Priority of Values of Project Stakeholders

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Abstract

In the research are presented principles and methods for prioritizing stakeholder values. The preconditions for the introduction of a customer-oriented approach by companies were analyzed. Also creation of project products based on the analysis of stakeholder values. As a result of the analysis of preconditions the purpose of research was described, the need to describe the values of stakeholders and the need to apply project campaigns to implement business processes to create the company's products. The principles for assessing stakeholder values are presented in the research. Within the framework of the described principles, the decision-making approaches of the stakeholders were considered. The principles of using an agile methodology in the implementation of projects to create products based on the values of stakeholders were also considered. The introduction of the presented principles is necessary to use the priorities of values in the formation of project products. A method for prioritizing the values of stakeholders was also proposed, based on the method of pairwise comparison of parameters. The tools for using the method of prioritizing the stakeholder's values at different stages of project implementation were also considered. The research examined the implementation features, developed mechanisms within the existing project management processes of the company.

To ensure a leading position, companies need to focus on the values of all stakeholders in the company's projects when creating products. The prioritization of values allows design features and quality requirements to be selected when defining project products. Ensuring these conditions is possible subject to the introduction of permanent marketing research processes in the structure of the company's processes. And also when implementing projects for creating products at each stage, focus on the results of marketing research.

Keywords [1]

Project management, stakeholders values, project products, pairwise comparison method

1. Introduction

Changes in the market and increased competition lead to the fact that companies that are unable to adapt to these changes lose customers and, as a result, cease their activities. To prevent this from happening, many company executives think about the reasons for customer refusals and loss of competitiveness of their products.

There can be several reasons for the increased competition in the market, and first, it is a freer transfer of information between countries and territories, as well as a freer exchange of goods and resources. Attempts to restrict access to goods or services of foreign companies do not solve the problem, since the penetration of information also leads to the conquest of the market. Clients are acquainted with new, more advanced products or services of competitors and, as a result, the requirements for local manufacturers increase significantly. This situation is observed in all areas,

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even in those where until recently local producers dominated. The key differences between competitive products include their quality and complexity.

It is quite difficult to create a product that would meet the customers' requirements for quality parameters and new technical capabilities and at the same time have an affordable cost price. This is due to the growing differentiation of customer groups. Each of the emerging social groups of customers has its own specific requirements for the company's products. When developing a product, companies are forced to focus on the requirements of customer groups for the quality and technical features of the product. Every year, the differentiation of social groups of clients only increases. Within the framework of already existing social groups of customers, separate subgroups are distinguished, the relation of which to the company's products is insignificant, but differ. Attempting to satisfy both subgroups of customers with the same type of product results in a drop in sales in both subgroups.

In addition to the emergence of new social groups of customers, the attitude towards the company's products in already existing subgroups is changing. This is due both to the directed work of competitors to conquer the market, and to the work of independent media. Information about new developments and product capabilities of other companies forces customers to think about changing the supplier company and switching to another product.

To meet the changing requirements for the quality and technical complexity of products, companies conduct market research. And if earlier these marketing studies were carried out only when developing a new product, now companies are forced to conduct them on an ongoing basis. By introducing business processes of constant monitoring of the interest of social groups of customers in the products of the company, they try to maintain their leading positions in the market. Based on the results of marketing research, projects are initiated to amend the line of goods and services of the company. Marketing reports are also a document on the basis of which new products and services of the company are developed.

Analysis of current trends shows the orientation in conducting marketing research on customer values. Analysis of the values of target social groups allows you to formulate requirements for the product. By analyzing the values of social groups, the company's marketers assess the degree of influence of products on the needs of social groups of customers.

Implementing a competitive approach in a company has its own complexities. Changing requirements from customers demand the creation of unique products. The implementation of unique products is possible only if the project approach is used. The implementation of new requirements for quality and technological complexity of the product is possible only by using innovative technologies. The choice of a design approach for creating new products is due to the orientation of the approaches, methods and tools of this approach towards creating unique products using unique technologies. In this way, it is possible to ensure competitive production by considering the processes of creation and production of each batch of products as projects.

In the framework of project management of the consumers of the project products, not only the end users of the main project products are considered, but all the stakeholders of the project. Various stakeholder groups are involved in the project. Each of the stakeholder groups has its own set of values and has different attitudes towards the project product. The project team must create a project product that ensures that the priority values of all project stakeholders are met.

