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Analysis Strategy by Priority Rate using ANP for Pension Fund Organization

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Abstract: A pension fund organization is a corporation that manages and implements a program that provides benefits of pensions. One of the reasons why pension fund organizations don't grow significantly is because the masses still don't believe that organizations should implement a pension program. More important, their fund is not left. Pension Fund needs an information technology solution. For efficiency, using the method of Strategic Planning for Information Systems (SPIS), it's mean calculations about external or internal factors in the organizational environment to generate the weight of value. The weight of all factors and strategies is using Analytical Hierarchy Processing (AHP). Every factor that has a relationship will be analyzed by the SWOT method (Strength, Weakness, Opportunities, Threats). The result will be processed by prioritizing strategies for all business processes and information systems that use the ANP method (analytical network processing). In this research, the ANP methods combining with ZOGP (Zero One Goal Programing) to increase the result with resources calculations. At last, Weight of business processing and information system will be calculated by the IT Balanced Score based on the priority rate. This research will help pension fund organizations choose an information system strategy to develop an information system or application to reach the best goal.

Keywords: Analytical Network Processing, Analytical Hierarchy Processing, Pension Fund, Score Card, Priority Rate

INTRODUCTION

A pension fund organization is a corporation that manages and implements a program that provides pension benefits. One of the reasons why pension fund organizations don't grow significantly is because the masses still don't believe that organizations should implement a pension program. After thinking about how pension fund organizations manage their assets for a long time, the masses are still hesitant about how the ending members of pension fund organizations get a benefit, either promising or doubtful that their assets will be managed by pension fund organizations that can grow efficiently and better than before. More importantly, their funds are not left (van Dalen & Henkens, 2023).

Some issues, such as pension fund organizations and assurance companies that cannot pay the fund with interest or growth, make people less likely to believe in the pension fund sector (Qayyum et al., 2023). Additionally, assets of funding for the pension fund sector also have lower values because pension fund investment instruments are in the capital or non-capital markets. Unbelievable Feelings of mass and still less knowledge about how to invest hard for Pension Fund Investment Management to become more cautious now. The low return will impact this. For a long time, it can give less benefit than the factual and less fund safety. This situation, in addition to making pension fund programs, is not interesting for people. Therefore, we need an information system with transparency that gives information about investment management, such as portfolio details, balancing, interest, and knowledge about the new investment concept.

The method used to analyze information systems in this research is Strategic Planning for Information Systems (SPIS) (AlQershi, 2021) (Knight et al., 2020) (Brumec & Vr□ek, 2002). The first step is to calculate the factors of success in the environment, including external and internal factors, to get information to reach the goal (Pant & Hsu, n.d.). Analyze the successful factors using the SWOT (Strengths, Weaknesses, Opportunities, and Threats) method because of analyzing external and internal factors in the organizational environment for analyzing strengths, weaknesses, opportunities, and threats in the organization (Bull et al., 2016) (Longhurst et al., 2020). Calculate the weight of each factor and strategy using the method of AHP (Analytical Hierarchy Processing) (Sevinç et al., 2018) (Goepel, 2018) (Trubnikov et al., 2020) (Marinoni, 2004). After that, each factor and strategy creates relationships for weights (Ahsan & Bartlema, 2004). Calculate the weight between each strategy, business process, and information system in this research using the method of ANP (Analytical Network Process) (Gaol et al., 2020).

Calculating it using the method of ANP will result in the number of weights to become the value and priority rate for business processes and information systems in the organization (Erdoğmuş et al., 2005) (Bayazit, 2006). Each business process and information system are analyzed for strategic analysis using the SWOT method, using the IT Balanced Scorecard by priority rate (Kaplan, 2010) (Nørreklit, 2003). In this research, I hope organizations can choose the best strategic priority rate when developing and implementing information systems so that there will be opportunities and an increase in the value of their existing businesses (Kaplan & Norton, 2004) (Leung et al., 2006) (Pandey, 2005).

