Paper 80

Human Capital Readiness in Facing Industry 4.0 – Study Case Shared Services Finance at Energy Company, PT Perminyakan

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Abstract - PT Perminyakan established a new organization named Shared Service Center (SSC) in 2018 as one of the embodiment of digital transformation of the company. SSC consist of four functions called multitower, they are Finance, IT, Human Capital and Asset Management. Shared Service Finance (SSF) provide services to stakeholders (customers, suppliers, and other function inside Perminyakan) in finance operation activities. In the daily job, SSF face many challenges, high volume and repetitive jobs are occurs every day. SSF helped by the management team that provide technologies industry 4.0 based to help and assist them in doing their daily activities. But the utilization of the tools is still low. Based on these problems, in this final project a research was conducted using a combination of quantitative and qualitative methods using questionnaire and equipped with semi-structured interviews to obtain data and information that will be included in the concept of Human Capital Readiness. Human Capital Readiness seen from four aspects: Knowledge, Hard Skill, Soft Skill, and Attitude. Furthermore, interviews were conducted to determine and give deeper information about the questionnaire result and gain insight about how company respond to the condition. SSF also has SIERA, it is an industry 4.0 based tool that develop by SSF itself. It uses Artificial Intelligence based technology. Writer also use the quantitative and qualitative method to find out the Human Capital Readiness of SSF in implementing SIERA. Furthermore, from Human Capital Readiness assessment that provide Human Development Index (HDI), a gap was used to determine some aspects that defined as ready, optimal, not ready. From the questionnaire and interviews that validate the questionnaire result, writer also give some recommendation of implementation plan to the company. The findings in this study are divided into two scopes. The first is about readiness to face the industrial 4.0, and the second is about the readiness in implementing SIERA. First scope give result that Knowledge and Soft Skill are not ready, but Hard Skill and Attitude are optimal. By this result, writer give recommendation to increase digital literation, upskilling and re-skilling, and culture development (digital leadership and digital mindset). Second scope give result that Hard Skill and Attitude are not ready, meanwhile Knowledge is optimal and Soft Skill is ready. Writer give three recommendations: upskilling, solve application issues and update, and aggressive branding for SIERA.

Keywords - Human Capital Readiness, Human Development Index, Industry 4.0, Artificial Intelligence, Shared Services Finance

I. INTRODUCTION

PT. Perminyakan is a state-owned enterprise in the energy sector which has a portfolio from upstream to downstream by supplying energy throughout Indonesia. To become world class energy company has been its vision, to call the future challenges in the energy sector. President Director of PT Perminyakan (Persero) said, "In line with taking several strategic steps. One of them is by establishing a Shared Services Center (SSC) which is part of PT Perminyakan's digital transformation.". So, with the establishment of SSC in Perminyakan, it is one of an indicator that the company has commit to do digital transformation inside the organization in facing more challenging era, industry 4.0.

(Udovita, 2020) said that digital transformation is arise from the intersection of cloud computing, Big Data, IoT, and AI, and it is vital to industries across the market today. The term Industry 4.0 was first mentioned at the Hannover Fair in 2011, which refers to the industrial revolution 4.0. Currently, the world is witnessing the fourth industrial revolution. Since the start of the Industry 1.0 revolution in the 17th century until today, the entire world has gone through various stages of rapid industrial evolution with a rapid pace of technological change. Perminyakan establish SSC as one of the answer to face industry 4.0 in the future.

II. METHODOLOGY

This research methodology uses both quantitative and qualitative approach. Quantitative method approach using questionnaire that being spread to the SSF employees in Perminyakan and using the formula of Human Development Index. Meanwhile, the qualitative method approach conducted using interview method within SSF employees including management team. SSC being chosen because SSC is one of the industry 4.0 initiatives by PT Perminyakan that conduct operational activities to be simpler by utilizing some technology and has new business process design compare to old Perminyakan. SSC also increase Perminyakan human capital productivities. SSC utilize many technologies such as robotic automation, control the cybersecurity and cloud computing, and has develop a virtual assistant that to be intended as the first AI in the

company. The research method based on human capital questionnaire that being developed based on (Hendarman, Primatasya, Sufiadi, & Sonia, 2021) Researcher got 140 total respondents that is being gathered from February until March 2022. The questionnaire designed in online survey. Statistical analysis and interview method will be additional insight and perspective to support the data survey

