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Stakeholder Analysis Using The Enhanced Salience, Power-Interest, and Stakeholder Cube Diagrams

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***Abstract*— Parties impacted by a project, both positively and negatively, are considered stakeholders. These stakeholders' expectations must be appropriately handled during a project, and a project manager is crucial in ensuring that their interests are met and balanced. Stakeholder analysis must be conducted in detail. To uncover fresh insights that might have been obscured by the stakeholder data, it also needs to be backed by the appropriate resources. The existing stakeholder analysis methods are predominantly qualitative, raising concerns about their ability to uncover all relevant insights effectively. Consequently, there's a risk of overlooking crucial stakeholder expectations and interests. To address this issue, two key enhancements are proposed. Firstly, salience diagrams are enhanced through the application of vectorization techniques, aimed at providing a clearer and more accurate visual representation of stakeholders' significance. Secondly, power grid diagrams benefit from the integration of Gartner's magic quadrant concept, facilitating a more precise evaluation of stakeholders' relative power and interest. These improvements enable the project team to make better-informed decisions and tailor strategies more effectively to interact with stakeholders. Ultimately, they lead to a deeper understanding of stakeholders' impact on the project and ensure that project outcomes are optimized for the benefit of all involved parties. In the end, these enhancements will provide the project team with the ability to decide and adjust their strategy to interact with each stakeholder efficiently.**

***Index Terms*—Project management; stakeholder management; salience diagram; power grid.**

I. INTRODUCTION

Stakeholder analysis has been included in the Project Management Body of Knowledge (PMBOK) handbook since its fifth version, published in 2013 [1]. This means that the world project manager community views understanding stakeholders as one of the keys to the success of a project.

The stakeholder analysis included in PMBOK adopts three tools that assist the project manager and his team in carrying out the analysis process. The three tools are the power-interest grid, the stakeholder cube, and the salience model [2]. So far, these tools have been quite helpful in the qualitative analysis of stakeholder positions, the results of which can be used as a reference in determining appropriate action plans as part of a stakeholder management strategy to be implemented in a project.

But even so, the methods of using these three tools can still be improved so that they involve numbers that indicate the degree of measurement in the units or metrics they use, and these numbers can then be mapped more clearly so that they can show the position of stakeholders in their quadrants. more precisely.

In this study, improvements were made to these tools to be more effective when used in project management. The results of improving these analytical tools are expected to be able to better support decision-making related to stakeholder management strategies.

Stakeholders have various definitions, ranging from narrow to broad. However, the most appropriate definition is “all those who impact and are affected by an organization's strategic policies” [3][4].

The Project Management Institute, an international project manager organization then formulates it as “all parties who are affected positively and negatively by a project initiative” [1]. This is included in the fifth version of the standard book and project management guide (PMBOK guide).

Stakeholder management, especially management of expectations, plays an important role in a project. In some cases, stakeholders from the client or user side may have unexpected and different wishes from what the project manager had in mind. Even under certain conditions, it is possible that a project that fails to meet the process performance success criteria can be declared successful because it meets the product performance success criteria according to its stakeholders [5].

In the organizational hierarchical structure, stakeholders have levels that indicate the size of the power and influence. Intensive communication in projects is important, especially for stakeholders closest to the project manager and with the greatest

potential for support, one of which is project sponsors [6].

Stakeholder analysis has an essential function especially when project leaders must implement the management strategy appropriately [1]. The tools used in the analysis process, such as the power-interest grid, stakeholder cube, and salience diagram provide the project team with the correct picture and measurement. The direction in which desires and interests are moving can be identified and indicate the direction that project leaders must take to support the smooth running of the project [7].

