

Strategy for Automation and Digitalization in Indonesian Aerospace Manufacturing

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Abstract

Purpose: Strategy formulation is part of organization design study to evaluate decision thoroughly, then enable organization to achieve company goal. This study aims to formulate strategy of automation and digitalization for PT XYZ, to be ready for welcoming future growth of demand by maintain competitive cost within the same industry.

Method: The study collects primary data from focus group discussion with selected participant of PT XYZ, located in Bandung, Indonesia, with participant selection based on information rich person reference. Data collection and analysis utilize qualitative and quantitative approach, and utilize three steps of strategy formulation (input stage, matching stage and decision stage).

Results: Strategy formulation steps as per theory, applicable to finalize strategy to support industry 4.0 transformation at PT XYZ. Combine steps with latest internal and external factor analysis method, such as PESTLE, VRIO, Porter Value Chain analysis, and QSPM, help broaden the perspective of the participant during discussion. The study resulted eight strategies, which then simplified by data reduction approach to be four.

Conclusions: The study successfully formulates PT XYZ's digital transformation strategy for Industry 4.0 by integrating comprehensive strategic tools such as PESTLE, Value Chain Analysis, VRIO, SWOT, TOWS, and QSPM. Strategy execution is prioritized in three phases: establishing an organizational hierarchy aligned with internal capabilities, adapting appropriate technologies to support human functions, and enhancing local and intercompany networks.

Limitations: This study is limited by its qualitative reliance on focus group discussions, which may be influenced by participant bias and lack real-time implementation feedback.

Contributions: By conducting this study, author expect it will prove the practical implementation of strategy formulation in industry 4.0 transformation for aerospace industry in Indonesia and Asia.

Keywords: *Automation and Digitalization, Aerospace Component Company, PESTLE, VRIO*

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1. Introduction

PT XYZ is a manufacturing company located in Bandung, Indonesia This company is part of corporate parent company, an American multinational aerospace and defence conglomerate headquartered in Arlington, Virginia. It is one of the largest aerospace and defence manufacturers in the world. Currently, the company having 416 employees with 200+ active part number. The factory mainly produces aircraft component use for actuate aircraft movement horizontal, vertical, and slower movement during landing, with main supply destination to Airbus A320 series. The output product of PT XYZ, majority deliver to sister company in United Kingdom and France, to be assemble with other components from different location, before send final assembly to Airbus facility.

As supplier of Airbus company, any demand fluctuation from this company will need to consider by all its supplier thru proper planning forecast, to ensure no delivery service disruption. PT XYZ performs LRP (Long Range Plan Analysis), following Operation and Supply Planning cycle. The activity inside LRP is planning resource, logistic, include financial plan. The activity known as Operation and Supply Planning Activities, in theory of Operation and Supply Chain Management. There are three ranges of planning activities based on years of visibility. Jacobs and Chase (2018) mentions the three ranges as long range planning, which done annually with coverage of greater than one year, then second type is intermediate range planning cover three to eighteen months with period review in weekly, monthly or quarterly. Then, the last type is short term planning with coverage of one day to six months with frequent review everyday or weekly basis.

Looking at Airbus Global Service Forecast in Shparberg and Lange (2022) it shows that by 2041, new generation aircraft which are A220, A320neo, A350, etc, will represent more than 95% of the fleet. Estimated there will be approximate thirty nine thousand aircrafts to be deliver between 2022-2041. This forecast cascade to all Airbus supplier, and start to be seen as well by PT XYZ thru LRP (Long Range Plan). With potential company growth, that seen thru LRP (Long Range Plan), showed 60% increase in next 5 years. However, the challenge to stay competitive in cost, continue increase the tension to the factory. Yearly increase employee wages and raw material price, consider as non-avoidance factor. To stay competitive, factory should start to consider a proper manage of digitalization and automation more serious, to be able answer the challenge, by consider digitalize or automate the manufacturing and operation activity.

Industry 4.0 start to be popular across manufacturing in 2011. This concept focused on inter connectivity, big data, cyber physical system. It also known as Internet of Things (IoT), which merges physical operations with smart process, powered by artificial intelligence and automation (Rahman et al., 2023). Indonesia starts to embrace the journey of industry 4.0, when Indonesia Industrial Ministry launch “Making Indonesia 4.0” program in 2018. Indonesia has aspiration to global top 10 economy by 2030. Align to Indonesia Industrial Ministry concept of Making Indonesia 4.0, PT XYZ benchmark how Indonesia automotive industry, which is one of five priority sectors perform their transformation. In addition, a visit to sister company in Singapore also performed to understand the concept and learn possible adaptation within the organization. Looked at business unit vision, which flow down annually thru policy deployment, digitalization became one of the expectations to be start in operation. This expectation aligns with industry 4.0 in manufacturing sector, which expected to create a cost competitive organization.

The first step launch by PT XYZ General Manager in 2020, by initiate Digital Council, with steering committee consist of three senior leadership and organizing committee member who perform part time activity on automation and digitalization activity. The team has frequent discussion to brainstorm idea, initiate study and execute agreed program.