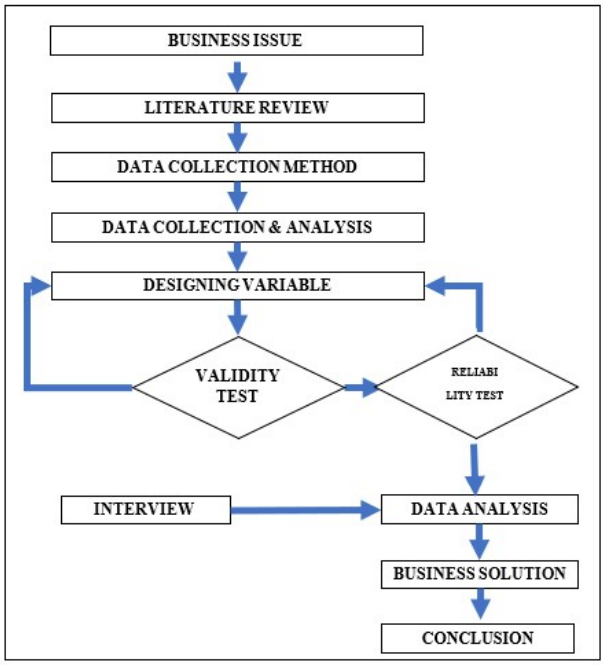

Figure 1: Methodology Framework

III. RESULTS

1. Human Development Index – Questionnaire

Based on Hendarman et al (2020a), Human Development Index calculated based on the gap to give depiction of readiness relativity interfactor after calculating the data realiability and validity.

Human Development Index formula can be calculated as follow:

$$\frac{\text{X} - \text{minimum value}}{\text{Maximum value} - \text{minimum value}}$$

Where,

X = gap value, expected value minus current condition value
Minimum value = smallest gap value
Maximum value = biggest gap value

Refer to the questionnaire list, writer aims are to find the HDI rate for every aspect: Knowledge, Skill and Attitude.

Here it is the Human Development Index (HDI) Range Value (both for assess the readiness to face industry 4.0 and the HDI of the readiness of SIERA implementation in the organization:

Table 1: HDI Range Values

Value Range	Level
0.00-0.20	Optimal
0.21-0.40	Receptive
0.41-0.60	Ready
0.61-0.80	Initial Stage Readiness
0.81-1.00	Not Ready

Reliability Test Result

Table 2: Reliability Result – HDI in facing industry 4.0

Assessment Aspect	*Cronbach Alpha*	Category
Knowledge		
Existing	0.875	> 0.60 (Reliable)
Expected	0.886	> 0.60 (Reliable)
Hard Skill		
Existing	0.908	> 0.60 (Reliable)
Expected	0.942	> 0.60 (Reliable)
Soft Skill		
Existing	0.921	> 0.60 (Reliable)
Expected	0.834	> 0.60 (Reliable)
Attitude		
Existing	0.743	> 0.60 (Reliable)
Expected	0.761	> 0.60 (Reliable)

Table 3: Reliability Result – HDI in implementing SIERA

Assessment Aspect	*Cronbach Alpha*	Category
SIERA Knowledge		
Existing	0.673	> 0.60 (Reliable)
Expected	0.692	> 0.60 (Reliable)
SIERA Hard Skill		
Existing	0.636	> 0.60 (Reliable)
Expected	0.809	> 0.60 (Reliable)
SIERA Soft Skill		
Existing	0.624	> 0.60 (Reliable)
Expected	0.823	> 0.60 (Reliable)
SIERA Attitude		
Existing	0.724	> 0.60 (Reliable)
Expected	0.831	> 0.60 (Reliable)