The principal aim of this study is to improve the efficacy of stakeholder analysis instruments frequently employed in project management, namely those specified in the PMBOK manual [1]. Even while methods like the salience model, stakeholder cube, and power-interest grid are useful in qualitative analysis, there is still room for development. The goal is to give project managers better insights into stakeholder positions and enable more informed decision-making on stakeholder management methods by adding numerical metrics to these tools and improving their mapping procedures [7]. In the end, the goal of the research is to enable project teams to better comprehend and cater to stakeholders' expectations and interests, which would improve project outcomes.

II. METHOD

The method used here is according to the stakeholder management method listed in PMBOK version 7. The following is the flow of the method used (Fig. 1).

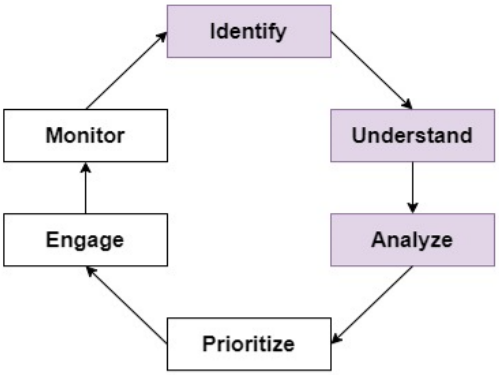

Fig. 1. Stakeholder management method [2].

Three crucial phases make up the process of conducting a stakeholder analysis: identification, understanding, and analysis. The identification phase, which comes first, is like putting out a wide net to catch every possible recipient or influencer for the initiative. It entails identifying peripheral stakeholders whose interests might overlap with the project's scope in addition to those directly involved. This is a foundational phase since failure to include important stakeholders could result in major oversights or misalignments in the planning and execution of the project.

The understanding phase dives deeper into the complex nature of stakeholders after identification. At this point, the emphasis switches to obtaining thorough insights into the traits, drives, and relationships of the stakeholders. This calls for a careful analysis of several variables, including their degrees of authority and influence within the project ecosystem, the kind and extent of their influence, their inclinations as individuals, and the underlying goals and interests that motivate their participation. This stage plays a crucial role in shedding light on the many viewpoints and possible motivators influencing stakeholder interactions and expectations.

The analysis phase then takes all the data gathered in the identification and understanding phases and combines it to create insights that can be used. Here, systematic procedures and analytical tools are used to examine the characteristics and dynamics of stakeholders. This entails evaluating prospective roles and contributions from stakeholders as well as mapping their locations, relationships, and relative value within the project landscape. The analysis phase provides project teams with the clarity and foresight required to build targeted plans and successfully minimize any risks or disputes by condensing complicated stakeholder data into actionable insight.

All those three phases are usually done qualitatively. This study focuses on how to enhance the tools used to gain more detailed results in a semi-quantitative way.

III. RESULT AND DISCUSSION

To identify, we can use the stakeholder register form which contains the following elements:

TABLE I. ELEMENTS ON THE STAKEHOLDER LIST FORM [8].

No	Element
1	Name
2	Position / Role
3	Contact Information
4	Requirements
5	Expectations
6	Impact (High, Medium, Low)
7	Interest, scale: (1-5)
8	Power, scale: (1-5)
9	Attitude, scale: (1-5)
10	Legitimacy, scale: (1-5)
11	Urgency, scale: (1-5)

The attributes explanation is described below:

1. Name: name of the stakeholder.
2. Position/Role: position in the organization.
3. Contact Information: email address or phone number of related stakeholders.
4. Requirements: requirement from related stakeholders that needs to be implemented in the project.

5. Expectations: what the stakeholders want from the project outcome.
6. Impact: stakeholders' impact on the project.
7. Interest: the level of concern or stake that a stakeholder has in the project's outcomes.
8. Power: the extent of influence or control that a stakeholder holds over the project.
9. Attitude: the disposition or perspective towards the project.
10. Legitimacy: the perceived appropriateness or validity of stakeholders' claims, interests, or involvement in the project.
11. Urgency: immediacy with which stakeholders' needs, concerns, or expectations must be addressed.