Scientific novelty lies in the prioritization of the values of the project stakeholders. The prioritization of stakeholder value networks is valued based on the vision of all stakeholders in the project. The prioritization of stakeholder values allows us to define the requirements for a project product that can satisfy its stakeholders.

It is possible to provide a competitive advantage for a company by creating products that meet the values of stakeholders. The purpose of the research is to describe the approaches and methods for determining the priority values of stakeholders.

Research objectives:

- Principles for prioritizing values, project stakeholders.
- Development of a method for assessing the prioritization of the values of project stakeholders.
- Development of approaches to using the method within the project management processes.

2. Principles for assessing the values of project stakeholders

With a focus on the uniqueness of the product and the use of new technologies, company leaders are forced to apply methods and tools for project management. They make it possible to plan new technological processes using modern approaches and methods [1]. Project management allows you to create unique project products in accordance with the requirements of customers and other stakeholders. When planning, the project product is decomposed into its constituent elements, and a technological process is planned, because of which the necessary product properties are changed and added [2].

As a result, of the project product description, its life cycle from creation to disposal is detailed. The product manager describes all the stages that the product goes through, taking into account the properties that it must possess in order to move to the next stage of its life cycle. Analyzing the life cycle of the product by the company's specialists, the projects are identified, the implementation of which will create and offer a product to the company's clients [3]. To create and promote each product, a separate program is created, the goal of which is the successful conquest of the market by the product. Programs aimed at promoting related products are depleted into separate sub-portfolios by product groups [4].

When implementing projects, not only the satisfaction of the values of the end users of the products is taken into account, but also the other interested parties involved in the project. In contrast to the classical business processes of customer service, the wishes of all interested parties are met during the project implementation [5]. This is because the implementation of unique technological processes requires the participation of external suppliers of unique products or services. When deciding on participation in the project, the stakeholders assess the degree of interest of their participation in the project. Suppliers and contractors participating in the project expect to receive additional both tangible and intangible project products as payment. The degree of stakeholder involvement in the project depends on the level of provision of stakeholder value by the transferred project products. The higher the priority of the values being satisfied, the more the interested party has a desire to participate in the project [6]. As a result, for the successful implementation of complex innovative projects, it is necessary to involve various stakeholders in the project. For successful involvement, it is necessary that the project form products that are priority for the values of the involved stakeholders.

The number of different technologies and product components determines the complexity of the project. The more different types of products are included in the result of the project, the more difficult the product is considered and the more difficult it is to manage it. An example is modern digital devices, which include both software and hardware. A wide range of functions can be implemented within one device on one platform. The software part must successfully integrate with existing software environments and popular software products. In addition to the product itself, it is necessary to develop a support infrastructure for end users. This provides many opportunities for product development, but also requires taking into account a large number of related areas of development and development. The development of an innovative and complex product makes it possible to enter new markets, but it is also associated with a large number of all kinds of risks.

Creating a complex product requires engaging a large number of different types of stakeholders to participate in one project on one product. The vision of products and technological processes for creating project products may differ from representatives of different stakeholders [7]. The success of the integration processes depends on the correct assessment of the values of the stakeholders. In conducting the assessment, the project team should assess the stakeholder's vision for:

1) project products;
2) technological processes;
3) management processes.;
4) the format of the provided management information.

After assessing the stakeholder's vision for a number of presented areas, the project team should build a process for exchanging information and a format for its presentation [7-8]. Focusing on the values of the stakeholder, the project team forms not only the project product itself, but also an

acceptable technology for its creation. In addition, management processes are formed that can provide operational and flexible planning and rescheduling of the project [9-10].

As mentioned above, the stakeholders in determining the project product operate on quality indicators. This feature makes it difficult to determine the parameters and technological requirements of the project product. Many technical and quality requirements are determined during the design and even creation process. This feature of creating innovative products is due to the fact that the stakeholders are not fully familiar with the final product. The creation of truly unique products requires different management processes than the classic ones. That is why in recent years, flexible methods and project management tools have been widely used to implement innovative projects [11].