Based on the background explained above, the problem statement will be discussed in this research, among others: (1) How to do a strategic analysis of internal and external factors in organizations using the SWOT method? (2) How to analyze and choose a priority rate for strategies, business processes, and information systems existing in an organization using the ANP method? (3) How to analyze information system strategies based on business processes, information systems, and strategic groups in organizations using IT balanced scores?

It can solve project interdependence based on ANP and ZOGP, using this method it concludes that it can solve problems having multiple criteria, interdependence, and resource feasibility. The selection of an appropriate set of IS projects is very helpful to all business organizations. In addition, interdependency among projects is one of the most important issues because it results in saving costs. Thus, to address IS management concerns by demonstrating that exploiting project interdependencies is one way of saving IS costs and frugality resources.

The research to analyze Information System Strategy by Priority Rate using an Analytic Network Process for Pension Fund Organization is DAPENBI IP (Dana Pensiun Bank Indonesia Iuran Pasti). So, its analysis of Information System Strategy is based on process business can be helped by Information Technology. Pension Fund Organizations have many process businesses but there are main process businesses, membership management and

investment management. And scope of information technology used for major impact on company use of information system or applications that connect with other applications.

METHOD

In this step, research-related information is needed from the organization such as vision and mission, business processes, and information systems that exist on the organization now. The business process in this research is any business process using information systems as the main means, and information systems in this research can be integrated systems or not. An explanation of each data point and the information obtained in the research will be explained in this chapter.

To identify each internal factor consisting of the strengths and weaknesses of the organization, as well as external factors consisting of opportunities and threats in the organization. Each factor will be measured individually by values of weight using the Analytic Hierarchy Process (AHP) method. Values of weight for each factor will be used to carry out the mapping on evaluation of internal and external factors. Furthermore, an assessment also requires a score that uses the rating given by top management or leader to each factor to see the proportions of each group of internal and external factors in the organizational environment.

To determine the organization's business strategy using the Strengths, Weaknesses, Opportunities, and Threats method (SWOT). For determining a business strategy, internal and external factors are needed that have been identified (Liu et al., 2022) (Iskandriani et al., 2023). The assessment was carried out using the Analytical Network Process method (ANP). Each strategy will be related to each business process for calculating the weight of each business process to determine the priority of each business process. Then, Assess the priority level of information systems that have similarities with to assessment of business process priorities against strategy. The difference is the element that is related to each strategy information system used in organizations. The method for this assessment is the Analytical Network Process (ANP) method. The organization that is a place of research is one pension fund organization that still growing and established 3 years ago in 2021, namely Dana Pensiun Bank Indonesia Iuran Pasti (DAPENBI IP). In business, DAPENBI IP is based on for use of information technology to support goals. Every business transaction carried out by application is based on a website or mobile app that connects customers/members, investment systems, finance, and accounting. This connection between members, management, founding fathers, and inspectors requires a strategy to relieve miscommunications or things that are detrimental to members, management, and the organization itself.

Data collection in this research was carried out in two main ways, namely by conducting interviews and filling out questionnaires or surveys. Respondents in carrying out data collection are the parties and individuals who are part of this pension fund that have a relation at DAPENBI IP. Based on the business model of a Pension Fund, the parties who have the main role in running a business are members, management and staff who run business processes at DAPENBI IP.

DAPENBI IP vision is a "Pension Fund that manages investment optimally and sustainably with primary services." The vision of DAPENBI IP must be achieved at least 10 years after this organization stands. The mission of an organization must be clear so that every stakeholder can understand it within the organization and can also be adjusted to the vision as well strategy of the organization. The mission of DAPENBI IP is to achieve its vision organization, namely: (1) To maintain continuity of funds with measurable risk and budget efficiency; (2) Services prioritize member satisfaction. The equations are an exception to the prescribed specifications of this template. In general, organizations operating in the Pension Fund field start their business inside the electronic environment of the internet. The organization will reach members and vendors via the internet and must be able to develop

internal skills and utilize information technology to support their members and partners. The business processes carried out by DAPENBI IP have business objectives such as services that provide information and help to maintain their fund and investment information. As a business goal, the services provided by DAPENBI IP are addressed to members and are classified as one B2C (business-to-customer) business and provide services to business others as drivers of business processes from DAPENBI IP, also called B2B (business-to-business). In Table 1, the business processes are running in DAPENBI IP.

