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DEVELOPMENT OF PRODUCTION INFORMATION SYSTEMS FOR UMKM BASED ON DIGITAL TECHNOLOGY IN THE FRAMEWORK OF INDUSTRY TRANSFORMATION 4.0

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Abstrak

This study aims to examine the development of digital technology-based production information systems as a strategic approach to Industry 4.0 transformation for Micro, Small, and Medium Enterprises (MSMEs) in Indonesia. As a vital component of the national economy, MSMEs face numerous challenges in adopting digital technology, including limited digital literacy, inadequate infrastructure, human resource constraints, and financial barriers. Using a qualitative descriptive approach, this research identifies key obstacles and designs a concept for an adaptive, user-friendly, and affordable production information system. The findings highlight that MSME digital transformation requires a holistic approach involving multi-stakeholder collaboration to create an inclusive and sustainable digital ecosystem. With an appropriate production information system, MSMEs can enhance efficiency, productivity, and competitiveness in the era of Industry 4.0

INTRODUCTION

In the era of increasing globalization competitive, development digital technology has become element crucial in push efficiency and power competition various sector industry. One of the group the business that becomes bone back economy, especially in developing countries such as Indonesia, are Micro, Small, and Medium Enterprises (MSMEs). MSMEs play a role vital role in creation field work, reduction poverty, and growth economy inclusive. However, along with with the more With the rapid advancement of information technology, MSMEs are faced with new challenges: how to carry out digital transformation to survive and compete amidst the dynamics of the industrial revolution 4.0.

Revolution Industry 4.0 is characterized by integration technology intelligent to in

the production and business process in a way overall. Technology such as Internet of Things (IoT), Artificial Intelligence (AI), big data, cloud computing, and systems information integrated has revolutionize method company produce, manage and distribute product or service them (Schwab, 2016).In context this, digital transformation is not no longer just a choice, but rather an inevitability for MSMEs to survive amidst the pressures of change.

According to a (McKinsey&Company, 2016), only around 20% of MSMEs in Southeast Asia actively adopt digital technology in their operational activities. This shows a significant digital gap between MSMEs and large companies. This gap not only impacts production efficiency, but also limits MSMEs' ability to access wider markets, understand consumer needs, and adapt to the dynamics of changing global market demand. One form of strategic technology adoption in this context is the development of a digital technology-based production information system. A production information system is an information technology application that supports the planning, implementation, control, and evaluation of production in an integrated and real-time manner. With this system, MSMEs can monitor the production process more efficiently, manage raw materials better, and respond to market demand more quickly and precisely (Laudon & Laudon, 2014)

However, the facts on the ground show that part large UMKM still use manual or semi-digital systems that do not integrated. Many MSME actors have not own understanding and capacity For develop or implement system information appropriate production with need business they (Kementerian Komunikasi dan Informatika Republik Indonesia (Kominfo), 2022).Therefore that, is needed effort Serious in development system information production of a nature adaptive, easy used, and affordable for MSMEs.

Furthermore, digital transformation through implementation system information production is part important from the national agenda in support vision Making Indonesia 4.0. The Indonesian government through the Ministry of Industry has push digital integration in sector industry, including MSMEs, in order to create ecosystem more industry tough and competitive (Kementerian Perindustrin Republik Indonesia (Kemenperin), 2018).Therefore that, research about development system information production based on digital technology for MSMEs is very relevant and urgent in support the transformation process going to industry 4.0.

RESEARCH METHODS

Study This use method descriptive qualitative, which aims For give description deep about conditions, needs, and challenges faced by MSMEs in the production process and implementation digital technology. Approach This chosen Because allow researcher For to study phenomenon in a way contextual and holistic without using quantitative data or statistics.

Data in study This obtained through studies library, observation No directly, and documentation from sources secondary like article scientific, report official government, results study previous, and information from relevant MSME websites. Analysis done in a way qualitative with interpret findings from various source For identify patterns, concepts, and relationships inter- related variables with digital transformation in the MSME sector. This method is also used For to design draft system information production that can answer need specific to MSMEs, with notice factors like production process efficiency, limitations source power, and readiness adoption digital technology. With

approach this, it is expected results study can give applicable and appropriate recommendations with context industry small and medium enterprises in the Industry 4.0 era.

RESULTS AND DISCUSSION

Even though MSMEs have vital role in structure Indonesian economy, adaptation they to changes of the times, especially in context digital transformation and revolution industry 4.0, still classified as slow and facing various challenge structural and also cultural. The digital era and industry 4.0 demand all over perpetrator businesses, including MSMEs, to transform in a way fast, efficient, and data- driven. However, in in practice, adoption digital technology by MSMEs is still very limited and not evenly.