Figure 1. PT XYZ Digital Council Organization
Source: Person analyze (2023)

The selection of technology will be important for low-cost country manufacturing, which already have competitive labour cost compare to other country. However, with the implementation of automation and digitalization in several high-cost country increases the pressure of labour cost competition. In order to stay competitive, a strategy of automation and digitalization should be effectively selected. For stay competitive and face the challenge, PT XYZ should formulate a strategy of automation and digitalization transformation.

2. Literature Review

2.1 Industry 4.0 Readiness

With the launch of Making Indonesia 4.0 program, Indonesia has aspiration to be top 10 global economy in 2030. There are five sectors selected as the industry pioneer, namely food and beverage, textile and apparel, automotive, chemical industry, and electronics (Taslim, 2023). These five sectors represent 70% contribution to manufacturing, 65% manufacturing export and 60% workers contribute to these sectors (Kemenko, 2022).

Mubyarto and Sohibien (2019) performed research to validate the competitiveness of these five sectors by compare to other ASEAN country. Result showed, by average 2000 to 2015, the competitiveness sector was the food and beverage industry ranked third in other ASEAN countries, and the textile and apparel industry ranked fourth. Unfortunately, the chemical industry, electronic industry, and the automotive industry have no competitiveness. Interesting insight for automotive show there is no ASEAN country has good competitiveness.

Since PT XYZ has desire to start the digital transformation, it is important to explore the province region readiness. This knowledge will be support the external factor analysis in strategy formulation. Susilo (2020) performed study by utilize secondary data from central bureau of statistic Indonesia on several parameters. Based on the research, it shows that West Java include top 10 province on internet penetrant user rate, ICT (Internet and Communication Technology) access and infrastructure, gross regional domestic product (GRDP), and Regional Economic Portfolio Matrix Analysis. Only human development index that show 11th position. Based on the study result, it shows that West Java infrastructure will help PT XYZ to embrace industry 4.0 transformation in the company.

2.2 Strategy Formulation

Strategic management defined as art and science to formulate, implement, and evaluate decision thoroughly, to enable organization to achieve objectives (Djordjevic, 2021). Its process based on belief that organization should monitor internal and external events and trends, to change in timely manner. Firms are similar to organisms, must ‘adept at adapting’ or will not survive (David, 2011); (Sumaryono & Rony, 2024).

Strategy formulation can be divides into three steps, input stage, matching stage and decision stage. The overview shows in figure 2.

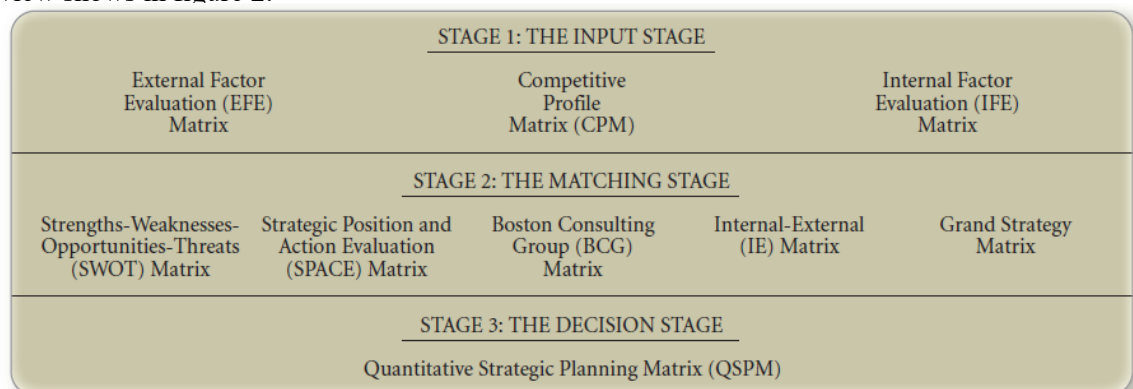


Figure 2. Strategy Formulation Framework

Source: (David, 2011)

2.2.1 Input Stage

The first input stage aims to provide organization initial review. There are two evaluations performs at this stage, namely external and internal factor evaluation, as well include competitive profile matrix. External factor evaluation will refer to economic social, cultural, demographic, environmental, political, legal, governmental, technological, and competitive trends that could provide benefit or risk to the future (David, 2011). Sakinah and Wibowo (2021) utilize PESTEL and Porter Five Forces analysis at their study to define external factor for scanning the environment aspect. Similar approach to use PESTLE also shows in study conduct by (Rousul & Hidayati, 2022). The external factor analysis will be consider as opportunities and thread to be consider by organization, as David (2011) stated that both opportunities and threats can be key external factors.

There are several methodology options to perform internal factor evaluation. First method known as as VRIO (Value, Rare, Imitate, Organized). This framework propose by Jay Barney, which perform the analysis thru ask several question to develop VRIO analysis for the organization. Next method known as RBV (Resource Based View), with the perspective of gain competitive edge thru argument that company's internal assets hold greater significance than external factors in attain and maintain competitive advantage. According this concept, resources are important elements for company to find opportunities and anticipate threats. VRIO and RBV analysis used by (Sakinah & Wibowo, 2021) to determine the internal factor analysis in the study.