Table 1. Process business in DAPENBI IP

Process Code	Process Description
PB-1	Provide and maintain each information technology infrastructure and information system in DAPENBI IP
PB-2	Maintain information and events about DAPENBI IP on the website (www.dapenbiip.co.id)
PB-3	Maintain information membership details in the web portal and mobile apps
PB-4	Help members to register their account in DAPENBI IP
PB-5	Process regular contribution (monthly) from founding father
PB-6	Process member cluster converting from Conventional to Syariah or Regular to Life Cycle Fund type.
PB-7	Process their benefit claim application and pay to members when they become pension member
PB-8	Invest member fund as good projection calculating into some of the investment instruments
PB-9	Procurement and making relations with partners to support process business and pay it as operational cost
PB-10	Making monthly reports to Otoritas Jasa Keuangan (OJK) and supporting the audit process yearly by an external auditor

The information system at DAPENBI IP is a system that integrates various systems, both internally and some of them are external. System internally is an integrated system based on each process meanwhile, the external system is a system managed by vendors or partners in supporting DAPENBI IP internal system Information systems on DAPENBI IP can be seen in Table 2.

Table 2. Information systems in DAPENBI IP

Process Code	System Name	Process Description
WCPS	Website Company Profile System	Website Company Profile System used by users externally and internally to search for information about the company, company events, and investment news
MWPS	Memberships Web Portal Systems	Memberships Web Portal Systems are used by members to get information about the last saldo, their contribution every month, and their interests.
MMAS	Memberships Mobile Apps System	Memberships Mobile Apps System used by members to get information about the last balance, their contribution every month, and their interest.
WAS	Website Admin System	Website Admin System used by internal staff to maintain content and information about the company and news
CAS	Core Apps System	Core Apps System used by internal staff to process all main process business such as members issues, finance, investment records, and accounting
CSS	Costumer Service System	The Costumer Service System is used by members to contact staff if there is a problem with the pension fund
ISS	Investment Support System	Investment Support System used by investment staff to get information about investment and get value of market price from partners
DSS	Digital Sign System	Digital Sign System used by internal staff to validate documents
HRS	Human Resources System	Human Resources System used by internal staff to support human resources business process

RESULTS AND DISCUSSION

Business Process Analysis is a combination of some methodologies with the objective of understanding existing organizations' processes in the objective context and the goals that organizations want. The firm's relation to the internal and external business environment is critical and essential in analyzing industry trends and the world market.

1) Identification of Internal and External Factors in the Organizational Environment: Analysis of the business environment in an organization must understand 2 main factors, such as internal and external factors. Every factor must be identified so can be calculated and evaluated. Identifications of every factor are the result of analysis and communications with some of the top management employees. Top management employees give a rating for every factor that is used to calculate the weight for every factor.

2) Calculations of Internal and External Factors: Calculations for business processes, environment factors, and pieces of information technology using with Analytical Hierarchy Processing (AHP) method. In AHP methods, every value will get a result of weight, and this weight can be the weight value for every factor. Marking for organization environment based on data from the result of the factor analysis phase in the organization environment in an internal and external way. Marking for comparison of every factor by collecting a data sample of research that divides for 3 main actors in DAPENBI IP pension fund, that is internal employee, members, and partner. Taking this data sample with fill out the survey provided with an online survey. This is several correspondences that participated in this survey 110 correspondence. For an explanation about AHP methods, a comparison from every factor gets values of 1,3,5,7, and 9, but this comparison uses 1 to 9 to make easily when correspondence chooses the answer. Based on internal factors that get from DAPENBI IP, pension fund, so in attachment 1 shows the result of the survey in the form of marking from internal factors while attachment 2 shows the result of the survey in the form of marking from external factors. Correspondence joins this survey from the internal and external sides of this organization.

