal benefits, and the management of information systems and information technology sufficient. It is also challenging to implement this information system because it considers many factors such as company needs, development costs, and infrastructure capability. Based on these problems, Ward and Peppard's framework with the Analytic Network Process - Benefit Opportunities Cost Risk method is used to find recommendations for information systems and information technology strategies. This research shows that the company does not utilize information systems and information technology to support its business operations. This study recommends some information system and information technology strategies whose application sequences have been adjusted to company needs and conditions. The ANP-BOCR results show that the development of an official website, a management information system, and a project management information system dictates its implementation priority.

Keywords: Strategic Planning, Information Systems, ANP-BOCR, Ward and Peppard.

1. INTRODUCTION

This era is an era of global competition where competition between companies is getting heavier. This competition encourages companies to adapt by innovating the information systems (IS) and information technology (IT) to survive [1]. The current development of IS / IT has made companies prioritize IS / IT in

supporting their business activities [2] [3]. IS / IT is a priority because the implementation and benefits of IS / IT are considered the key to the company's business innovation's success in gaining a competitive advantage. The case study in this research is a company specializing in information technology. The company provides information system development services, enterprise resource planning (ERP), and integrating information

systems with information technology according to client needs. The company has served dozens of clients from government to private in the last six years.

Based on interviews with company deputy directors, there are some problems in using IS / IT that are not optimal or ineffective. These problems include some business activities that can be optimized using IS / IT, existing information systems but cannot be fully utilized, and ineffective IS / IT management. The maximally utilized IS / IT can affect company performance in increasing company profits [4] and playing a role in company business innovation [5]. Besides, IS / IT can also support the company in increasing its superiority compared to other companies [6]. Therefore, the non-optimal use of information systems/information technology and delays in optimizing business activities with information technology can hinder the company's future business development. On the other hand, the existing information system/information technology but its use is not maximized, indicating that the company has not carefully planned the use of the information technology. This inadequate planning makes the company lose because it invests in IS / IT, which is not used optimally in business operations. Examples of these problems include the absence of an information system to support managers or related departments in assessing employee performance, ineffective sales data management, and no information system for monitoring client product maintenance, the absence of IS to process data for criticism, suggestions, and complaints from clients related to company services and products, and the absence of SI for employee information.

Researches to determine the IS / IT strategic plan have been carried out in many individual industrial companies, organizations, and institutions with information systems or information technology requirements. These studies include IS / IT strategic planning in government institutions [7] [8], IS / IT strategy development in an educational institution [9], determination of IS / IT strategy recommendations for individual companies

[10][11], and IS / IT alignment with business strategies in pharmaceutical companies [12]. The sequence of implementing the information system recommendations in each of the previous studies was made only based on the information system recommendations in the McFarlan Strategic Grid portfolio, vision and mission, and the SWOT matrix. Researchers do not consider some main criteria in ordering such as system development costs, the impact of using the system for operations, infrastructure conditions, and some technical matters in companies' application of information systems. Gaol's research results suggest that the order of IS / IT recommendations can be different or uncertain due to the consideration of business needs and company resources' ability to implement IS [12]. Based on these conditions, ANP-BOCR is used to sequence the implementation of the information system recommendations.

This study uses the Ward and Peppard framework with the ANP-BOCR method to determine the IS / IT strategic plan recommendations that best suit the company's business needs. The analytical network process (ANP) method is used to find IS implementation sequence after the IS / IT strategic plan recommendation is determined. While the Benefit, Opportunity, Cost, and Risk (BOCR) method is a general aspect used as a guide in determining what criteria are needed in the ANP method in evaluating SI. This research's main contribution is to rank the SI strategy recommendations from the Ward and Peppard framework. The ranking uses one of the multicriteria decision making (MDCM) methods, namely ANP.

2. METHOD

This research consisted of two main stages: The Ward and Peppard framework stages and the ANP-BOCR method stages. The grooves of the Ward and Peppard framework using the ANP method are shown in **Figure 1**. The first stage consists of collecting data and information on the company's current condition.