Third internal factor analysis method is Value Chain Analysis, which perform the analysis on primary and support activities (Elistioko, Anggraeni, & Indrawan, 2023). Subramanian, Viswanathan, and Parveen (2019) mentioned that the generic value chain developed by Porter is a very logical and important practical tool, generally for manufacturing industries. Primary activities involve product manufacturing, product distribution and after sales activity. While support activities typically will provide assistance to primary activities within the firms.

2.2.2 Matching Strategy

Strategy is sometimes defined as the match an organization makes between its internal resources and skills and the opportunities and risks created by its external factors (David, 2011). The matching stage depend on the input stage result. Strength and weakness will be resulted from internal factor evaluation, while opportunity and threads will refer to the output of external factor evaluation. Known five techniques for matching stage, namely SPACE (Strategic Position and Action Evaluation) Matrix, BCG (Boston Consulting Group) Matrix, IE (Internal-External) Matrix, Grand Strategy Matrix and SWOT (Strength Weakness Opportunity Thread) Matrix, SWOT analysis has an old fashioned feel about it but is a framework which has stood the test of time and can readily incorporate ideas from newer approaches (Desiyanti, 2016); (Puyt, Lie, & Wilderom, 2023). Matching internal and external success factor will derive key to generate alternative strategies.

Strengths-Weakness-Opportunities-Threats (SWOT) matrix, help identify all four factors accordingly. By perform the analysis, the organization will understand which strength have to continue build, eliminate weakness, opportunities to be explore and which treats require a countermeasure (Barja, 2024). Perform SWOT matrix will open the potential four strategies, which are : SO (strengths-opportunities), WO (weaknesses-opportunities), ST (strengths-threats), and WT (weaknesses-threats). SO strategies will take firm internal strength to take advantage of opportunities, WO will identify a weakness improvement action by took external opportunities advantage. ST strategies will use internal strength to meet threats of external environment, while WT tactics directed to reduce internal weakness and avoid external threat (David, 2011).

Previous paragraph which states four type strategies is refer to Weihrich (1982) which introduce TOWS Matrix to be use as situational analysis of strategies in his journal. The step connect to previous stage of internal and external analysis of the firm. It mentions that thru external environment analysis, threat will be put in box "T", while opportunities considered, populate in box "O". Then, the internal environment assess for its strength and weakness, and put in the box of "S and W". The illustration show in figure 3.

Step 1. * Prepare an Enterprise Profile: (a) the Kind of Business; (b) Geographic Domain; (c) Competitive Situation; (d) Top Management Orientation			
Step 4. Prepare a SW Audit in: (a) Management and Organization; (b) Operations; (c) Finance; (d) Marketing; (e) Other			
Internal Factors	Step 5 Develop Alternatives Step 6. Make Strategic Choices Consider: Strategies, Tactics, Action Steps 1 to 6. Test for Consistency. Also Prepare Contingency Plans. (Step 7)	List Internal Strengths (S): (1)	List Internal Weaknesses (W): (1)
External Factors			
Step 2. Identify and Evaluate the Following Factors: (a) Economic, (b) Social, (c) Political, (d) Demographic, (e) Products and Technology, (f) Market and Competition Step 3. Prepare a Forecast, Make Predictions and Assessment of the Future	List External Opportunities (O): (Consider Risks Also) (1)	SO: Maxi—Maxi	WO: Mini—Maxi
	List External Threats (T): (1)	ST: Maxi—Mini	WT: Mini—Mini

* The Steps Are Suggestive and May Vary

Figure 3. Process of Corporate Strategy and TOWS Analysis
Source: (Wehrich, 1982)

(Azra, 2022) further mentions that TOWS analysis will indicate four conceptually distinct alternatives. The four are WT, WO, ST and SO strategy. Detail as follow; WT Strategy (mini mini), with aims to minimize weakness and threat of the company. WO Strategy (mini-maxi), attempts to minimize weakness and maximize opportunities. ST Strategy (maxi-mini) which based on strength of organization to deal with external threat. The aim is to maximize the former while minimizing the latter. SO Strategy (maxi-maxi). Any company would like to be in position that they can maximize strength and opportunities. Successful enterprise will attempt to get a situation, where they can work from strength to take advantage of opportunities.

2.2.3 Decision Stage

After matching stage in previous section, the step will deliver feasible alternative strategies. There will be several strategies propose that required to be select on prioritization list, by provide rating at the scale of 1 to 4. Methodology to be use at this stage is QSPM. Quantitative Strategic Planning Matrix (QSPM) will determine attractiveness of feasible strategies action. QSPM will provide indicator which strategies are best. The tool will evaluate the strategies objectively. It requires good intuitive judgement, to properly rate the option, and take best decision to organizations. QSPM use the internal and external analysis in input stage, then continue matching stage output, which is alternative strategies.