3) Evaluations of Internal and External in Organizational Environment: Evaluations for internal and external factors must be based on weight factor calculation of internal and external. In this evaluation step, a matrix of Internal Factor Evaluation (Internal Factor Evaluation – IFE) and external (External Factor Evaluation – EFE). Matrix creation based on data and information that was approved and analyzed for internal and external organizations' environments. Internal-external consists of 2 dimensions, that is a few IFE values on the horizontal line and several EFE values on the vertical line. The IFE score of DAPENBI IP is 3.10 and the EFE score of DAPENBI IP is 3.45. Figure 5 shows DAPENBI IP positions in an internal-external matrix that stands for quadrant I, that is DAPENBI IP stands for backward, forward, or horizontal integrations, Market Penetration, Market Development, and Product Development.

Strategy on an organization must be suitable with internal factors which are strengths and weaknesses as soon as external factors for opportunities and threats (AlNuaimi et al., 2022). Therefore, it needs a design for each factor in a matrix called Strengths, Weaknesses, Opportunities and Threats Matrix (SWOT). SWOT matrix is the identification of some factors systematically to create an organizational strategy. Each strategy will be grouped based on analysis of internal and external factors that have been gotten so that can be created by a matrix, it is called a SWOT matrix. If the strategy is chosen by an organization with the viewpoint that makes integration with Strengths and Weaknesses with Opportunities and Threats.

Table 3. Details of SWOT approaches

Strategy	Strategy Types
Improvement services for customers (members) and partnerships	Strategy – SO
Integrations of each system to supply member needs.	

Provide information system to generate automatic monthly reports to Finance Regulations.	
Improve information technology infrastructure.	
Improvement services education using many platforms, like YouTube, and Instagram.	Strategy – WO
Minimalize system changing that correlation with transactions between partners and members	
Improvement of task management application to manage relationships with partner	
Improvement of employee skills to use a system application with training regularly.	
Improvement of cyber security for all the system and IT infrastructure	Strategy – ST
Improvement or guarantee system or subsystem before launched	
Improvement of helpdesk application to manage relationships with partner	
Improve relationships with regulators and associations to push Syariah's instruments provided	
Guarantee each system is fit to using	Strategy – WT
Improve relationships with many other pension organizations	
Improve information technology infrastructure that supports information systems	
Give Cyber Security training to each employee	

Business processes from organizations are very impactful for business processes in an organization. Business processes will be analyzed as business processes that use information systems and mutual integration with another system. Relations strategy and business process can be categorized based on the result of analysis for that organization. Analysis of strategy impact on business process in this research using ANP methods. ANP methods give a correlation structure design from one strategy with each business process based on important ratings in the business process with strategy category. If vision and mission become a goal in these organizations, so strategy group based on the concept of SWOT (Strategy-SO, Strategy-ST, Strategy-WO, Strategy-WT) becomes a bunch of criteria and the business process becomes an alternative.

Analysis of relations for strategy groups and business processes using ANP methods needs technic to collect data and spread a questionnaire for the internal side of the organization, that is DAPENBI IP internal side. The role of top management in these organizations has an important role in giving information on each relationship between strategy and business process. In this research, the role of the Chief Executive Officer (CEO) in DAPENBI IP gives a decision in the form of questionnaire filling and interview.

After the CEO fills out the questionnaire that has been given, then each value of the answer is re-analyzed based on the ANP method using the Super Decision work tool. Each relationship between strategy and business process based on the results of questionnaire filled out by the CEO will be processed and provide results in form of several matrices with each weight. The results of data management based on the level of priority can be seen in Fig. 1.