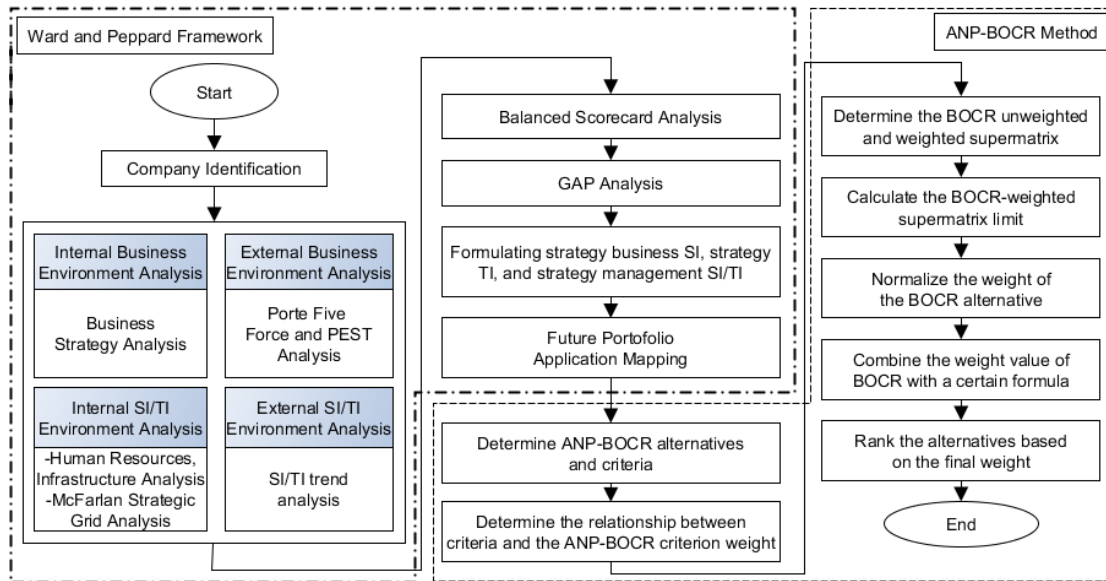


FIGURE 1. The research flow with the Peppard and Ward framework and ANP-BOCR.

Ward and Peppard stage: Data and information on the company's current condition are analyzed at the stage of understanding the company's current condition. This stage describes the company's business and non-business aspects from an internal and external perspective [13]. This stage is divided into four parts, namely analysis of the internal business environment, analysis of the business's external environment, analysis of the internal IS / IT environment, and analysis of the external environment of IS / IT. In the analysis of the external business environment, this process uses the Political, Economic, Social, and Technological (PEST) analysis and Porter's Five Force analysis [14][15]. In the analysis of the internal IS / IT environment, four aspects of company's internal IS / IT are analyzed from the human resource competencies of IS / IT, IS / IT infrastructure, IS / IT management policies, and the current company application portfolio. In the analysis of the external IS / IT environment, there are several trends in information system technology or services that have been applied to other companies to support their business. Case study company can implement these trends in the future. The analysis results of understanding the company's current condition are used as the basis for determining the company's potential business needs. Analysis of potential needs begins with looking for business objectives using the Balanced Scorecard (BSC) [16]. The BSC results are used for determining business requirements in the gap analysis. The next stage is to make recommendations for the IS business strategy, IT strategy, and IS / IT management strategy. This recommendation is determined by analysing the company's potential business needs from the previous stage. The information system business strategy (SI) recommendations are categorized into four McFarlan Strategic Grid quadrants in the fifth

stage. The four categories are Strategic, High Potential, Key Operational, and Support [17].

ANP-BOCR stage: ANP-BOCR consists of four processes, namely ANP based on Benefits (Subnetwork B), ANP based on Opportunities (Subnetwork O), ANP based on Risk (Subnetwork R), and ANP based on Cost (Subnetwork C) [18]. The ANP-BOCR method begins by determining the alternatives and criteria to be used. Then look for relationships that exist between elements and other elements. This element consists of criteria (cluster), sub-criteria (sub-cluster), and alternatives. Pairwise comparison results are used to find the cluster's weight, sub-cluster, and alternatives based on a particular element's perspective. In each of the BOCR subnets, all the cluster weights, sub-cluster, and seventh stage alternatives are combined to create an unweighted supermatrix [19]. The next stage is that the unweighted supermatrix is converted into a weighted supermatrix. The weighted supermatrix is calculated as its limit value. Calculation of the limit value aims to find the alternative weight value that is in the weighted supermatrix. Then the weight value of the supermatrix limit process is normalized. This normalization result shows the alternative rank of the BOCR subnet so that there are four different ranking results from the BOCR subnet process. The ANP-BOCR process ends by combining alternative weights from the BOCR subnet. This stage begins with assessing the weight of the BOCR utilizing ratings. B, O, C, and R weights are multiplied by the alternative rank weight value. The result of this process is the overall alternative weight of the BOCR subnet. The ranking of information system strategy recommendations for future portfolios is carried out using alternative weights where the most significant weight is the most suitable alternative (information system) to be implemented first.