In the study of Alhassan, Adu-Gyamfi, and Asafo (2020) mentioned that QSPM is a high level tool for evaluate strategic decision. The tool provides objective analytical method to compare feasible strategies/actions. The study also shows that QSPM is excellent tool for assimilating and prioritizing key internal, external, and competitive information needed for devising an effective strategic plan. There are six steps recommend by QSPM. Step one, listed SW (internal factor) and OT (external factor) in left column, step two, assign weight factor. Follow by step three, listed alternative strategies from matching stage at top row, step four, determine attractiveness score (AS) which indicate relative attractiveness of individual strategies at given alternatives. Number provides by weigh factor impact to selected choice of strategies. Follow by step five, for calculate TAS (Total Attractiveness Score), then last stage at step six which calculate sum of TAS.

3. Methodology

3.1 Data Collection

This study utilizes primary data collection method from PT XYZ. Data collection technique uses mixed method, combine qualitative and quantitative. Quantitative approach basically measure numeric data, analyse with statistical and graphic technic to examine variable's relationship (Saunders, Lewis, & Thornhill, 2023). In this study, writer use QSPM (Quantitative Strategic Planning Matrix) approach to collect and analyse the numeric data.

Qualitative method basically is non-numeric data gathering. It has synonym of data collection (such as interview) and data analysis procedure (with data categorization), which generates non-numerical data (Saunders et al., 2023). Author uses focus group discussion with selected stakeholder. Recommended best practice refer to 6 to 8 person. However, it will also depend to complexity of research topic to decide number of participants. Recommended to have composition participant with critical knowledge to the research topic, called as "information rich" person (Saunders et al., 2023). Participant selection for join focus group discussion in strategy formulation, selected, based on scope knowledge of internal and external factors. Below is figure of focus group discussion participants.

Table 1. Focus Group Discussion Participant

No	Job Title	Years
1.	General Manager	7 years
2.	Finance and IT Director	18 years
3.	IT Manager	18 years
4.	Continuous Improvement Manager	9 years
5.	Continuous Improvement Senior Staff	9 years
6.	IT Senior Staff	10 years

Source: Data study (2023)

3.2 Data Analysis

Doody, Slevin, and Taggart (2013) provided key points of focus group discussion analysis should ensure researcher generate rich date, follow by data familiarization, writing memos on statements, indexing statements, and the last is creating themes and interpret data. An additional reference use for qualitative data analysis taken from Rijali (2018) which indicates the activities in data analysis by data reduction, data display, and conclusion drawing / verification. **Data reduction** means summarizing data, choosing things that corner, focusing on important things, and looking for themes and patterns. The data source of this step, use memo recording of participant's input, include written input based on topics explore during the discussion. **Data display** taken from theme summary of written evidence. **Conclusion drawing** summarize focus group discussion, following all memo collected.

Quantitative analysis focus for strategy formulation final step. There are 6 steps to develop a QSPM (Quantitative Strategic Planning Matrix) approach (David, 2011). List down key external and internal factors at first column, Assign weight to each factor, Examine matching matrices, Determine attractiveness score (AS), Compare total attractiveness score (Taslim), Sum total attractiveness score (Taslim). To provide clear framework of the strategy formulation use for this study, figure 4 will provide more overview.