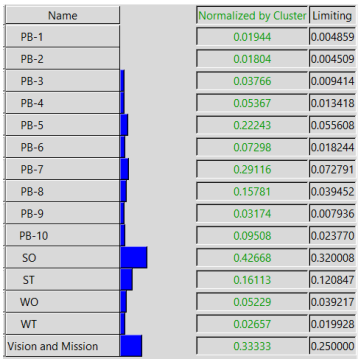

Figure 1. The results of data management based on the level of priority

Based on the previous figure, it can be seen the similarity with the structure and hierarchy in the relationship between business processes and strategies. The difference in the

analysis of the calculation of the priority level is the individual who will provide input on the value in the ANP method. If in the relationship between strategy and business processes, it is a CEO who provides input on value, in this case, a Chief Technology Officer (CTO) will provide input on value. The questionnaire given to the CTO is a collection of comparative questions to determine the value of the information system to the strategy group. After getting the questionnaire results, the next assessment is carried out using the Super Decision work tool. The results of the questionnaire data management can be seen in Fig. 2. When viewed from the priority level of the strategy group based on the information system, the strategy group that greatly influences the development of the information is the SO Strategy group.

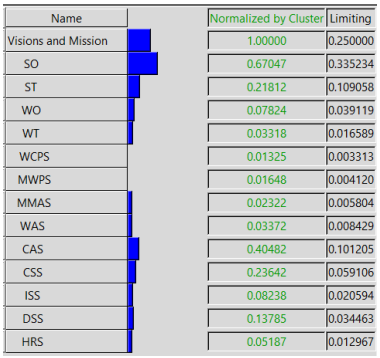

Figure 2. The results of data management based on the level of priority

Zero One Goal Programming refers to Goal Programming that multiple objective programming techniques. It's different from linier programming, because it's not optimized (maximize/minimize) the objective directly. Its process to minimize the deviation desired goal and realized goal. And the goal must be prioritized by hierarchy priority. So, the over and under achievement of goals are deviation variables.

The Zero One Goal Programming model can handle an issue for organizations that want to implement an information system but still have a condition of limited resources. In Zero One Goal Programming algorithm, the result of priority ANP can be a formula to calculate the priority of information development with resources prediction in DAPENBI IP.

Table 4. Resources prediction on DAPENBI IP development process

Event name\Information System	CAS	CSS	DSS	ISS	HRS	WAS	MMAS	MWPS	WCPS	bBi	tType
	x1	x2	x3	x4	x5	x6	x7	x8	x9		
Development Fee	0,7	0,1	0,05	0,8	0,1	0,2	0,3	0,3	0,1	2	billion
Development Hours	960	480	160	160	320	480	480	480	160	1920	hours
Training Hours	640	480	160	480	320	480	320	320	160	960	hours

Table 3 shows the process of Information developing until implementation in DAPENBI IP. There are 3 key processes that impact resources, the total of Development Fee is 2 billion annually, the total of Development Hours is 1920 hours annually and the total of Training Hours is 960 hours annually (Bi variable). And for x variable is the information system that has been analyzed previously each event process. It also normalizes into binary; it means the result is just 1 or 0 to check the combinations information system project can achieve the best goal with limitations resources. The whole formula is executed by LANDO software to get an optimize value.