3. RESULT AND DISCUSSION

Understanding the Current Condition of the Company: The first stage is the collection of data and information from company. Data and information were obtained through interviews, questionnaires, and analysis of official company documents. Interviews were conducted with company employees. The questionnaire was conducted through a google form, which some respondents from the company filled in. Interviewees and questionnaires consist of various positions in the company to obtain several perspectives on its current IS / IT condition.

In stage two, the first stage results are analyzed into four parts: analysis of the internal business environment, analysis of the business's external environment, analysis of the internal IS / IT environment, and analysis of the external environment of IS / IT. Table I shows the results

of the internal business environment analysis. This result is obtained from describing the company's strengths or weaknesses from aspects such as the vision, mission, objectives, and values used. Besides, aspects of products/services, business processes, human resources, and company organizational structure are also used to analyze the internal business environment.

Analysis of the external business environment is carried out by describing several external aspects that affect company. PEST and Porter Five Forces methods are used to look for strengths, weaknesses, and other things that affect the company from external company. The results of the external business analysis include government regulations related to the increase in the UMK Kediri every year, which affects the finances and prices of company products/services, company is in a geographical position that benefits the company when doing business, and SI company products have several advantages over cloud-based web development services.

Table I. Analysis of the internal business environment and internal IS / IT.

| No | Internal Business Environment Analysis Results |
|----|---|
| 1 | The company has a clear vision, mission, goals, corporate values. |
| 2 | Company management is carried out professionally with competent human resources. |
| 3 | This year (2020), the company changed its client service focus from the government to private. |
| 4 | One of the company's new targets is to dominate the IT consultant market in the Kediri district. |
| 5 | The company uses a promotional strategy through Instagram social media and its official website for a branding strategy. The branding strategy aims to change company's image from only providing IS / IT products based on client requests to producing IS / IT based on market needs. |
| 6 | Company Standard Operation Procedure (SOP) that is clear in providing services to clients. |
| No | IS / IT Internal Environment Analysis Results |
| 1 | There is no particular section/department that manages the company's IS / IT |
| 2 | Most company employees understand and can use some IS / IT to support the company's business. |
| 3 | The operations and production department manages the main business activities of the company. |
| 4 | The IS / IT infrastructure development is not based on its strategic plan because the company has not yet determined its strategic plan related to infrastructure. |
| 5 | Several company information system applications still rely on third parties. |

Table I displays the results of the IS / IT internal environment analysis. This analysis describes four aspects of information technology in the company, including human resource competence, information technology infrastructure, IT management policies in use, and its current information system portfolio. The descriptions of these four aspects are analyzed to look for weaknesses, strengths, or several other things related to IS / IT in the company. External IS / IT environmental analysis is carried out by observing specific information systems and information technologies used by some companies. The external IS / IT analysis results are security, ease of access, minimum duration and the possibility of downtime, and flexibility in physical server development are among the needs of companies engaged

in IT. Other analysis results are that the company can utilize some programming languages' advantages to make products according to client needs.

Results of the Future Needs Planning Stage : Planning for future needs begins by analyzing the results of the company's internal and external IS / IT business environment using the Balanced Scorecard (BSC) method. The BSC method results are used to determine the company's potential business needs with the gap analysis method. Potential business needs are the result of the future needs planning stage.

The BSC method analysis produces eight company business objectives as in table II. BSC results in table II show the dominant company's business objectives related to improving quality, effectiveness, and

operational efficiency by utilizing IS / IT (Points 5, 6, and 7). The impact of this increase is that the quality of company products and services increases following the analysis of business objectives in point 1 and point 2. On

the other hand, the improvement of IS / IT management results from a business objective analysis because company management lacks current information systems and information technology.