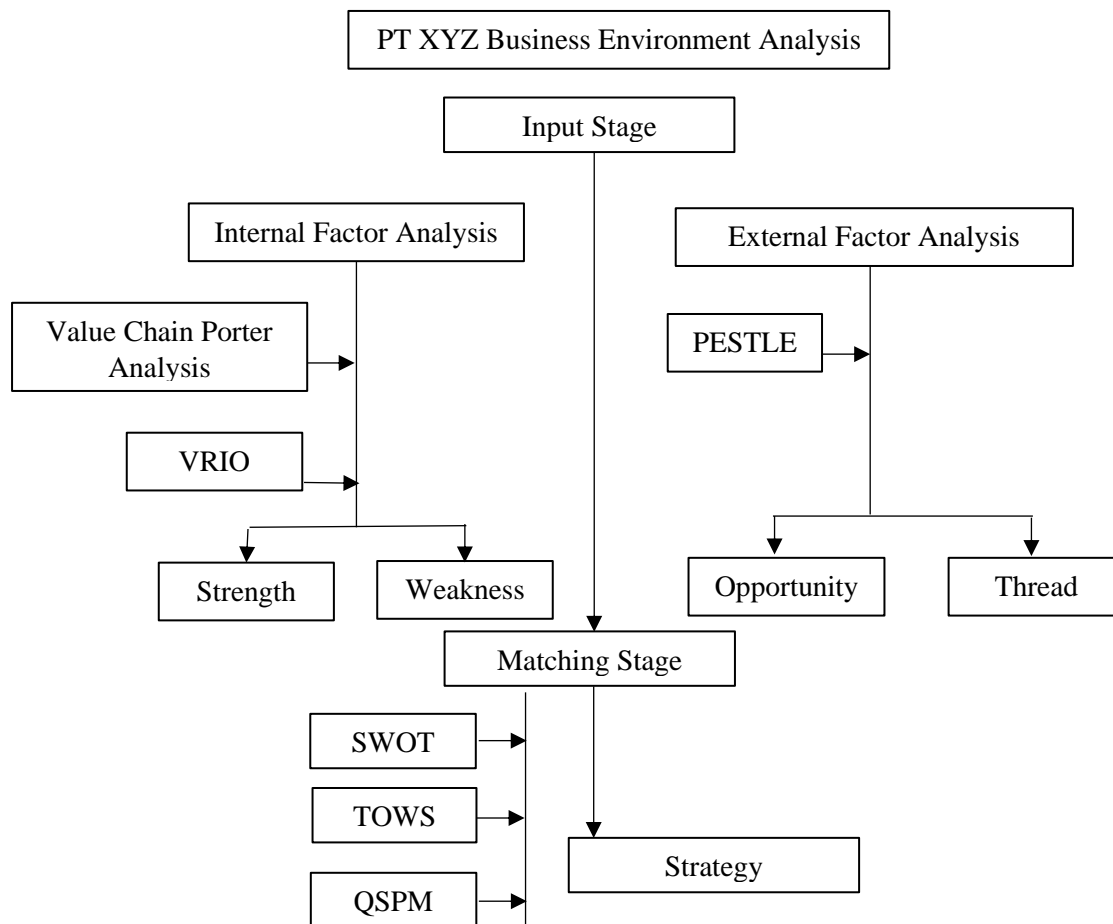


Figure 4. Research Framework
Source: Person analyze (2023)

4. Results and Discussions

4.1 Input Stage

At this stage, a focus group discussion held to get six participants input on internal and external factors, to use as strength, weakness, opportunity and thread identification. Group activity use brainstorming discussion, and populate the analysis thru post-it written, then summarize the result. The discussion, able to produce PESTLE analysis of external factor with three items in Political, four aspects in economic, three factors in social, five items in technological, follow by four factors in legal and one at environmental. Summary analysis show in figure 5.

<div>P</div> <div>POLITICAL</div>	<ul style="list-style-type: none"> a) Trade Wars, Political Stability, Geopolitics (US-China Conflict, restricted of using China product) b) Less government support/incentive for industry 4.0 c) US (Western) Ally Brand - easy connect with our system
<div>E</div> <div>ECONOMIC</div>	<ul style="list-style-type: none"> a) Uncertain on Economics situation (Volatile), impact to Exchange rate, unemployment rate, growth b)Slower economic growth may impact to less capital investment capability c) Site size scale will create limit to the capability cost spending allocation for digitalization and automation d) Aircraft market grow trend year over year e) Automation and Digital give competitive advantages

<div>S</div> <div>SOCIAL</div>	<ul style="list-style-type: none"> a) Automation = Jealousy from worker (worry of losing job, due to less human worker) b) Change demographic (nationalisation and customer perspective) c) Give better quality of life (with automation/ digitalization at right place&qty of technology)
<div>T</div> <div>TECHNOLOGICAL</div>	<ul style="list-style-type: none"> a) Big variety range of technology being used, due to rapid change and shorten technology lifecycle nowadays b) Many benchmark of new technology from external source c) Innovation, cyber security, new technology d) Data sharing, data storage, data backup, data recovery e) AutomationTechnology in Indonesia
<div>L</div> <div>LEGAL</div>	<ul style="list-style-type: none"> a) Data privacy should follow, even Indonesia government not apply yet b) Corporate Policy to control open source/ free software c) Technology or brand used should follow DT policy and not allowed for others, which create constraint due to local level availability/support d) Connecting or centralized data is difficult
<div>E</div> <div>ENVIRONMENTAL</div>	<ul style="list-style-type: none"> a) Sustainability, waste disposal, climate change awareness and green initiative

Figure 5. PESTLE Analysis of PT XYZ

Further analysis performed by focus group discussion participants is the internal factor analysis. Prior performed VRIO, identification of value chain Michael Porter analysis conducted. Same approach found in the study conducted by (Wandrial, 2011). A clear identification of resources is required to be understand by the organization, to be able ensure proper VRIO analysis will consider all internal resources, both primary and support activities. Internal analysis result cover value chain Michael Porter and VRIO analysis for PT XYZ, show in figure 6 and 7.