The stakeholder's factors (no. 7-11) are measured on a 1-5 scale, where 1 represents lowest or least significant and 5 represents highest or most significant.

After we get the data related to the stakeholders in a table with the elements above, we can proceed to the analysis stage. The tools raised in this research have often been used in the stakeholder management activities of a project. These tools support qualitative analysis to map the positions of stakeholders, where knowledge of these positions can assist project leaders in determining and implementing appropriate strategies in approaching stakeholders (stakeholder engagement).

The effectiveness of these tools can still be increased, this is what will be reviewed in this section.

A. Enhanced Power-Interest Grid

This analytical tool maps two elements of the characteristics of a stakeholder, in this case, the level of power and the level of interest. From the data obtained, the following is the mapping performed on the initial version of the power-interest grid.

The following is an example of data used in mapping on power-interest diagrams and stakeholder cubes (Table 2). Parameter assessment (P, I, and A) uses a scale of 1-5 (Table 3). This data is synthetic data, which has already been coded and given the values of P, I, and A. This data has been made to be as representative as possible of the project data used in the actual project environment.

In Fig. 2 we map the stakeholder groups listed in Table 2 onto the original power-interest grid diagram. The power-interest grid has two axes, where the Y axis represents the power factor, and the X axis represents the interest factor. From the left to the right, the interest factor spans from lowest (1) to highest (5), while from bottom to top, the power factor spans from lowest (1) to highest (5).

The group that is mapped is the top management group. Here we can see that the dominance of this group is in the upper right quadrant which can be interpreted that this group possesses high power and high interest in the project's success. The suggestions for action that need to be taken (Fig. 3) are strict management of both information and the wishes of the stakeholder group [9].

In Fig. 4 we apply one improvement to the original diagram, namely by adding the average line. The dotted red line shows clearly which way the weights of the combined power and interest levels move. From Fig. 4 it can be observed that the direction of the weight of the power-of-interest level of the stakeholder group is to the upper right quadrant. The quadrant formed from the average line is somewhat different from the original quadrant. From this composition, we can re-prioritize the ranking of stakeholders within a group.

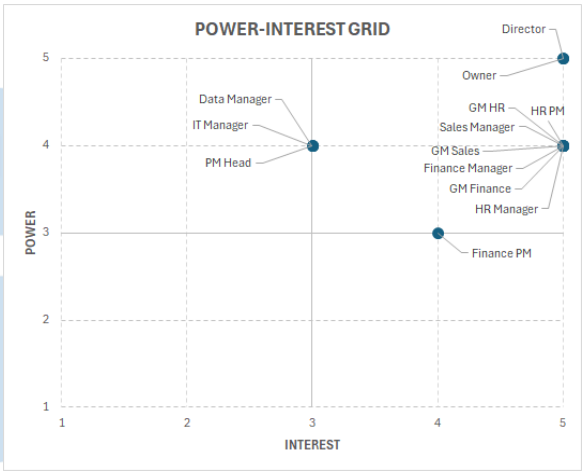

Fig. 2. Mapping part of the stakeholders on the original power-interest grid.

TABLE II. THE DATA USED IN THIS STUDY.

No	Code	Role	*Power* (P)	*Interest* (I)	*Attitude* (A)
1	OWN	Owner	5	5	3
2	DR	Director	5	5	4
3	ITM	IT Manager	4	3	1
4	GMF	GM Finance	4	5	4
5	GMH	GM HR	4	5	5
6	GMS	GM Sales	4	5	3
7	MF	Finance Manager	4	5	5
8	MH	HR Manager	4	5	5
9	MS	Sales Manager	4	5	3
10	PM1	PM Head	4	3	1
11	PMF	Finance PM	3	4	4
12	PMH	HR PM	4	5	5
13	MD	Data Manager	4	3	3
		Average	4.08	4.46	3.54