Factor Analysis (Validity Test) Result

Table 4: Validity Result – HDI in facing industry 4.0

Variable	*Existing*	r *pearson*	*Expected*	r *pearson*	Note
Knowledge	KE1	0.693	KH1	0.773	> 0.3 (valid)
	KE2	0.698	KH2	0.774	> 0.3 (valid)
	KE3	0.74	KH3	0.724	> 0.3 (valid)
	KE4	0.568	KH4	0.682	> 0.3 (valid)
	KE5	0.617	KH5	0.803	> 0.3 (valid)
	KE6	0.731	KH6	0.676	> 0.3 (valid)
	KE7	0.506	KH7	0.711	> 0.3 (valid)
	KE8	0.488	KH8	0.711	> 0.3 (valid)
	KE9	0.573	KH9	0.567	> 0.3 (valid)
Hard Skill	HSE1	0.735	HSH1	0.845	> 0.3 (valid)
	HSE2	0.667	HSH2	0.765	> 0.3 (valid)
	HSE3	0.741	HSH3	0.796	> 0.3 (valid)
	HSE4	0.726	HSH4	0.765	> 0.3 (valid)
	HSE5	0.635	HSH5	0.845	> 0.3 (valid)
	HSE6	0.765	HSH6	0.845	> 0.3 (valid)
	HSE7	0.715	HSH7	0.845	> 0.3 (valid)
	HSE8	0.69	HSH8	0.838	> 0.3 (valid)
Soft Skill	SSE1	0.752	SSH1	0.589	> 0.3 (valid)
	SSE2	0.754	SSH2	0.653	> 0.3 (valid)
	SSE3	0.736	SSH3	0.472	> 0.3 (valid)
	SSE4	0.607	SSH4	0.698	> 0.3 (valid)
	SSE5	0.788	SSH5	0.472	> 0.3 (valid)
	SSE6	0.736	SSH6	0.894	> 0.3 (valid)
	SSE7	0.756	SSH7	0.894	> 0.3 (valid)
	SSE8	0.814	SSH8	0.709	> 0.3 (valid)
Attitude	AE1	0.405	AH1	0.699	> 0.3 (valid)
	AE2	0.506	AH2	0.772	> 0.3 (valid)
	AE3	0.55	AH3	0.424	> 0.3 (valid)
	AE4	0.645	AH4	0.48	> 0.3 (valid)
	AE5	0.536	AH5	0.621	> 0.3 (valid)

Questionnaire Result

Table 5: Questionnaire Result

Aspect	No	HDI	Level
Knowledge	1	0.779	ISR
	2	0.716	ISR
	3	0.798	ISR
	4	0.538	R
	5	0.815	NR
	6	0.813	NR
	7	0.519	R
	8	0.596	R
	9	0.543	R
Hard Skill	1	0.548	R
	2	0.579	R
	3	0.736	ISR
	4	0.83	NR
	5	0.601	R
	6	0.42	R
	7	0.468	R
	8	0.378	Receptive
Soft Skill	1	0.788	ISR
	2	0.81	NR
	3	0.728	ISR
	4	0.611	ISR
	5	0.679	ISR
	6	0.829	NR
	7	0.596	R
	8	0.75	ISR
Attitude	1	0.555	R
	2	0.332	Receptive
	3	0.596	R
	4	0.483	R
	5	0.718	ISR
SIERA Knowledge	1	0.388	Receptive
	2	0.474	R
	3	0.609	R
SIERA Hard Skill	1	0.609	R

Aspect	No	HDI	Level
	2	0.651	ISR
	3	0.353	Receptive
SIERA Soft Skill	1	0.612	ISR
	2	0.423	R
	3	0.163	O
SIERA Attitude	1	0.644	ISR
	3	0.346	Receptive

Gap and HDI Findings

Table 6: GAP and HDI in Facing Industry 4.0

Aspect	Current condition	Expected	Gap	HDI	Category
Knowledge	4.059	4.940	0.886	0.901	Not ready
Hard Skill	4.341	4.976	0.635	0.007	Optimal
Soft Skill	4.042	4.951	0.909	1.000	Not ready
Attitude	4.285	4.917	0.633	0.000	Optimal

Table 7: GAP and HDI Value in implementing SIERA

Aspect	Current condition	Expected	Gap	HDI	Category
SIERA Knowledge	3.789	4.891	1.112	0.000	Optimal
SIERA Hard Skill	3.221	4.942	1.721	1.000	Not ready
SIERA Soft Skill	3.571	4.955	1.385	0.447	Ready
SIERA Attitude	3.189	4.888	1.699	0.963	Not ready

2. Interview Analysis

Writer also conduct interview process to ensure and support the questionnaire validity. The interview process conducted with expert in the organization. They are all the management team of the SSF personal in the organization. Their point of view as management team will give additional explanation how company overcome this industry 4.0 challenges. The interview conducted with semi structured method. According to (E. Newcomer, P. Hatry, & S. Wholey, 2015), Semi-structured interview conducted conversationally with one respondent at a time and employs a blend of closed – and open – ended questions, often accompanied by follow up why or how questions. The dialogue can meander around the topics on the agenda – rather than adhering slavishy to verbatim questions as in a standardized survey – and may delve into totally unforeseen issues.

