

SWOT Analysis for Center of Technology Development and Industrial Collaboration in the Context of New Normal, Industry 4.0, and Society 5.0

Retno Wulan Damayanti⁽¹⁾, Haryono Setiadi⁽²⁾, Pringgo Widyo Laksono⁽³⁾,
Joko Triyono⁽⁴⁾

Center of Technology Development and Industrial Collaboration,
Institute for Research and Community Service, Universitas Sebelas
Maret,
Ir. Sutami Street 36 Kentingan, Jebres, Surakarta, Central Java,
Indonesia

Email: ¹rwd@ft.uns.ac.id; retnowulan@staff.uns.ac.id

Available Online

<http://www.jurnal.unublitar.ac.id/index.php/briliant>

History of Article

Received on 12 Oktober 2022

Accepted on 23 May 2023

Published on 24 May 2023

Pages. 338-350

Keywords

Challenges; Industry 4.0; New Normal;
Society 5.0; Study Center

DOI

<http://dx.doi.org/10.28926/briliant.v8i2.1168>

Abstract: Post-pandemic recovery in the new normal era is one of the challenges industries in 2022. This is in addition to the use of industry 4.0 and society 5.0, labeled as “*triple challenge*” by industries to determine their direction and business strategies. These factors become an opportunity for the Center of Technology Development and Industrial Collaboration or *Pusat Kajian dan Pengembangan Teknologi dan Kolaborasi Industri* (PKPTKI) to improve its management to support industries. Three steps were conducted to tackle those challenges. The first is identifying and mapping the industry partner's challenges. The second is solution mapping to support them while facing the triple challenges, and lastly is formulating the solutions using SWOT analysis and developing a new roadmap for PKPTKI. The outputs are the partner challenges and knowledge mapping, SWOT analysis, and solution strategies with a planned improvement program.

INTRODUCTION

The Center of Technology Development and Industrial Collaboration or *Pusat Kajian dan Pengembangan Teknologi dan Kolaborasi Industri* (PKPTKI) is an academic Institute for Research and Community Service (*Lembaga Penelitian dan Pengabdian Masyarakat – LPPM*) Universitas Sebelas Maret (UNS). PKPTKI has three mission statements and purposes, namely to (1) accommodate the implementation of teaching, research, and community services, (2) interact, collaborate, and cooperate with partner industries in the fields of science and technology, and (3) serve the community (public) in respect to their technology needs through consulting services. Some research carried out by PKPTKI includes engineering technology transfer, telecommunication and information technology, biomedical engineering, industrial product design and engineering, agricultural technology, and others.

To realize its programs and initiatives, PKPTKI carried out research on community service implementation reflected by a roadmap. Based on its establishment in 2005, this institution focused on small and medium enterprises (SME) as well as an industrial cluster in Surakarta. Meanwhile, from 2010 to 2015, PKPTKI started to disseminate and develop previous research from the first phase (2005 to 2010) to SMEs and industrial cluster. The second phase aimed to expand the cooperation network to SMEs and industries outside Surakarta. In the third phase, which lasted from 2015 to 2020, PKPTKI had programs to follow up and expand its network to the public as a technology consultant for partner industries. This enabled it to become a referral center for technology in Surakarta and Central Java.

However, the Covid-19 pandemic negatively impacted research activities and led to certain challenges and changes that affected the performance of PKPTKI. Some partner industries also had to terminate their contract. This resulted in the inability to achieve some targets in the third phase, although these were realized in 2021. When the pandemic reduced, PKPTKI faced another challenge called the "new normal." This post-pandemic era led to the emergence of different activities, mainly focused on recovery, compared to the pre-pandemic period (Belousova *et al*, 2021). Besides the new normal challenge, other encounters related to industry 4.0 and society 5.0 were also faced (Mourtzis *et al*, 2022). The present research and industries need to re-match the application of knowledge and theory to face these "*Triple Challenges*," namely new normal, industry 4.0, and society 5.0. This is perceived as an opportunity for PKPTKI to improve internal management, increase collaboration with external partners and other establishments, as well as develop a new roadmap to accommodate those *triple challenges* in 2022.