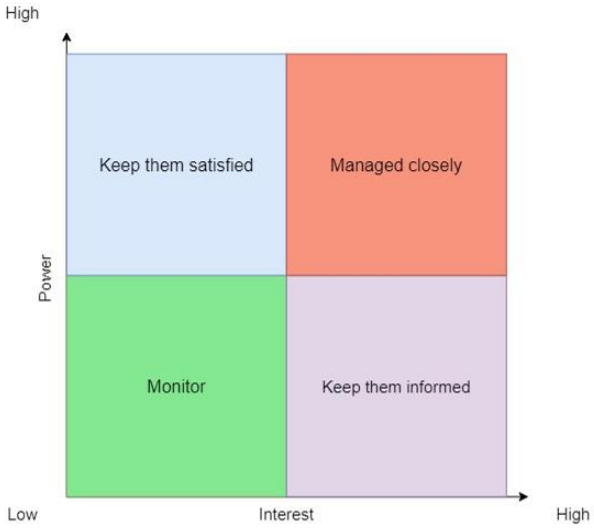

Fig. 3. Suggested approaches from the original power-interest grid model.

In the Fig. 4 diagram, the roles of Data managers, IT managers, PM heads, and PM finance can be given lower priority weights than Owners and directors in the first group. Also, relatively lower than GM Sales, HR and Finance, HR and Finance Managers, and PM HR in the second group.

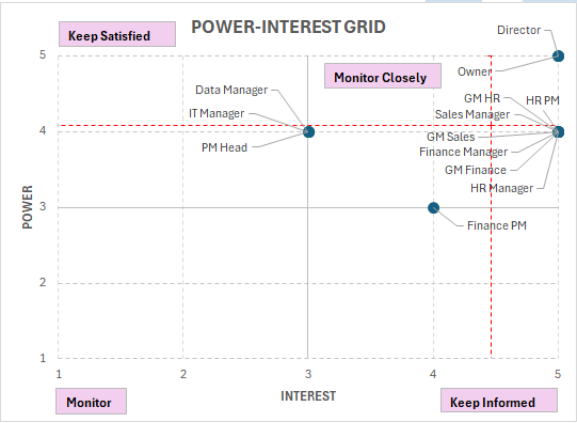

Fig. 4. The same mapping *was* implemented on *an* enhanced power-interest grid.

The addition of the dotted red average line in the power-interest grid adds certainty to the trend direction which will greatly assist us in determining the right general action in engaging and managing the stakeholders. The average value of the parameters P and I can be seen in Table 2. In the analysis stage of stakeholder management, this average line helps to visualize the weight of the overall stakeholder's power and interest, thus this will allow the team to decide which stakeholder engagement strategy to focus on the project and on which group of stakeholders the strategy should be targeted.

B. Enhanced Stakeholder Cube

The stakeholder cube is a multidimensional tool utilized in stakeholder analysis to comprehensively evaluate stakeholders' attributes and dynamics. It involves three key dimensions: interest (x), influence (y), and power (z). The interest axis denotes stakeholders' level of concern or vested interest in the project's success. The influence axis indicates stakeholders' capacity to impact project processes and outcomes. The power axis represents stakeholders' ability to influence project decisions and outcomes. Each stakeholder is positioned within the cube based on their level of power over the project, their level of interest in the project's outcomes, and their influence on project decisions.

In this tool, the improvements made are the same as in the power-interest diagram, namely the addition of an average line, but it is applied to a three-dimensional plane. The following is an example of a typical stakeholder cube diagram that maps out the same group of stakeholders (Fig. 5). The stakeholder cube in principle is a power-interest grid with one more axis added, namely the level of behavior (attitude) so that it becomes a three-dimensional power-interest-attitude mapping. The data used in this mapping is the data in Table 2.

The addition of the average plane, where the point of intersection is represented by a blue dot, shows the direction of the trend of the position of the stakeholders. From this position, we can conclude that the stakeholder group that we mapped has a high level of power and interest, but behavior that is only slightly above neutral.