Table II. The results of the BSC analysis.

| No | Business Goal |
|----|--|
| 1 | Provide quality products. |
| 2 | Provide quality services. |
| 3 | Develop SOPs and management policies for the maintenance and use of IS / IT that will be implemented. |
| 4 | Develop an IT department or department. |
| 5 | Use IS / IT to improve the quality of company services and products. |
| 6 | Use several new information systems to support the activities of several parts of the company. |
| 7 | Replacing some applications from outside the company into applications developed according to company needs. |
| 8 | Optimize costs. |

The next process is a gap analysis based on the results of the BSC table II. Gap analysis consists of three aspects of potential business needs: information systems, information technology, and IS / IT management. Gap analysis of the information system aspect reveals that the company has fifteen potential business needs, as in table III. Potential business needs table III is dominated by information systems for data management, evaluation, and monitoring. Many of the company's operational activities are still carried out manually, such as the client information system maintenance services and sales data management activities. These two activities have not used information systems because the company considers that not much data has been processed, but the supervision is also low. Besides, with a significant increasing trend of

clients every year, the delay in using information systems is irrelevant to the potential future business needs.

In the results of a gap analysis in the IS / IT management aspect, the potential business need is to establish a particular IT department and create some standard operation procedure (SOP) based on the business objectives' analysis. The information technology aspect in the gap analysis shows the potential business needs to add several IT tools. The company's information technology tools have supported operational activities, but by implementing several information system recommendations and increasing future business activities, these IT tools are not sufficient. Therefore, the potential business need in the form of additional IT is highly recommended in supporting the implementation of all information system strategy recommendations.

Table III. Gap analysis results on the aspects of information systems.

| No | Potential Business Needs |
|----|---|
| 1 | An information system that makes it easy for company to respond quickly to client complaints/questions. |
| 2 | Information system to manage company inventory/warehouse data. |
| 3 | Information system to manage company project. |
| 4 | Information system to manage and display staffing information. |
| 5 | Information systems to manage and optimize company finances. |
| 6 | Information systems to manage sales and marketing data for company products/services. |
| 7 | Information system for employee performance appraisal. |
| 8 | Information system to manage and supervise client product maintenance. |
| 9 | Information system to manage purchasing data. |
| 10 | Information system to manage the costs incurred by employees on business trips. |
| 11 | A system that makes it easier for company to manage employee salaries. |
| 12 | Information system to manage contract employee data. |
| 13 | Information system to ease administrative activities. |
| 14 | Information system to manage and display apprentice information. |
| 15 | Information system for managing and displaying business meeting schedules and results. |

Result of IS / IT Strategy Formulation: The IS / IT strategy formulation consists of determining recommendations for information systems, information technology, and IS / IT management. The formulation is

carried out by determining the company's specific needs based on the previous stage's potential business needs. The information system formulation results show that there are fifteen information systems that the company

can implement following table IV. The results of determining information technology recommendations show that company needs three recommendations to support its business operations. The determination of IS /

IT management recommendations resulted in two recommendations for improving company IS / IT management.

Table IV. Results of the IS Business strategy recommendation formulation.

| No | IS Business Strategy Recommendation |
|----|---|
| 1 | <i>Development of the official company website</i> |
| 2 | Replacement of the Trello / Zenkit Application into a Project Management Information System |
| 3 | Change the Odoo Application to an Office Inventory Management Information System |
| 4 | Personnel Information System |
| 5 | Administrative Information System |
| 6 | Sales and Marketing Information Systems |
| 7 | Purchasing Management Information System |
| 8 | Financial Information System |
| 9 | Employee Performance Appraisal Information System |
| 10 | Client Product Maintenance Information System |
| 11 | Apprentice Information System |
| 12 | Meeting Management Information System |
| 13 | Contract Employee Information System |
| 14 | <i>Payroll System</i> |
| 15 | Employee Cost Management Information System |

Table IV illustrates that the company needs several information systems to support its business operations. Several factors cause this, including the company's desire to improve the quality of products and services and the tendency to increase business activities every year so that some business activities are no longer relevant if they do not use information systems. Besides, several information systems already exist but are not being fully utilized by the company. Therefore, the researcher recommends many information systems to support company's business activities.