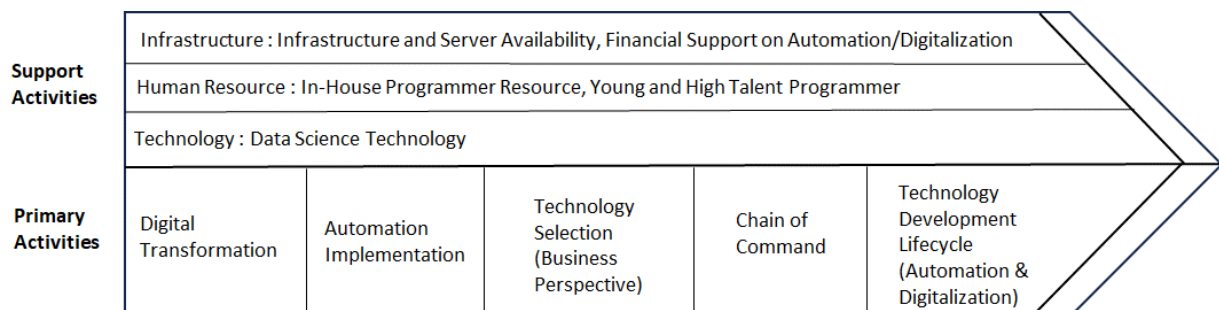


Figure 6. Value Chain Michael Porter Analysis

Table 2. PT XYZ VRIO Analysis

Resources	Valuable <i>This resource add value to customer</i>	Rarity <i>Resource is rare, organization don't have it</i>	Inimitability <i>Resource difficult imitate to others</i>	Organized <i>Is our team organized to take advantage of this resource ?</i>	Remark
In-House Programmer Resource	V	V	X	X	Strength, with non organized and not imitable within larger organization
Infrastructure and Server Availability	V	X	V	V	Strength
Data Science Technology	X	X	V	X	Weakness, not yet utilized
Young and High Talent Programmer	V	V	X	X	Strength, with non organized and not imitable within larger organization
Known process aerospace company	X	V	X	X	Weakness, no value add to automation/ digitalization initiative
Chain of command	X	V	X	X	Weakness, not yet established
Financial Support on Automation/Digitalization	X	V	V	X	Weakness
Digital Transformation	V	X	V	X	Strength, with lack of organized and integration
Automation Implementation	V	V	V	X	Strength, with lack of organized and knowledge
Technology Selection (Business Perspective)	V	V	X	X	Weakness, with lack of organized and budget allocation
Technology Development Lifecycle (Automation & Digitalization)	X	X	V	X	Weakness, not yet established

Source: Data analyze (2023)

4.2 Matching Stage

After complete identification of internal and external analysis in input stage, now complete factor of strength, weakness, opportunity and threat are completed. Internal factor analysis provide result on strength and weakness, while external analysis use as the source of opportunities and threats. All information ready, to be assembled for SWOT. Prior that, a data reduction was performed, to ensure there is no duplication on the factors based on focus group discussion output. Figure 8 show SWOT Analysis result.

Strength In-House Programmer Resource Infrastructure and Server Availability Automation Implementation US (Western) Ally Brand - easy connect with our system	Weakness Unexplore Data Science Technology Known process aerospace company Chain of command is not Clear Financial Support on Automation/Digitalization Technology Selection (Business Perspective) Lack of organized and integrated Digital Transformation Technology Development Lifecycle (Automation & Digitalization) is not establish
Opportunity Aircraft market grow trend year over year Automation and Digital give competitive advantages Give better quality of life (with automation/digitalization at right place&qty of technology) AutomationTechnology in Indonesia	Threat Trade Wars, Political Stability, Geopolitics (US-China Conflict, restricted of using China product) Uncertain on Economics situation (Volatile), impact to Exchange rate, unemployment rate, growth Automation = Jealousy from worker (worry of losing job, due to less human worker) Corporate Policy to control open source/ free software Technology or brand used should follow DT policy and not allowed for others, which create constraint due to local level availability/support Sustainability, waste disposal, climate change awareness and grow initiative

Figure 8. PT XYZ SWOT Analysis

The next step after SWOT, research continue with TOWS matrix creation. This step is important, to understand SO, WO, ST and WT strategies. Each item of strength and weakness positioned in horizontal column, while opportunities and thread put in vertical row. Then middle area intersection is utilized to state the strategies. Figure 9 illustrate TOWS Matrix result of PT XYZ.

Internal Factor	Strength	Weakness
	S1 In-House Programmer Resource S2 Infrastructure and Server Availability S3 Automation Implementation S4 US (Western Allies), easy connect to the system	W1 Unexplore Data Science Technology W2 Known process aerospace company W3 Lack Chain of command W4 Less Financial Support on Automation/Digitalization W5 Weak Technology Selection (Business Perspective) W6 Lack of organized and centralized Digital Transformation

External Factor		W7 Lack of Technology Development Lifecycle (Automation & Digitalization)
Opportunities O1 Growth aircraft demand over the year O2 Competitive advantages by implement automation/digitalization O3 Better quality of life for employee O4 Automation Technology Support in Indonesia is available	SO Strategies S1S2O1O2 Utilize in-house resource capability to enabler competitive SPQDC performance S1O3 Enrich people capability and experience for new technology S1S2O3 Automation/digitalization should become enabler of safety and quality of living improvement in our working environment	WO Strategies O1O2W4 Optimize investment on automation/digitalization towards demand growth O1O2O3W3 Create clear chain of command to enabler integration and change management for strengthen automation/digitalization deployment
Threats T1 US-China conflict, restriction of using China product T2 Uncertain on Economics situation (Volatile), impact to Exchange rate, unemployment rate, growth T3 Automation = Jealousy from worker (worry of losing job, due to less human worker) T4 Corporate Policy to control open source/ free software T5 Technology or brand used should follow DT policy and not allowed for others, which create constraint due to local level availability/support T6 Sustainability, waste disposal, climate change awareness and grow initiative	ST Strategies S1T5 DT policy compliance become culture of automation/digitalization initiative	WT Strategies T3W3 Technology adapt based on need to support and help human task T1W1W4W5 Strengthen local and inter-company network and partner to explore new technology