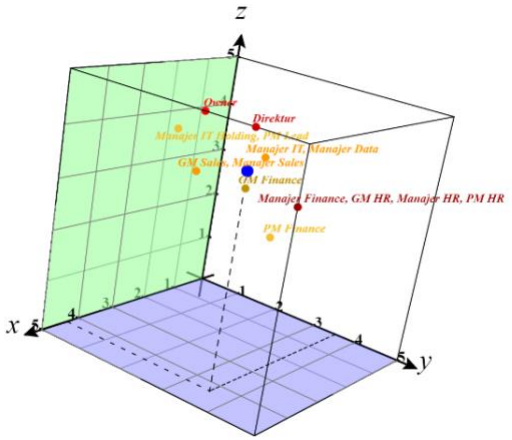

Fig. 5. Enhanced stakeholder cube, mapping the interest (x), attitude (y), and power (z).

This means that in carrying out the stakeholder engagement and management strategy, we need to prioritize increasing the level of behavior, where some stakeholders whose behavior values are below neutral (3) become above neutral (> 3) so that the blue dot becomes closer to the top corner (x= 5, y=5, z=5).

C. Vectorized Salience Diagram

The salience diagram was known to be able to map stakeholders into eight characteristics (Table 3).

From these characteristics, we can determine the approach strategy for each party.

Most of the articles and blogs that discuss the use of the salience diagram only describe descriptively the mapping of stakeholders, so it seems there are no definite measurements. There is only one template obtained from a search on the internet regarding the application of the salience diagram which sufficiently involves a semi-quantitative assessment, although the range of values given is only 0 to 1 for each parameter of power, legitimacy, and urgency. We also use this as a basis for classifying stakeholders, but the range of values is widened to a scale of 1 to 5 (Table 3).

TABLE III. EIGHT CHARACTERISTICS OF STAKEHOLDERS IN THE SALIENCE DIAGRAM [10].

No.	Characteristics			Classification	Action
	P	L	U		
1	1	0	0	*Latent/Dormant*	*Monitor*
2	0	1	0	*Discretionary*	*Monitor*
3	0	0	1	*Demanding*	*Keep them informed*
4	1	1	0	*Dominant*	*Keep them informed*
5	1	0	1	*Dangerous*	*Keep them satisfied*
6	0	1	1	*Dependent*	*Managed closely*
7	1	1	1	*Core/Definitive*	*Managed closely*
8	0	0	0	*Non-Stakeholder*	*Don't manage*

The parameters of power, legitimacy, and urgency are explained as follows:

1. Power – Related to how much influence and impact a stakeholder can have on the results of a project [10]. It can also be defined as a person's position to others in an organization, where the higher the position the person has the greater the power to make other people do what they are told [4].
2. Legitimacy (Legitimacy) – Related to how much authority the stakeholders have [10]. Or in another perspective, the level of acceptance of the actions taken by a party within an organization, where the higher the level of acceptance from all parties, it can be said that the party acting has high legitimacy [4].
3. Urgency (Urgency) - Related to how much sensitivity to time and the level of criticality of project work. A stakeholder who always emphasizes the speed of response, and timeliness and considers the project critical can be said to have a high level of urgency [4].

In practice, each project may have different characteristics that affect these three parameters. In some regions or countries, maybe the power parameter dominates more, and company culture also influences the dominance weight of each parameter [11].

The salience diagram pattern used in the project has the shape shown in Fig. 6.

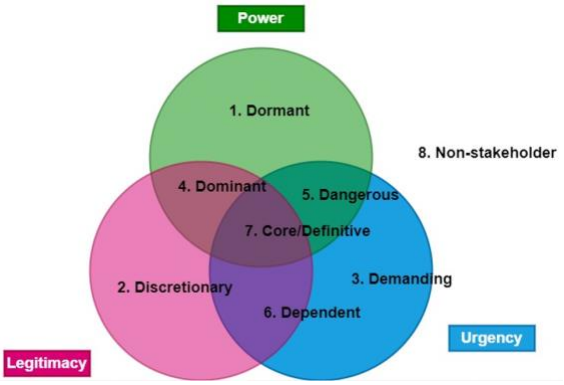

Fig. 6. Mapping parameters of power, legitimacy, and urgency along with their intersections [4].