The IT strategy formulation describes the recommended IT equipment and network infrastructure based on the company's potential business needs or IS recommendation needs. The first recommendation is to add a server. This server supports several new information systems such as purchasing information systems, employee performance appraisal information system, and company warehouse/inventory management information systems. On the online server recommendation, the formulation results recommend using a cloud server to host several SI company

recommendations so that the consideration of server back-up features and server access back-up is essential. The recommendation to add an online server does not significantly change the existing corporate network infrastructure design. The addition of network support equipment is the access point device. An access point is used to increase wireless internet access and increase the number of computer devices connected to the internet on the company office network.

The IS / IT management strategy formulation determines the IS / IT management strategy recommendation that supports the IS business strategy and IT strategy. Currently, developing and managing the company's IS / IT assets are carried out by the operations and production departments. An IT department's establishment expects maintenance, repair, and IS / IT support activities to be more focused and professional without disturbing other departments' activities. Standard Operation Procedure (SOP) and policies are created as the IT department is established. These SOPs and policies discuss the maintenance, repair, development, and IS / IT support services tailored to its needs.

Table V. Mapping of all information system strategy recommendations.

| <i>Strategic</i> | <i>High Potential</i> |
|--|---|
| 1. <i>Official company website</i> 2. Sales and Marketing Information Systems | 1. Client Product Maintenance Information System |
| <i>Key Operational</i> | <i>Support</i> |
| 1. Inventory Management Information System 2. Personnel Information System 3. Financial Information System | 1. Project Management Information System 2. Administrative Information System 3. Purchasing Management Information System 4. Apprentice Information System |

| | |
|--|--|
| 4. Employee Performance Appraisal Information System | 5. Meeting Management Information System |
| 5. Sistem Payroll | 6. Contract Employee Information System |
| | 7. Employee Cost Management Information System |

The application portfolio was obtained by conducting interviews and discussions with company employees from different departments. Table V shows the results of the mapping of all information systems from the SI business strategy recommendations. Companies can use these mapping results as a reference in implementing the IS / IT strategy recommendations in the future [20]. The information system application portfolio from Table V can be used as a reference for companies in deciding which information systems to implement first. If the

company wants to implement an information system that has a significant impact on the business, it can implement all strategic quadrant information systems. Meanwhile, if the company wants to optimize operational activities, it can implement all information systems in the critical operational quadrant. In other conditions, if the company wants to maximize efficiency and effectiveness without considering the impact on the business, then the company can implement all applications in the support quadrant

Table VI. Clusters and sub-clusters in the Benefit and Opportunities subnet.

| <i>Cluster Benefit</i> | <i>Subcluster Benefit</i> |
|-----------------------------|--|
| Operational | Ease of use |
| | Ease of supervision |
| | Data management |
| | The Efficiency of duration and work activities |
| Implementation | Scalability |
| Quality | Reducing the error rate |
| <i>Cluster Opportunites</i> | <i>Subcluster Opportunities</i> |
| Business development | Increase sales of products/services |
| | SI applications become company products |
| Features | Feature customization |
| | Latest technology |

Ranking Information System Recommendations :

The ANP-BOCR method begins by identifying alternatives and criteria to be used. The alternatives used are all information systems (IS) from the strategic, key operational, and support quadrant from table V. The high potential quadrant is not an alternative because this quadrant only consists of one information system. To make this research easier, SuperDecision version 2.10 software is used for ANP-BOCR calculations.

ANP-BOCR criteria are criteria or factors that play a role in determining the order of information technology that the company will purchase or implement. The criteria consist of strategic criteria, control criteria, and clusters / sub-clusters in each BOCR subnet [21]. The researcher derives these criteria from several ANP method literature related to selecting information technology and discussions with the company. Examples of strategic criteria used in this study include IS / IT lifespan, IS / IT product function, IS / IT reliability, vendor training and consultant services, company budget, and company infrastructure condition. The control criteria used are

technology and financial criteria. This criterion is used for the determination of the BOCR subnet cluster / sub-cluster.