Figure 9. TOWS Matrix for Strategy Formulation of PT XYZ

There are eight strategies identified thru TOWS matrix, by create intercept between vertical, opportunity/threat, and horizontal, strength/weakness item. Listed strategies show in figure 9, left box stated as rev. 1. Based on discussion with focus group discussion participants, stakeholder requested to simplify and combine the eight strategies to be four or five maximums, for message simplification purpose. In order to accommodate participants expectation, a data reduction approach performed to simplify the strategies, which then resulted four items, as showed in rev.2.

Rev 1 - Eight Strategies Result

S1S2O1O2 Utilize in-house resource capability to enabler competitive SPQDC performance

S1O3 Enrich people capability and experience for new technology

Rev 2 - Simplify

Optimize internal resources to enhance skills and experience, enabling competitive SPQDC performance and improving quality of life in our workplace.

Establish a clear organization hierarchy to facilitate integration and change management for strengthening the deployment of automation and digitalization by optimizing investments to meet growing demand

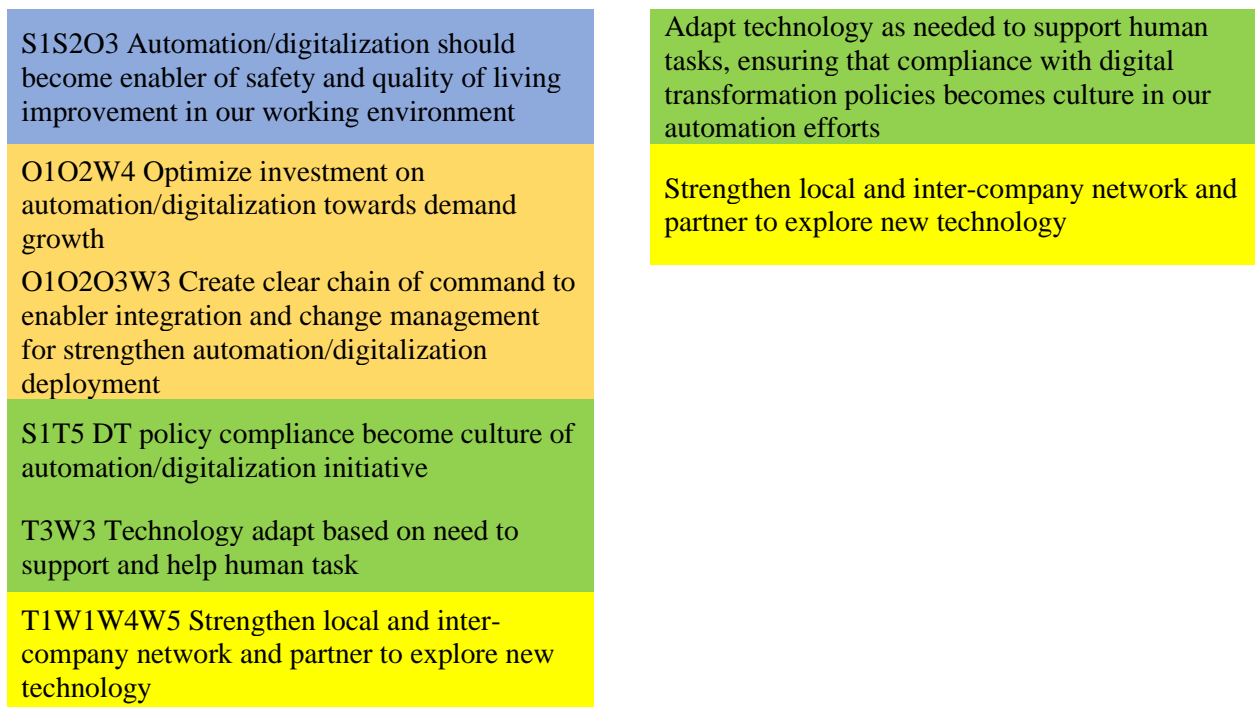


Figure 10. Strategies Simplification Result

4.3 Strategy Formulation

As four strategies already identified thru matching stage, study continue to perform strategy formulation. The methodology use at this stage is QSPM (Quantitative Strategic Planning Matrix). There are six steps followed according to the reference. Detail TAS (Total Attractiveness Score), after analysis shows as follow :

1. Establish clear organization hierarchy at top of the score, with TAS 6.28.
2. Adapt technology to support human task at second highest score, with TAS score show as 5.88.
3. Strengthen internal and local company support follow at next, by show TAS score 5.72
4. Optimize internal resource to enhance skills and experience, has lowest TAS score, which is 5.48.

The detail result of analysis shows in figure 10.