Mitchell [4], only explained that the above diagram is qualitative, which then describes a detailed review of the characteristics of each stakeholder category (numbers 1-8). In this research, we proposed a vectorized salience diagram. It is an enhanced salience diagram that is added with an element of scale to measure the level of power, legitimacy, and urgency of each stakeholder in a more detailed manner, and a sense of direction that comes along with the vector characteristics.

The implementation of the vector to the salience diagram adds a visual indicator of how strong the classified characteristics go and the direction in which characteristics go along. Finally, we could also do a vector operation on the model and get the resultant which shows the combined characteristics and its magnitude.

The functions of adding the scale and direction include:

1. Provide a graded quantitative reference, by which the analyst can determine the position of stakeholders within a representative spectrum.
2. Clarify measurement metrics. Of course, a scale of 1-5 will provide a broader perspective than just 0-1.
3. Incorporating vector operation in the parameter mapping of each stakeholder, where the resultant vector will show the direction of the relevant stakeholder category, complete with instructions on the magnitude of the trend [12].

The following is an example of mapping the parameters of levels of power, legitimacy, and urgency using the vectorized salience model (Fig. 7 and Fig. 8).

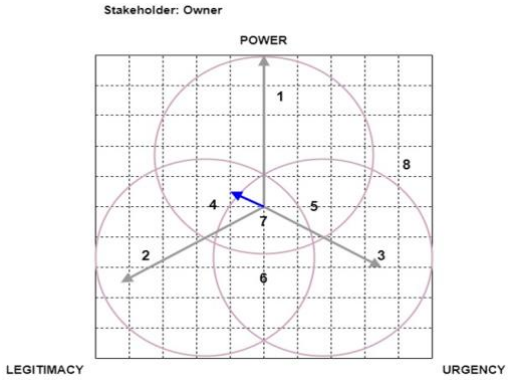

Fig. 7. Vectorized salience diagram of stakeholder with owner role.

In Fig. 7, the stakeholder whose parameters are mapped is the owner, who has parameter values as shown in the following table (Table 4). It shows the value of each factor (power, legitimacy, and urgency) along with their coordinates (X, Y) in the 2D plane as shown in Fig. 7. The coordinates value for legitimacy and urgency is calculated with formulas (1) through (4).

The resultant vector shows two competing strong factors of the Owner, which are power and legitimacy. While the short magnitude of the resultant shows significant strength on the urgency factor. Stakeholders with this kind of characteristic can be considered a high priority to be managed. The action to be taken from Table 3 should be "managed closely".

TABLE IV. PARAMETER MAPPING FOR THE OWNER ROLE.

	Stakeholder: *Owner*		
	Value	**X**	**Y**
Power	5	0	5
Legitimacy	5	-4,33	-2,5
Urgency	4	3,46	-2
Resultant		-0,87	0,5

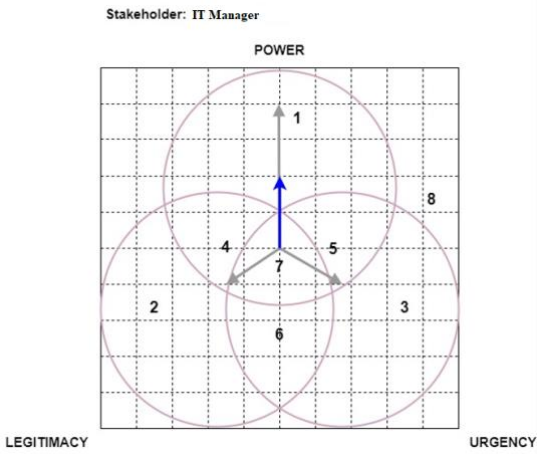

Fig. 8. Vectorized salience diagram of stakeholders with the role of Holdings IT Manager.