Table VI shows the clusters and sub-clusters used in the benefit subnet. The benefit sub-cluster is more related to ease and efficiency in certain parts because determining the purchase or application of an information system in the company considers the advantages and benefits of the system's ease and efficiency. Table VI shows opportunities cluster and subcluster. Clusters and sub-clusters in the subnet opportunities are long-term because they are based on the potential / potential benefits provided by (alternative) information systems in the future.

Potential losses or risks from alternatives are assessed using the risk subnet cluster and sub-cluster. Cluster risk consists of implementation, security, and costs. The sub-clusters of risk include application instability, data security, upgrade costs, and budget overruns. The sub-cluster in the cost cluster represents the expense risk that the company must incur when purchasing or developing

alternatives. The consideration of cost cluster risk is crucial because it depends on the company's financial capability. Meanwhile, the implementation cluster and security cluster help companies filter out alternatives that significantly impact when the system is unstable and data leaks occur.

The definite loss or expense of the alternatives is assessed using the subnet cost cluster and sub-cluster. The

subnet cost elements are used to rank the alternatives that have the highest to the lowest costs. The sub-cluster subnet cost includes alternative maintenance costs, alternative development costs, employee training costs to use alternatives, and infrastructure provision costs for alternatives.

Table VII. Weight of IT / IT project aspects and company resources aspects.

| Aspect | Strategic Criteria | Local Weight |
|------------------------------|--|--------------|
| IS / IT Products (0.306592) | Function | 0.412595 |
| | Warranty | 0.164265 |
| | Reliability | 0.263761 |
| | Maintenance | 0.104921 |
| | IS / IT upgradeability | 0.054459 |
| Company Resources (0.109826) | The condition of the Company's human resources | 0.182559 |
| | Company Infrastructure Conditions | 0.817441 |

The process continues by looking for relationships between clusters and sub-clusters and determining the weights between elements based on these relations. The relationship between the elements is obtained through interviews with the company. Based on these relations' results, a pairwise comparison questionnaire was compiled via google form and filled in by five respondents [22]. Respondents are company employees in several positions such as deputy director, head of the production department, and head of the operational

department. The SuperDecision application does not have a multi respondent input feature, so the five respondents' pairwise comparison weights are combined using the Geometric Mean Method (GMM). Table VII displays the weight of the strategic criteria from the pairwise comparison with GMM. Due to many pairwise comparisons and the limited number of areas to display data in this study, only the weight of the IS / IT Product aspect's strategic criteria and the Company Resources aspect is shown

Table VIII. The weight of all operational sub-clusters to the scalability sub-cluster.

| Cluster | Subcluster | Local Weight |
|-------------|--|--------------|
| Operational | Ease of Use | 0.116651 |
| | Ease of Supervision | 0.225208 |
| | Data Management | 0.055442 |
| | The Efficiency of Work Duration and Activities | 0.602699 |

The weights of table VIII are the result of pairwise comparison between all elements in the operational cluster with one element in the implementation cluster on the benefits subnet. This pairwise comparison is made like this because the implementation cluster elements have a relationship with all operational clusters. Determination of weight based on the relationship between elements was carried out on all clusters, sub-clusters, and alternative subnet BOCR [23]. There are dozens of weights of elements resulting from pairwise comparison data and it is not sufficiently displayed through this study so that only the weight of the Operational cluster is displayed in this study.

The stage is continued by combining all pairwise comparison weights into one matrix. This matrix is called an unweighted supermatrix. This supermatrix must be weighted by normalizing each column in the supermatrix.

The result of the normalization of an unweighted supermatrix is called a weighted supermatrix. Normalization aims to find alternative weight values for a later stage [24]. The process is continued by calculating the supermatrix limit based on the weighted supermatrix. The supermatrix limit is the process of multiplying the weighted supermatrix by itself until the column values are the same or convergent. The calculation process is carried out through the SuperDecision software. The weight value on the alternative row shows the final result of the alternative weight. The alternative weight value is normalized and it is this weight value becomes the alternative weight of one of the BOCR subnets.