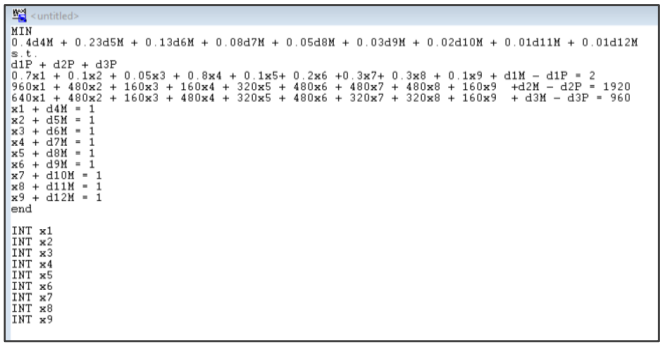

Figure 3. ZOGP formula implementation on LANDO software

Figure 3 shows the result of ZOGP formula implementation, suggesting that projects 1, 3, 9 to get the best goals. Project 1 is CAS; it means Core Apps System Development. Project 3 is DSS, it means a Digital Sign System. Project 9 is WCPS, it means a Website Company Profile System. If all of information system project summary, it gets a total of Development Fee is 0.85 billion annually, it means that under of the total budget to development fee is 2 billion annually. Total Development Hours are 1280 hours annually; it means that under the total budget to development fee is 1920 hours annually. So, the result can be a suggestion to decision making for a leader to develop the information system based on DAPENBI IP resources.

Providing initiatives for information system strategies requires an analysis of the IT division's perspective into operational terms (concluding strategy into operational terms) focus on the balance between each operational aspect and the use of information systems in the organization (Tran, 2024).

Each perspective will be correlated with the strategy, business processes and information systems used. This is intended to determine the priority level of each strategy. When viewed from the analysis of the assessment of the priority level of business processes and information systems against the strategy group, then in this information system strategy initiative it is something that is related to the strategy in the Strategy-SO group, that is: (1) Improvement of services for customer (member) and partnerships; (2) Integration of each system to supply member needs; (3) Provide an information system to generate automatic monthly reports to Finance Regulations; (4) Improvement of information technology infrastructure.

Based on the 4 strategies above, it can be further analyzed to provide information system strategy initiatives using the IT Balanced Scorecard method. Analysis of information system strategy initiatives is described based on objectives, benchmarks, business processes, systems, initiatives and targets from each perspective will be described. In the IT-Balanced Scorecard there are 4 strategic perspectives, namely: Costumer, Internal Process, Resources, Learning and Growth Perspectives.

CONCLUSION

The method used in analyzing the internal-external factors of the organizational environment is the Analytic Hierarchy Process (AHP) method based on the use of the SWOT (Strengths, Weaknesses, Opportunities, Threats) method. The results of the analysis of internal-external factors of the organizational environment show that DAPENBI IP is an organization that is in growth based on the industry attractiveness scale externally with a value of 3.45 and the internal business strength scale at a value of 3.10. On this analysis, it can be said that DAPENBI IP can develop better by developing products and increasing the market to a wider area.

This organizational business strategy is the main benchmark in determining the priority level in business processes and information systems running in the organization. The priority

level of organizational strategy must be aligned with the business processes and information systems running in the organization. Making a comparison by calculating the priority level of business processes and information systems against organizational strategy in this research was carried out using the Analytic Network Processing (ANP) method.

The results of the analysis of the assessment of the priority level of business processes and information systems indicate that the Strategy-SO group, which is a strategy to deal with Strengths and Opportunities, is the strategy group with the highest value. In the priority of business processes against organizational strategy, Strategy-SO has a value of 0.42 and in the priority of information systems against organizational strategy, it is at a value of 0.67. Comparison on result of ANP with the existing strategic information system priorities can be explained by table 3. It shows the strategy is different from now because in 2021, the company just began the business operation and just founding by founding fathers. The budget to develop an information system also become challenging in first year's founding phase.

Table 4. Comparison of the research result with existing

System Code	System Name	Strategic 2021 Priority	ANP Result Priority	ZOGP Suggestion for next year	Human Validation
WCPS	Website Company Profile System	2	9	✓	9
MWPS	Memberships Web Portal Systems	4	8		8
MMAS	Memberships Mobile Apps System	5	7		7
WAS	Website Admin System	7	6		6
CAS	Core Apps System	1	1	✓	1
CSS	Costumer Service System	6	2		2
ISS	Investment Support System	8	4		4
DSS	Digital Sign System	3	3	✓	3
HRS	Human Resources System	9	5		5

The Zero One Goal Programming model can handle an issue for organizations that want to implement an information system but still have a condition of limited resources. In Zero One Goal Programming algorithm, the result of priority ANP can be a formula to calculate the priority of information development with resources prediction in DAPENBI IP.

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