The use of agile project management methods and tools allows you to involve stakeholders in the workflow. Stakeholders participate in decision-making within each iteration of the project [12]. This approach, in the first place, allows more efficient use of resources and does not waste the time of workers on making changes. In addition, stakeholder participation in the decision-making process within the iteration reduces the risk of conflict in the transfer of project products. Having determined the priority values, the project team is able to offer the most suitable solution [13]. In addition, the participation of stakeholders in the management process allows you to quickly adjust both the product itself and the priority of their values [14].

3. The method of prioritizing the values of the linked sides

The method of prioritizing the values of the fixed sides is realized for the participation of experts. In addition, when carrying out an examination, a practical analysis should be carried out. Expertise on the value of the most important indicators in the assessment of the value of the specified sides and based on the value one value is greater or the lesser priority is lower than the one. In the capacity of the experts, there are representatives of the transformed parties.

A feature of stakeholder valuation processes is the high degree of uncertainty and subjectivity in the assessment. This is due to the need for stakeholders to assess their requirements and needs, which in most cases are described in quantitative terms. Stakeholders conduct the assessment based on their own scale for assessing their attitudes towards their needs and future products. There is subjectivity in the assessment of values by stakeholders. When choosing a method for conducting an expert assessment of the priorities of stakeholder values, the requirements are to change the subjectivity of the assessment and spend as little time as possible on the assessment.

The method of analysis of hierarchies has proven itself well in conducting expert evaluation. The authors analyzed various methods of comparative analysis [15] and recognized that the most suitable for solving this problem is the method of hierarchy analysis. However, its use needs to be adapted, as its classic use requires a lot of information from experts. The method of hierarchy analysis was used for expert analysis in various sectors of the economy [16-19]. In addition, the method of analysis of hierarchies was also used in assessing the effectiveness of investment projects.

Based on the results of the analysis, the authors propose to develop a method for determining the priority of stakeholder values based on the method of analysis of hierarchies, which was developed by Thomas Saati.

Using the method of analysis of hierarchies in the classical form requires additional steps and obtaining the necessary information, so a more adapted version of this method was proposed, based on the gradual comparison of values by stakeholders. Gradually comparing values, stakeholders determine which ones are more important and to what extent. Thus, the general attitude of the interested parties to all offered values is defined.

Authors describe the sequence of steps to implement the method of determining the priorities of stakeholder values:

1. Identify the stakeholder for whom it is necessary to prioritize values. The project management team can analyze the list of stakeholders and identify those stakeholders of value that do not have defined priorities or their total amount is not equal to one.

Mathematically describe this step as follows:

$$\forall Z_j, Z_j \in Z, \sum_{j}^{h} p_{ji}^{c} \neq 1, \quad (1)$$

where $\boldsymbol{Z}$ – the list of projects stakeholders;

$\boldsymbol{Z_j}$ – j project stakeholder;

$\boldsymbol{p_{ig}^{c}}$ – the priority of the i value of the g project stakeholder;

h – number of values j project stakeholder.

2. The project management team shall designate a stakeholder representative to conduct the examination. The stakeholder representative acting as an expert should have the right to determine the values for the stakeholder.

3. Conducting an interview with experts to determine the priorities of values. Experts compare values in pairs to determine how much one value takes precedence over another. The value of the estimate is written in the format from + N to -N. N values are the maximum deviation in the priority level of the stakeholder's values.

The specialists of the design office determine the level of maximum deviation. A positive value indicates how much the first indicator is more priority than the second is. A negative value indicates how much the second indicator takes precedence over the first. The results of the examination are entered in the table, an example of which is given in table 1.

4. Establishing absolute values of stakeholder values. To form absolute values, it is necessary to bring the obtained priority values to a positive form. To do this, you need to add to the value of priorities the product of the maximum priority value of the indicator and reduced by one the number of values of the stakeholder.

Mathematically describe this step as follows:

$$\forall C_{ig}, C_{ig} \in C_g, p_{ig}^{c} = p_{ig}^{c} + (h-1) * N_i, \quad (2)$$

where: $\boldsymbol{C_g}$ – the list of values g project stakeholders;

$\boldsymbol{C_{ig}}$ – i value of the g project stakeholders;

$\boldsymbol{N_i}$ – the maximum value of the priority level of the indicator of i value of the project stakeholders.