One of challenge main is lack of digital literacy among UMKM actors. Based on survey Association Indonesian Internet Service Providers (APJII) in 2022, although internet penetration in Indonesia has reach more from 77%, the level understanding and utilization digital technology for business productive among MSMEs still low. Many MSME actors only use technology For communication base such as WhatsApp or social media, without truly understand potential optimization business through system information, data analytics, or automation of production processes (APJII, 2022). Challenges second is limitations infrastructure technology. In remote and rural areas, access to stable and affordable internet network Still become obstacle big. UMKM in the region This face constraint in access online training, using application cloud -based, as well as reach the digital market area. Inequality infrastructure This create the digital divide is getting wider widen canyon between MSMEs that have “gone digital” and those that have not.

Challenge next related with limitations source Power human and expertise technical. The majority MSME actors are individual with background behind education intermediate to bottom that has not been used to with system information or device soft management production. Absence staff specializing in the field technology information cause Many MSMEs are having difficulties in select, implement, or look after system appropriate information with need his efforts. This is has implications for low level success adoption digital system in sustainable.

Next, the aspect financing also becomes challenge crucial. Development or procurement system information production, although in simple form, still need investment beginning in the form of device hard, device soft, and training source Power humans. Many MSME actors consider cost This as burden additional, not investment term long. Moreover again, access formal financing such as banking or institution finance often not easy reached by MSMEs because problem collateral, eligibility credit, or legal status informal business.

Challenge fifth is lack of ecosystem Supporter digitalization of MSMEs, especially those related to with integration chain supply, support policies, and collaboration cross sector. Many digital applications are developed for UMKM is partial and not connected in a way systematic with other platforms such as e-commerce, logistics, digital finance, or system more manufacturing big. This causes SMEs to have difficulty For do business process integration end -to-end, even though integration it is very important in ecosystem industry 4.0.

In addition, the factor culture organization and resistance to changes also become obstacles. Many MSME actors have operate his efforts in a way conventional during for

years feel reluctant change system work that has been done considered " safe " and " familiar ". Changes to digital systems often considered complicated, consuming time, or even threaten control personal on the production process. Perception This strengthened by failure implementation technology in the past, which caused trauma and distrust to new digital solutions.

In context industry 4.0, more challenges specific appear in form unpreparedness technical and institutional aspects of MSMEs For adopt technology advanced such as IoT (Internet of Things), artificial intelligence (AI), and big data analytics. These technologies This become base from automation and connectivity tall in the production process, but its implementation Still Far from range part large UMKM. A a study by the Asian Development Bank shows that more of 80% of MSMEs in Southeast Asia do not own understanding or readiness For integrate technology industry 4.0 to in operational business they.

Unpreparedness This is also reflected in lack of data and systems documentation owned by MSMEs. Many MSMEs have not own system good record keeping on the production process, inventory, or finance. This condition make it difficult implementation system information data -driven and automated production. Without consistent and documented data, the system information No can running optimally, and decisions business become No accurate.

From the side policy, although government has Lots issue a program for support digitalization of MSMEs, but program fragmentation and limitations synergy between institution Still become challenge itself. Many training programs, subsidies technology, or digital assistance that is not coordinated, overlapping overlap, or No reach perpetrator business in the field in a way comprehensive. The absence of a strong monitoring and evaluation system also leads to the difficulty measure the effectiveness of the MSME digitalization program in general national.

The challenges the describe that the digital transformation process of MSMEs, especially in context adoption system information production based on digital technology, is not easy and linear thing. Transformation This need a holistic approach systemic, holistic, and needs - based as well as capacity real UMKM. Need existence synergy between government, sector private, institution education, and community technology For create an inclusive digital ecosystem that empowers MSMEs.

So from that, research and development system information designed production special For the context of MSMEs becomes very important. The system the must notice limitations source existing power, considering aspect convenience usage (user-friendly), as well as capable give benefit direct measurable in increase efficiency and effectiveness of the production process. With method this, digitalization No only become a slogan or discourse, but truly become applicable and sustainable solutions for perpetrator business small and medium enterprises in Indonesia.

CONCLUSION

transformation and revolution industry 4.0 brings opportunity big for MSMEs to increase efficiency, productivity and power compete. However Thus, the process of adapting MSMEs to this era Still faced with various complex and interrelated challenges related. Challenges the covers low digital literacy, limitations infrastructure technology, shortcomings source Power human beings who have skill technical, limitations financing For investment technology, as well as Not yet formation integrated and supportive digital

ecosystem.

In addition, internal challenges such as resistance to change, culture Work conventional, and minimal documentation as well as data usage in taking decision participate slowing down the process of MSME digitalization. The unpreparedness of MSMEs in adopt Core technologies of industry 4.0 such as IoT, AI, and big data analytics are also becoming inhibitor in realize system modern and efficient production.

Situation This show that digital transformation of MSMEs is not only question procurement technology, but need approach comprehensive involving improvement human resources capacity, access to infrastructure and financing, as well as synergy cross sector in create an inclusive and empowering digital ecosystem. With understand challenge in a way comprehensive, then design system information relevant, affordable and easy production implemented become solution strategic that can encourage MSMEs to transform towards the industrial era 4.0 more effective and sustainable.

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