The owner gets the results of a row of 5, 5, and 4, for power, legitimacy, and urgency. The X and Y values are their vector mappings to cartesian coordinates. The power vector ($\vec{p}$) is aligned along the Y axis, which means that the value of X = 0, and the value of Y ranges from 1-5. The legitimacy vector ($\vec{l}$), will point 120° counterclockwise, where the X and Y values follow the following formula:

$$X = -(legitimacy \times \cos(-30°)) \quad (1)$$

$$Y = legitimacy \times \sin(-30°) \quad (2)$$

The urgency vector ($\vec{u}$), will point 120° clockwise, where the X and Y values are calculated using the following formula:

$$X = urgency \times \cos(-30°) \quad (3)$$

$$Y = urgency \times \sin(-30°) \quad (4)$$

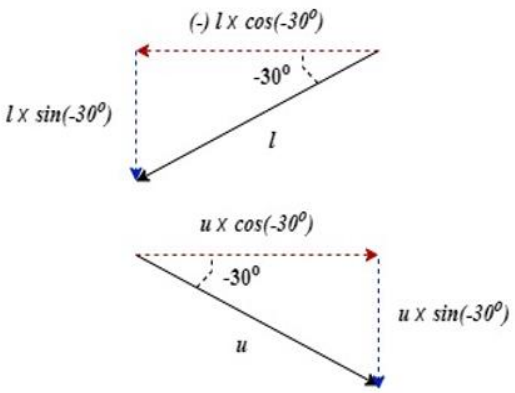

Fig. 9. Illustration of vectors ($\vec{l}$) dan ($\vec{u}$) along with their x and y components.

TABLE V. PARAMETER MAPPING FOR THE IT MANAGER ROLE.

	Stakeholder: *IT Manager*		
	Value	**X**	**Y**
Power	4	0	4
Legitimacy	2	-1,73	-1
Urgency	2	1,73	-1
Resultant		0	2

The second example is shown in Fig. 8 which plots the IT Manager factors into the coordinates. The resultant vector which is colored in blue keeps pointing upward towards the power factor but with a slightly lower magnitude than the power vector. Its factors value and their coordinates are shown in Table 5. It shows that the most dominant is the power factor.

Vectors have advantages in their characteristics, namely being able to show magnitude and direction. Vectorization of stakeholder identification data related to the parameters of power, legitimacy, and urgency allows us to obtain an accurate indication of the direction of the stakeholder category along with the magnitude of the trend. Directions give us greater certainty about the positions of relevant stakeholders

and which factors are dominant in the related stakeholders.

The use of a scale of 1-5 makes the level of granularity more precise. If with a scale of 0 and 1, we will only get direction vectors that are fixed in certain directions, and with a certain magnitude, then with a scale of 1-5, our vectors have a more varied range of directions and magnitudes and can reach to 360° from the center point, or in other words in all directions. This combination of direction and magnitude can help to show more precisely, because in practice each stakeholder has a certain level of each parameter, and the combined values of these levels would form the final characteristic value. We can see this from Fig. 7, for example where the resultant vector ($\vec{R}$) which is blue leads to the dominant classification (4) but is not too strong, in fact, it almost enters the core/definitive classification (7).

From Fig. 8, it can also be seen that the resultant vector ($\vec{R}$) points perpendicularly upward and makes the stakeholder with the position of IT holding manager dominant in the power factor. If we use the previous version of the salience diagram, certainly this kind of stakeholder will fall into the latent/dormant classification (Table 3). However, from the value of the resultant magnitude, it can be seen that its other two factors are still quite strong because the resultant magnitude value shows closeness to the core/definitive classification area which proposes the action of "manage closely".