Table 1

Table of examination of determining the values of stakeholders

	C_1	C_2	…	C_i	…	C_h	Total
C_1		p_{12}^{c}	…	p_{1i}^{c}	…	p_{1h}^{co}	$\sum_{j}^{h} p_{j,1}^{c}$
C_2	$-1 * p_{12}^{c}$		…	p_{2i}^{c}	…	p_{2h}^{co}	$\sum_{j}^{h} p_{j,2}^{c}$
…	…	…	…	…	…		…
C_i	$-1 * p_{1i}^{c}$	$-1 * p_{2i}^{c}$	…		…	$p_{i,h}^{c}$	$\sum_{j}^{h} p_{j,i}^{c}$
…	…	…	…	…	…	…	…
C_{h-1}	$-1 * p_{1,h-1}^{c}$	$-1 * p_{2,h-1}^{c}$		$-1 * p_{j,h-1}^{c}$	…	$p_{h-1,h}^{c}$	$\sum_{j}^{h} p_{j,h-1}^{c}$
C_h	$-1 * p_{1,h}^{c}$	$-1 * p_{2,h}^{c}$		$-1 * p_{j,h-1}^{c}$	…		$\sum_{j}^{h} p_{j,h}^{c}$

5. Reduction of relative values to relative values. To reduce the values of value priorities to relative values, it is necessary to determine the sum of the values of all priority values of the stakeholder. Then divide the value obtained by the value of each priority of the stakeholder's values.

Mathematically describe this step as follows:

$$p_{ig}^{c} = \frac{p_{ig}^{c}}{\sum_{i}^{h} p_{ig}^{c}}, \quad (3)$$

6. The results of determining the priorities of values are entered by the project management team in the table. The template of the table is given in Table 2.

Table 2

Table of priorities for stakeholder values

	C_1	...	C_i	...	C_l	Verification
Z_1	p_{11}^{c}	...	p_{1i}^{c}	...	p_{1l}^{c}	$\sum_{i=1}^{l} p_{1,i}^{c} = 1$
...	...	...	...	...	...	
Z_j	p_{j1}^{c}	...	p_{ji}^{c}	...	p_{jl}^{c}	$\sum_{i=1}^{l} p_{j,i}^{c} = 1$
...	...	...	...	...	...	
Z_g	p_{g1}^{c}	...	p_{gi}^{c}	...	p_{gl}^{c}	$\sum_{i=1}^{l} p_{g,i}^{c} = 1$
Priority of values	$\sum_{j=1}^{g} p_{j,1}^{c}$	...	$\sum_{j=1}^{g} p_{j,i}^{c}$	...	$\sum_{j=1}^{g} p_{j,l}^{c}$	

The method of prioritizing stakeholder values should be implemented each time changes are made to the list of values. The project management team implements the method. The sum of the values of all the priorities of the stakeholder's values should be equal to one. This check will identify stakeholders that have been analyzed incorrectly. Deviations in the verification of values indicate a loss of homeostasis in the assessment of stakeholder values.

The priority of values is defined as the sum of the priorities of all stakeholders. Mathematically, this step is described as follows:

$$p_{1}^{c} = \sum_{j=1}^{g} p_{j,1}^{c}, \quad (4)$$

The calculation given in formula (4) allows determining the absolute value of the priority of the value of the project stakeholders.

7. In working with the priorities of stakeholder values, the project team uses the relative value of this indicator. Determining the relative priorities of stakeholder values is calculated as the ratio of the value of each priority indicator to the total amount of stakeholder values priorities.

The calculation of the relative values of the priorities of stakeholder values will be described as follows:

$$p_{i}^{c} = \frac{p_{i}^{c}}{\sum_{i}^{l} p_{i}^{c}}, \quad (5)$$

Using relative value, the project team tracks not only which value has higher priority but also how much a value is more important to a stakeholder than others are.

4. Implementation of the method within various stages of project management

The method for prioritizing the values of project stakeholders can be used in various project management processes at the stages: initiation, planning and implementation. Let's consider the features of using this method at various stages of project management.

At the stage of project initiation, company leaders determine how realistic it is to implement the proposed project. The assessment process identifies the types of stakeholders who would be interested in participating in the project. In addition, the proposed project product is determined with a set of technical parameters and requirements for them. At this stage, there is a process of agreeing on the types of stakeholders and the technical requirements of the project product.