Table 8: Summary of Interview Results

INTERVIEW QUESTIONS	SUMMARY OF RESPONSES
How is company commitment in giving knowledge to the employees about industry 4.0 and the implementation in SSC Finance? HDI result not ready	Commitment already shows by company with the programs such as POLS (PT Perminyakan Online Sharing) and some socializations. But some activities are still using conservative ways in terms of transition to the digital era.
Does company have programs to increase hard skill of the employees about industry 4.0 implementation in SSC Finance? HDI shows optimal result	Today many training, and courses related to industry 4.0 such as RPA 9Robotic Process Automation) training, VIM (Vendor Invoice Management), SMARTGEP etc.
How company facilitate Soft Skill of the employees related to implementation of industry 4.0 technology? HDI shows not ready	Company facilitate the soft skill via online since the pandemic situation.
How is company programs to build attitude of the human capital related to industry 4.0 in daily work? HDI result shows optimal.	The Company's program in building a culture and attitude of industry 4.0 technology in daily work has led to increased automation, for example at SSF to process third party bills using softcopy and can be done anywhere without the need for physical documents, machine-to-machine communication, for example, question and answer with chatbots and web shared services are available FAQs that will answer questions about SS, God willing, in the future Chatbots will use AI technology, as well as sustainable technology development.
Does company commit to implement industry 4.0 and how do employees' commitment as the technology users?	Company already commit to implement the industry 4.0 in the daily activities, it is shown from the KPI of the management that already included industry 4.0 assessment.
About SIERA knowledge, HDI shows optimal, is it already as the same in the reality?	Yes, because SIERA knowledge already being socialized through many media in the company, such as broadcasts, sharing knowledge, and socializations.
HDI – Hard Skill aspect shows that employee are not ready regarding SIERA. Why it can be?	Because SIERA is a brand-new technology product in the company. Besides, many channels are provided before the launching of SIERA. Needs to build customer engagement and rebranding SIERA to improve SIERA positions and image to the stakeholders.
HDI Soft Skill aspect shows that SSC Finance employees are ready in implementing SIERA, is it already suitable with real condition?	Yes. If we don't adjust, we will be left behind than other companies.

What is your opinion regarding HDI – Attitude aspect that shows not ready? Do you think the organization support for development of Knowledge Management?	Many channels are still provided to help stakeholders. And this situation can be solved with more socializations and branding the SIERA itself to get intentions of the stakeholders.

IV. DISCUSSION

1. Human Development Index Solutions

Based on the measurement, questionnaire and the interview result, hereby writer provide some analysis, resulting in improvement designs that can be proposal to the company to increase HDI score. The improvement design can be seen in the table below:

Table 9: Improvement Design Based on Gap and HDI Value of Human Capital Readiness in Facing Industry 4.0

Aspect	Current condition	Expected	Gap	HDI	Category	Improvement Design
Knowledge	4.054	4.94	0.886	0.9161	Not ready	- Increasing digital literation by engage employees into some broadcasts knowledge series related to industry 4.0 knowledges. - Giving an extra point to the employees that has a high willing to learn new technologies by giving them more score in the performance evaluations. - Conduct webinar inside company and invite people that mastery in technology industry 4.0
Hard Skill	4.341	4.976	0.635	0	Optimal	- Do the re-skilling regarding the industry 4.0 technologies that already used in the daily works and conduct upskilling for new technologies (besides the familiar ones). - Conduct talent pool inside SSF function and involve them in some new technologies development.
Soft Skill	4.042	4.951	0.909	1	Not ready	- Increasing desire to innovate, especially related to industry 4.0 tools, based on the daily experiences and problems - Conduct more sharing knowledge regarding how important industry 4.0 in our future
Attitude	4.285	4.931	0.646	0.0401	Optimal	- Give some broadcast how to check out digital devices daily to help employee checking their own devices in good way.

Table 10: Improvement Design Based on GAP and HDI Value of Human Capital Readiness in implementing SIERA

Aspect	Current condition	Expected	Gap	HDI	Category	Improvement Design
Knowledge	3.788	4.907	1.119	0	Optimal	Knowledge aspect for implementing SIERA already said as optimal. But the company may also continue the literation of SIERA to increase engagement to the tool. This can be done by periodically spread broadcast via email, or Microsoft Teams, regarding SIERA functions, SIERA update, and benefit in using SIERA.
Hard Skill	3.221	4.942	1.721	1	Not ready	Hard Skill is an important point in the digital implementation. Company should conduct upskilling and training to the SIERA users about using SIERA. The SIERA developer may also clean some bug that maybe still exist on SIERA. Training for trainers should also be conducted to the employees, since they will be SSF ambassadors to use SIERA and spread the SIERA implementation to the SSF stakeholders.
Soft Skill	3.571	4.955	1.384	0.4402	Ready	Keep doing the sharing knowledge, via PT Perminyakan Online Learning & Sharing, and also can be via KOMET website (knowledge management system that already owned by PT Perminyakan).