IV. CONCLUSION

The following are the things that can be drawn as a conclusion from this research:

1. The application of calculations and mapping of the average value of each element in the power-interest grid and stakeholder cube add clarity to the tool and can assist project managers in seeing the direction of trends that dominate the stakeholder population of a project. However, for the stakeholder cube, the visualization is a little bit complicated because of the mapping effect of 3D coordinates to 2D canvas. Users need more effort to spot each of the points plotted on the three-dimensional coordinates.

2. The application of vectorization to the salience diagram also adds clarity to the tool. It makes the diagram more detailed in determining the position of stakeholder classification in the trigram quadrant. The resultant vector from the sum of the three vectors of the power, legitimacy, and urgency parameters has wide variations and can point to 360° directions in the quadrant trigram salience diagram. Besides that, it is also able to show the value of the quantity that represents the level of each parameter. This causes the mapping to be more accurate in showing the stakeholder classification. However, this enhancement also brought additional effort in drawing the vectors. It is very easy to draw the vectors manually on paper using a ruler and protractor, but it will be quite difficult to draw them on Microsoft Excel or graphics tools such as *draw.io*.

Overall, the enhancement of those three tools brought positive effects such as more clarity, quantification, and more detail added to the existing method.

The enhanced tools in this study can be applied to project management information systems for further research, especially to the stakeholder management module as a component of the analysis dashboard visualizing the data with these enhanced tools.

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REFERENCES

[1] Project Management Institute (PMI). A guide to the Project Management Body of Knowledge, 6th ed. PMI. 2017.

[2] Project Management Institute (PMI). A guide to the Project Management Body of Knowledge and the Standard for Project Management, 7th ed. PMI. 2021.

[3] R. E. Freeman. Strategic Management: A Stakeholder Approach. Cambridge, England. Cambridge University Press. 1984. http://dx.doi.org/10.2139/ssrn.263511.

[4] R. K. Mitchell, B. R. Agle, D. J. Wood. "Toward a theory of stakeholder identification and salience: Defining the principle of who and what counts." The Academy of Management Review, 1997, 22(4), 853.

[5] P. Diegmann, D. Basten, O. Pankratz. "Influence of Communication on Client Satisfaction in Information System Projects. A Quantitative Field Study." Project Management Journal, 48(1). 2017. https://doi.org/10.1177/875697281704800106.

[6] O. Schibi, C. Lee. "Project sponsorship: senior management's role in the successful outcome of projects." PMI® Global Congress 2015. EMEA, London, England. Newtown Square, PA. Project Management Institute. 2015.

[7] L. W. Smith. "Stakeholder analysis: a pivotal practice of successful projects." Project Management Institute Annual Seminars & Symposium, Houston, TX. Newtown Square, PA. Project Management Institute. 2000.

[8] C. S. Stackpole. A project manager's Book of Forms: Companion to the PMBOK Guide, 5th ed. Wiley. 2013.

[9] E. Baker. "Planning effective stakeholder management strategies to do the same thing!" PMI® Global Congress 2012. North America, Vancouver, British Columbia, Canada. Newtown Square, PA. Project Management Institute. 2012.

[10] S. Talamo. "Salience model-based stakeholder register." Projectmanagement.com. 2017. Retrieved January 18, 2023, from https://www.projectmanagement.com/deliverables/402914/Salience-Model-Based-Stakeholder-Register

[11] C. Pedrosa-Ortega, M. Hernández-Ortiz, E. García-Martí, E., M. Vallejo-Martos. "The stakeholder salience model revisited: Evidence from Agri-Food Cooperatives in Spain." Sustainability, 2019, 11(3), 574. http://dx.doi.org/10.3390/su11030574

[12] J. Vince, "History of vector analysis," *Vector Analysis for Computer Graphics*, pp. 1–7, 2021. doi:10.1007/978-1-4471-7505-6_1