A feature of this stage is the fact that in determining the stakeholders at the initiation stage we are talking about a role with a set of requirements and wishes for the product. Based on the experience of implementing projects in the past, the company's employees assume the possible interest of interested parties in the product being developed.

Accordingly, the definition of the list of values of the stakeholders of their assessment is taken based on information from the company's already implemented projects. The difficulty with such an assessment is that the company may not have enough information to implement projects to create innovative products. Most of the conclusions are based on the opinions of internal and external experts. Applying a stakeholder value prioritization method without sufficient information from an expert can lead to bias. To clarify the information, it is worthwhile to implement the method several times based on different, albeit incomplete, data sets and compare the results. It is worth highlighting those products for which there is no disagreement in the results of the method implementation. You should also highlight additional iterations when planning a project. As part of these iterations, clarify those parts of the project product for which there is sufficient information and there is no disagreement in the assessment.

At the planning stage, a list of the main stakeholders of the project is determined. To validate its assumptions, the project team should arrange for a value prioritization method to be implemented using key stakeholder representatives as experts. An important factor is the involvement of several representatives from the same stakeholder from among the decision makers. The results of the implementation of the value prioritization method will clarify the vision of the main stakeholders on the project products.

When planning a project, both the structure and list of project stakeholders and the structure and list of project products can be subject to significant decomposition. Accordingly, when these structures change, the project team should update the prioritization of stakeholder values. The loss of relevance in the list of priorities of stakeholder values leads to a loss of interest on the part of stakeholders in the products implemented in the project.

The stage of project implementation can take a significant period. During the implementation of the project, a large number of external factors influences stakeholders. Their initial interest in the products of the project can be reduced or completely lost. The project team must keep track of the changing interests of project stakeholders. Depending on the dynamics of external change, the project manager should establish the frequency of implementation of the method for prioritizing stakeholder values. By controlling the dynamics of changes in the priorities of the values of stakeholders, the project team can anticipate negative trends and make appropriate adjustments to the technical requirements for the project's products. Obsolescence of the project product, both technical and moral, is a significant risk for the project.

Flexible methods are used for management while implementing innovative projects. The project is dividing into iterations. The project team should determine the assessment of the party involved in the integration. For the parties to the iteration, their values are highlighted, as well as products that could help the highlighted values. Having identified the products that will be created in the implementation process, the main tasks for their creation are described, as well as the resources required for implementation. Stakeholders providing resources for the iteration tasks are also added to the iteration parties list. It is important to immediately determine the duration of the integration. It can take anywhere from two weeks to a month. The duration of the iteration depends on the level of

uniqueness of the product and the innovativeness of the project. The higher the innovativeness of the project, the shorter the iteration duration. The level of innovation of the project depends on:

1) a large number of different parties types;
2) a large number of different sub-products included in the product;
3) the uniqueness of the requirements for the products of the project;
4) dynamic changes in the external environment on projects.

In addition to the fixed duration of the iteration, a fixed amount of the company's financial resources, which it is ready to spend on the iteration, must also be established.

The values of these parameters are needed to determine the list of tasks that can be implemented within the iteration. If the specified iteration duration and budget does not cover the selected list of iteration tasks, the project team decides to change the list of iteration parties. Using the described method of priority values of the parties, a rating of the least priority values is established. Based on the updated list of values, updated product specifications. The project team implements reducing the requirements for the iteration products by reducing the tasks performed in the iteration. Unnecessary requirements for the project's products are carried over to the next iteration. The availability of additional financial resources within the iteration allows you to implement additional tasks for creating projects within the iteration.

Key factors in the choice of products, values, products and objectives, provide homeostasis in the exchange of products and resources. The success of the project depends on meeting the requirements of the parties' requests.

It should be noted that it takes a long time for the project team to implement the stakeholder prioritization method frequently. Use information systems should be developed to optimize this process. The use of information systems will allow not only to reduce the implementation time, but also to accumulate statistical information. Analysis of the accumulated information will allow tracking the dynamics of the priority values of stakeholders and creating new proposals for a constantly changing market.

5. An example of using methods of searching for values of third-party programs

To illustrate the use of the stakeholder value prioritization method, let us consider an example of stakeholder value priority analysis for a construction project. The purpose of the analysis is to determine the priority values for the selected social groups. Based on the results of the analysis, the priority areas of construction and development of the residential facility will be determined.