Aspect	Current condition	Expected	Gap	HDI	Category	Improvement Design
Attitude	3.189	4.888	1.699	0.9635	Not ready	Increasing engagement SIERA usage to the employees. This can be done with some improvement, conduct quiz to the employee and give some prises to the employee that can answer SIERA challenges (via Quiz), reviving SIERA usage by reminder by Microsoft teams and pop up notification in the employee's desktop.

2. Digital Business Agility Solutions

Writer also describes following digital business agility proposal in order to increase the Human Development Index related to the Human Capital Readiness in facing industry 4.0, for Shared Services Finance function. Hereby the analysis using the digital business agility method:

Table 11: Digital Business Agility Solutions

	Digital Business Agility Solutions	Focus Area	Current Situation	Opportunities for Enablement	Digital Enablers
	Behavioral Awareness	Employees	Employees already have sufficient level of awareness in facing industry 4.0 especially in hard skill aspect, since the technology are being used daily such as MySAP, P-Office, RPA, etc. But still only for certain technologies. Employees use the technologies daily since it is being requirements by the company, but they don't have enough time to increase their skill in other technology.	Company may increase awareness for other technology (industry 4.0) to the employees that employees aren't familiar enough such as big data analytics and artificial intelligence.	E-training platform, Knowledge Sharing, other technology training, and challenges.
Hyperawareness	Situational awareness	Business environment	Internal operations already used such a technology, called it MySAP, p-office, digital signature, RPA, etc. Company also already has SIERA in support business environment, but the usage level and engagement are still low.	Increasing user engagement of artificial intelligence-based technology such as SIERA, because it will reach not only shared services finance employees, but also employees from other function (whom are SSF customer as well) and can be developing to reach external customer for the future business environment	Knowledge Sharing and Socialization, technology development.

Informed Decision Making	Inclusive decision making	Inclusive environment	There is still silo mentality can be seen in the SSF body. Sometimes employees in the SSF are still not in touch each other in solving some problems addressed by customers.	Develop integrated decision-making platform which is broader than FAQ (Frequently Asked Questions). This platform can be used by employees, and also customer and can be integrated with SIERA, so that it will give not only employee knowledges, but also customers outside SSF.	Integrated Informed Decision-Making Platform
	Augmented Decision Making	Automated decision maker tools	SIERA is one of the tools, but the basis is still only FAQ.	Enriched SIERA knowledges and train the machine (since SIERA also consider as machine learning) so that the communications via SIERA can be solutions to many disputes and can lead customers also employees to decision made.	SIERA development phase 2

Fast Executions	Dynamic resources	Agile Talent	Some of SSF employees come from millennials generations. But since the rapid, high volume and repetitive job that exist in the organizations, the talent pools are needed to be develop.	involved talent management function to give challenge and targeting some talent pool inside SSF, to develop and sharing knowledge regarding industry 4.0 to the employees, also involved them in some training and in some technology development.	Talent Management & IT Directorate
	Dynamic processes	Agile and rapid enablement	There is change management function in the Shared Service Center, but maybe can be occupy with the strategic plan regarding digital transfor	Role of Research and Development also needed to form digital transformation strategy plan.	Research and development team, Digital Transformation Champion
			mation plan and make exact target.		

V. CONCLUSION

Hendarman (2021) also do the research using competencies aspect in Telecommunication, Banking, and Manufacture industry in Indonesia. The research results shows that : Knowledge (K), early stage ready; Hard Skill (HS), not ready; Soft Skill (SS), optimum; Attitude (A), ready. And for this research, from the result of the questionnaire, it is known that there are two aspects of Human Development Index that capture Human Capital Readiness of SSF in facing industry 4.0 era that show not optimum enough, they are Knowledge and Soft Skill. This result also being discussed in the interview sections with some employees and management team in SSF body. Interview was held in form semi-structured interview. The result may show not ready, perhaps affected by many factors. For the knowledge aspects, it is being discussed that there are some factors that affects the situations:

- The tools being utilize in the SSF are not so many in varieties. Current tools being used are related to MySAP, mySSC, RPA, SIERA, etc.