		Alternative Strategies							
		1		2		3		4	
		Establish a clear organization hierarchy to facilitate integration and change management for strengthening the deployment of automation and digitalization by optimizing investments to meet growing demand		Optimize internal resources to enhance skills and experience, enabling competitive SPQDC performance and improving quality of life in our workplace.		Adapt technology as needed to support human tasks, ensuring that compliance with digital transformation policies becomes culture in our automation efforts		Strengthen local and inter-company network and partner to explore new technology	
Key Factors	Weight	AS	TAS	AS	TAS	AS	TAS	AS	TAS
<i>Opportunities</i>									
1. Growth aircraft demand over the year	0.15	4	0.6	4	0.6	4	0.6	3	0.45
2. Competitive advantages by implement automation/digitalization	0.12	4	0.48	4	0.48	3	0.36	3	0.36
3. Better quality of life for employee	0.07	4	0.28	3	0.21	4	0.28	2	0.14

4. Automation Technology Support in Indonesia is available	0.08	1	0.08	3	0.24	2	0.16	4	0.32
<i>Threats</i>									
1. US-China conflict, restriction of using China product	0.08	3	0.24	2	0.16	2	0.16	4	0.32
2. Uncertain on Economics situation (Volatile), impact to Exchange rate, unemployment rate, growth	0.1	3	0.3	4	0.4	3	0.3	2	0.2
3. Automation = Jealousy from worker (worry of losing job, due to less human worker)	0.1	2	0.2	3	0.3	4	0.4	2	0.2
4. Corporate Policy to control open source/ free software	0.1	4	0.4	2	0.2	2	0.2	3	0.3
5. Technology or brand used should follow DT policy and not allowed for others, which create constraint due to local level availability/support	0.12	4	0.48	3	0.36	2	0.24	3	0.36
6. Sustainability, waste disposal, climate change awareness and grow initiative	0.08	0	0	0	0	0	0	0	0
	1								
<i>Strengths</i>									
1. In-House Programmer Resource	0.1	3	0.3	4	0.4	3	0.3	3	0.3
2. Infrastructure and Server Availability	0.06	4	0.24	2	0.12	3	0.18	3	0.18
3. Automation Implementation	0.1	4	0.4	3	0.3	4	0.4	3	0.3
4. Technology Development Lifecycle (Automation & Digitalization)	0.1	4	0.4	3	0.3	3	0.3	4	0.4
5. US (Western Allies), easy connect to the system	0.09	4	0.36	3	0.27	3	0.27	3	0.27
<i>Weaknesses</i>									
1. Unexplored Data Science Technology	0.06	4	0.24	4	0.24	4	0.24	3	0.18
2. Known process aerospace company	0.04	0	0	0	0	0	0	0	0
3. Lack Chain of command	0.15	4	0.6	2	0.3	3	0.45	4	0.6
4. Less Financial Support on Automation/Digitalization	0.12	3	0.36	3	0.36	4	0.48	3	0.36
5. Weak Technology Selection (Business Perspective)	0.08	4	0.32	3	0.24	2	0.16	2	0.16
6. Lack of organized and centralized Digital Transformation	0.1	4	0	2	0	4	0.4	4	0.32
Total	1		6.28		5.48		5.88		5.72

Figure 11. PT XYZ QSPM Analysis Result

During discussion with stakeholder, they were agree to establish a clear organization hierarchy, in parallel to optimize current internal resource to enhance skill and experience as quick strategy execution taken. Beier et al. (2022) study also shows that company representatives participate in the survey, expect

increases in the required employee qualifications in all domains – specific digital skills and analytical competences for the more complex activities are likely to gain in importance, which is align to stakeholder expectation, to include enhance skill and experience as quick win action.

Both organization hierarchy and optimize internal resource to enhance skills and experience considered as priority to strengthen internal coordination and capability. These two strategies required for future growth of PT XYZ toward more effective resource utilization. Remaining two strategies, which involve external stakeholder, will be execute after the organization hierarchy is settle

5. Conclusion

The study successfully able to formulate the strategy of PT XYZ on industry 4.0 digital transformation, that the organization should consider, following growth challenge. Three steps of strategy formulation followed accordingly, by utilize PESTLE, Value Analysis Michael Porter, VRIO, SWOT, TOWS and QSPM. The selection of focus group discussion, by consider years of service and knowledge level of internal and external factors mapping, hold a key success of the discussion. Based on final step of strategy formulation, PT XYZ decided strategy execution priority to be start from create organization hierarchy parallel with internal resources skills and experience development. Second strategy execution will be adapting technology as needed to support human tasks. Then, follow by last execution on strengthened local and intercompany network. The step follow from David (2011) enable the organization to widen the analysis, consider internal and external factors, to ensure all strategic factors are considered properly.

Limitations and Future Study

This study is limited by its qualitative reliance on focus group discussions, which may be influenced by participant bias and lack real-time implementation feedback. Additionally, the absence of quantitative validation or performance tracking restricts the ability to measure actual impact post-strategy execution. Future research should include longitudinal studies to assess the effectiveness of each strategic phase, and explore how emerging Industry 4.0 technologies continuously reshape strategic priorities.

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