The last step is to determine the alternative weight of all the BOCR subnet results. This determination uses a particular formula. In general, there are two formulas available, namely multiplicative and additive (negative)

formulas. The advantage of the additive (negative) formula is that it considers the weight of the BOCR so that the results of the alternative sequences are more realistic. The additive (negative) weakness is that determining the weight value of BOCR with this formula requires a longer process than the multiplicative formula [25]. The company chooses to use an additive (negative) formula based on the consideration of implementing the IS / IT strategy in the next few years. The additive (negative) formula is done by multiplying the weight of each BOCR then adding each of that weight. Table IX shows the final weight of the key operational quadrant information system and Table X shows the final weight of the support quadrant information system.

Based on the final weight calculation results, the development of the company official website (S1) with a

weight of 0.784169 is the priority to be implemented first and the Sales and Marketing Information System (S2) is the last priority with a weight of 0.215831. The reason why company respondents prioritize S1 is because company will clean up its official website. The researcher's recommendation for the official company website is in the form of web development by adding several particular pages for the needs of the helpdesk information system so that the development of the helpdesk on the company website can be carried out in line with the improvement of the appearance of the current website. The S2 is not ranked first because information on new products was still in the introduction stage, so it did not require intense data management and monitoring.

Table IX. The alternative weights of the key operational quadrant.

| Alternatives | Weight |
|--|----------|
| K3 (Financial Information System) | 0.022884 |
| K1 (Inventory Management Information System) | 0.018563 |
| K5 (Payroll System) | 0.008758 |
| K4 (Employee Performance Appraisal Information System) | 0.00751 |
| K2 (Personnel Information System) | 0.003736 |

Based on table IX, company respondents gave the Financial Management Information System (K3) high weight because financial management SI played a role in financial management and supervision due to implementing new company strategies and assisting in corporate financial management due to the Covid-19 pandemic. Inventory Management Information System / Warehouse (K1) is in second place because the company can still manage company property data. The Payroll System (K5) is in the third position because the K5

application helps companies transfer and manage employee salaries even though they have sufficient development costs. The Employee Performance Appraisal Information System (K4) and the Personnel Information System (K2) are in the last position because the frequency of personnel data management activities is still low, the company can still handle employee performance appraisal activities, and the number of company employees is less than fifty. Therefore, respondents put K4 and K2 in the last position.

Table X. The alternative weights of the support quadrant.

| Alternatives | Weight |
|---|----------|
| ST1 (Project Management Information System) | 0.248418 |
| ST7 (Employee Cost Management Information System) | 0.171612 |
| ST2 (Administrative Information System) | 0.164267 |
| ST3 (Purchasing Management Information System) | 0.151525 |
| ST4 (Apprentice Information System) | 0.116521 |
| ST5 (Meeting Management Information System) | 0.08823 |
| ST6 (Contract Employee Information System) | 0.059427 |

Table X shows that the Project Management Information System (ST1) is in the first rank with a weight of 0.248418. ST1 makes it easy for company to work on client projects such as easy distribution and supervision of employee tasks. This system makes

working on client projects more effective and efficient so that company respondents tend to choose the ST1 application for the first place. Information system ST7, ST2, ST3, ST4, ST5, and ST6 are not the first ranking due to several considerations, such as the impact of

information systems on business operations, current benefits, infrastructure, and the company's financial condition. The information system in Table X is an information system that does not affect business and does not affect the company's operations but is effective and efficient when used. Based on this, the weight order of information systems Table 10 describes which information systems are the most effective and efficient and which information systems are less effective and efficient to implement by company.

Based on the results of determining the information system's final weight, the ANP-BOCR method can find the sequence of implementation of information system recommendations with specific criteria. Besides, the use of ANP-BOCR is more suitable for use in ranking information systems than some other research, which only uses the basis of the company's vision, mission, and portfolio quadrants [7][8][9][11][12].

4. CONCLUSION

IS / IT strategic planning with the Ward and Peppard framework shows that company has some potential business needs that have not been met. The study recommended fifteen strategic information systems, three IT strategy recommendations, and two IS / IT management strategic recommendations based on these business needs. These recommendations are adjusted to company conditions requiring solutions to optimize the company's business operations' efficiency and effectiveness and anticipate future spikes in business activities.

ANP-BOCR can search the sequence of implementation of information system recommendations. The ordering results show that companies need more information systems that support company operations. The company can use this research's final results to develop and manage information systems or information technology adapted to its future business. The researcher suggests using a different strategic planning method, such as the Anita Cassidy Stages method for future research.

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