- Employees knowledges are limited to the tools that they use every day. We know that SSF job description are very high volume and repetitive, writer can conclude that they don't have spare time to gain own knowledge (outside the daily job).

  Other aspects that shows not ready result is Soft Skill aspects. Soft Skill will bring relations to individual adaptive ability to new technologies, and this thing become company strength to endure and sustain from disruption threat as consequences of industry 4.0 digital era (Hendarman, Primatasya, Sufiadi, & Sonia, 2021).

  Other questionnaire was conducted and asked about Human Development Index in implementing SIERA – an Artificial Intelligence based technology owned by Shared Services Finance. The result was shows there are two aspects of HDI that got score as "not ready", which are Hard Skill and Attitude aspects. There are some causes that writes gets from the interview section:

- The usage level of SIERA still low. This can be seen from internal data that SIERA engagement are still low. Customers, Suppliers, even employees were still in their "comfort zone", being served with conventional method: phone, chat, and ticketing from MySSC websites. As the interview result, the SIERA was being created also to educate the users, so that they can do by themselves by asking to SIERA. But it is shown that they are still prefer with conventional method, since the channel are still being open. But the traffic was high enough. This is not help reducing with the customer service load, and the stakeholders will still need to have queue, even just for asking simple question.

- SIERA also a new player in the company. Not every employees are using this applications. Unfortunately, Shared Service Finance's employee as well. Since the are rarely using the app, the engagement wasn't high. Socialization and re-upskilling can be done to increase the Hard Skill of HDI aspects for SIERA implementation.

Writer propose seven programs, three for the Human Capital Readiness in industry 4.0, consist of Digital Literation, Digital Leadership, Upskilling and Reskilling, and the last Culture Development. Action in implementing Digital Literation, the company may conduct several broadcasts of technology series to the employees through emails, Microsoft team's media, and KOMET (Knowledge Management Portal owned by PT Perminyakan). And other activity that company may do is conduct webinar inside the company and inviting expert people in technology. These actions expected to increasing knowledge aspect from the Human Development Index assessment and increase employee's personal digital literation. For Digital Leadership, A digital leader should take further steps and has wider view and bring together people he leads to cross the borders and using information technologies and communications to reach organization goals (Cahyarini, 2021). (Klein, 2020) describe characteristics needed as digital leaders:

1. Characteristics-Digital Business. A digital leader should have innovative visionary. Another important characteristic is networking intelligence, that they must capable to coordinate between knowledge, skill, and resources. Digital leaders also have a role as digital talent scout. Other characteristics is they must have complexity mastery and business intelligence to build new business model.

2. Characteristics-Social Attitude. A digital leader has a role as motivating coach and role model to the team. They must be open and transparent to the team, also conduct democratize delegative, designing the organization hierarchy and bureaucracy in minimalist form and focus to the team progress and development.

3. Characteristics-General Mindset. A digital leader should be agile and easy to adapt with the new business model and capable to create transformation strategies. A digital leader also should capable to learn from the errors, knowledge-oriented person and life-long learner.

Upskilling, reskilling, job rotation and experiential learning can be held for all employee's layer in SSF, from assistant until the leaders. Culture Development, can be realized by increasing innovation environment, conduct more

sharing knowledge and growing digital mindset for the employees. Growing digital mindset can be done through self-regulation, self-motivation and self-leadership.

Hendarman (2021) describe that self-regulation is a task that individuals must complete to benefit from new technology and have confidence that technology can be learned in a disciplined and consistent manner. Furthermore, self-motivation is a method of developing self-confidence through the use of new technology, allowing for greater innovation, exploration, and risk-taking. Furthermore, self-leadership focuses on the capabilities of developing independent digital thinking, optimism, and vision in order to become a digital leader in one's own right (Harjanto, 2021)

Other three proposed program are dedicated to SIERA implementation, consist of upskilling, solve application issue and update, and aggressive branding to increase engagement. For upskilling program, company may conduct upskilling event for the users of SIERA, and training for trainers for the SSF employees since they are expected to be brand ambassador of SIERA itself. Solve the SIERA issue may also reduce bug in the application and increase the level of comfort for the users in using SIERA. Bringing up new feature also becoming a propose program, this also will increase user's attentions regarding SIERA presence. And regarding the aggressive branding expected to increase the digital awareness of SIERA.

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