The analysis involved representatives of the following social groups:

- clients working with children and without a car;
- clients working without children with the machine;
- customers working with children with a car;
- clients, no children, no car, unemployed pensioners.

For better analysis, stakeholders were divided into four separate groups. Each group will be asked to rate a pairwise constraint list of values.

For the analysis, the following list of values was proposed:

- the area of the apartment;
- distance to the metro;
- availability of parking;
- presence of a kindergarten.
- availability of a store.

To simplify the assessment process, experts are encouraged to use a fixed priority scale from +10 to -10. To assist in the assessment, the experts are offered a table describing the priorities presented in Table 3. By comparing the two values, the experts determine which of the values is more important to them and by how much. According to the third step of the method described above, we will conduct an expert assessment and determine the priorities of the values of the group of the first group of clients. The results of the work of the expert group of clients working with children and without a car

are presented in Table 4. During the assessment, the values were compared only once. As a result, the priority values were filled above the diagonal. The values below the diagonal were taken.

Table 3
Priority description table

Priority value	Priority description
10 – 7	Value is much more important
6 – 4	Value is more important
3 – 0	Value is more important than
0 – (-3)	Value is less important
(-4) – (-6)	Value is not important than
(-7) – (-10)	Value is much less important

Table 4
The results of an expert assessment of working clients with children and without a car

	Apartment area	Distance to underground Distance to underground	Parking availability	Presence of a kinder-garten	Store availability	Total
Apartment area		3	9	2	2	16
Distance to underground	-3		9	-4	-2	0
Parking availability	-9	-9		-5	-3	-26
Presence of a kindergarten	-2	4	5		1	8
Store availability	-2	2	3	-1		2

By implementing the fourth step of the value priority assessment method, we will bring the obtained priority values to integer values. The results of this step are presented in Table 5.

Table 5
The table with the results of an expert assessment by priorities reduced to integer values

	Apartment area	Distance to underground	Parking availability	Presence of a kinder-garten	Store availability	Total
Apartment area		13	19	2	2	36
Distance to underground	7		19	6	8	40
Parking availability	1	1		5	7	14
Presence of a kindergarten	8	14	15		11	48
Store availability	8	12	13	9		42

Let us calculate the relative values of the priorities both for the first social group of clients and for the three remaining social groups of clients. The results of the implementation of the method for determining the priority of values are given in Table 6. The results of the test showed that the homeostasis of values is not violated and the total sum of all relative priorities for all social groups of clients is equal to one. As a result of the analysis (Table 5.), we can draw a conclusion, that for the groups of stakeholders represented, the most priority is the size of the living space of the proposed

housing. The next priority is the presence of a store near the property. The availability of parking spaces is ranked third in priority for selected customer groups. The distance to the metro and the presence of a kindergarten in the vicinity are respectively in fourth and fifth place in priority.

The implementation of the presented methods requires additional resources and labor on the part of the project team. In addition, the presented materials do not show methods and tools for prioritizing stakeholders.

Table 6

A table for assessing the priorities of the values of different groups of project stakeholders

	Apartment area	Distance to underground	Parking availability	Presence of a kinder-garten	Store availability	Verifi-cation
Clients working with children and without a car	0,20	0,22	0,08	0,27	0,23	1,00
Clients working without children with a car	0,33	0,04	0,48	0,03	0,12	1,00
Clients working with children with a car	0,19	0,35	0,25	0,01	0,2	1,00
Clients, no children, no car, unemployed pensioners	0,60	0,02	0,05	0,01	0,32	1,00
Priority of values	1,32	0,63	0,86	0,32	0,87	

As practice shows, the priority of stakeholders affects the assessment results of the priority of the values of stakeholders. The prioritization of project stakeholders will be presented in future publications on this research.

6. Conclusions

Based on the research data, it can be assumed that the implementation of complex innovative projects is possible if the values of the selected social group of clients are satisfied.

1) In the context of heightened competition, it is necessary to conduct regular marketing research on the priority of stakeholders' values at all stages of the project.

2) Priority of stakeholder values determines the priority of the requirements for the project's product. Product requirements are generated based on the analysis of the requirements of the priority stakeholders.

3) Bringing on the priority stakeholders is possible provided that their important values are met. To retain priority stakeholders in the project, it is necessary to create products that satisfy their values.

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