Three main strategies are employed to improve the governance of PKPTKI's activities, research, and community service facing the *earlier triple challenges*. The first is identifying and mapping the partner industries' challenges in particular and others in general. The second is knowledge mapping to support the establishments facing those *triple challenges*. The last is developing an in-lined research and service roadmap of PKPTKI based on the mapped problem and solution potencies. Development of a research roadmap is important to describe the path of the most important services to provide to industry partners (Fayek and Golabchi, 2022). The strengths, weaknesses, opportunities, and threats, widely known as SWOT analysis, need to be conducted to improve the activities, research, and community service management (Jain *et al*, 2022). The results are expected to be used in developing the roadmap of PKPTKI to face challenges related to the new normal, industry 4.0, and society 5.0.

METHOD

SWOT analysis is a familiar method adopted by several organizations as a basis for decision-making and strategy formulation (Leigh, 2010). It is widely implemented in various sectors, such as oil and gas, manufacturing, transportation, agriculture, and SMEs (Namugenyi *et al.*, 2019). SWOT analysis

can also be applied to formulate the improvement of a roadmap in a study center (Susantiningrum et al., 2020; Widiанти & Damayanti, 2015).

SWOT analysis is often arranged in a table or 2x2 matrix based on the internal and external aspects or performances. The internal performance is categorized as a strength (S), and the internal resistor as a weakness (W). Meanwhile, the external performance is classified as an opportunity (O) and the external resistor as a threat (T). The description emphasizes a holistic view of those four categories, even though they can be broken down separately for practical purposes (Leigh, 2010). The process of exploring the opportunity and threat is gained by involving the stakeholders and external entities. The strengths and weakness analysis is obtained based on the organization entity's potencies and flaws (Mariani, 2017).

The present research employed the framework designed by Widiанти and Damayanti (2015). It is divided into three steps, the first is identifying and mapping the industry partner's challenges. The second is solution mapping to support the establishments facing the *triple challenges*. The third is formulating and developing a new roadmap for PKPTKI.

Identifying and mapping the industry partner's challenges commenced from March to mid-April 2022, using online and offline surveys. An online survey was conducted using Zoom virtual room when Surakarta was still observing social distancing. Consequently, the lead researcher and other members performed an offline survey when the situation was conducive using standard health protocol. The next activity entailed a focused group discussion (FGD) in mid-May 2022 between the lead researcher, PKPTKI members, partners, and Surakarta Industry Department. It was carried out in a hybrid manner comprising offline and online. After the survey and FGD data were obtained, from mid to late May 2022, the research team analyzed and mapped the opportunity and threat related to PKPTKI partner's *triple challenges*.

The second step, solution mapping to support the industries facing the *triple challenges*, commenced from June to mid-July 2022. It was carried out by sharing knowledge between other study centers and research groups in UNS every two weeks. This program also invited experts and industry practitioners to PKPTKI webinars. The knowledge-sharing results were used to analyze the strength and weaknesses of this institute's competency to support the industry partners in Surakarta and its environs.

The formulated solutions and the new roadmap development as the last step aimed to adopt the appropriate strategy to solve these challenges. The activities associated with these steps include processing, analyzing, and mapping the SWOT matrix's strengths, weaknesses, opportunities, and threats. Its study was completed in late September 2022. The output of the SWOT matrix was used to formulate the appropriate strategies to support industry partners facing the *triple challenges*. The formulation process was conducted offline on October 2022, involving all PKPTKI members. The results are the basis of the roadmap development from 2023 to 2025.

RESULTS AND DISCUSSIONS

A. Industry Partner Challenges

Partners whom PKPTKI successfully approached to review their challenges during the post-pandemic era in industry 4.0 and society 5.0 belonged to various sectors. These include Telkom Surakarta (telecommunication firm), UNS Hospital, Magetan leather industries, Borobudur tourism establishment, online food delivery services, internet service provider, organic food and vegetables company, and a new partner, the State Electric Company (*Perusahaan Listrik Negara* – PLN) and the induction stove manufacturer My Amin. The challenges faced by each of them are briefly explained as follows.

1. Telecommunication industry (Telkom Surakarta) challenges

Covid-19 has changed the communication pattern of society. This led to a new challenge, which affected quality management. Implementing upgraded quality management, also termed quality management 4.0, is important to fulfill customer expectations (Souza *et al*, 2022). The widely known related method and certification are ISO 9001:2015 (Saihi *et al*, 2021). The role of staff in the implementation of this approach is extremely necessary. Therefore, it is important to develop an ideal staff competency model.

2. UNS Hospital challenges

The pandemic had already described the reality of some healthcare service systems, questioning the overall readiness and how precisely the adopted strategies were affected by Covid-19. Hospital readiness is one of the fundamental steps in the crisis management cycle (Shrivastava & Shrivastava, 2020), especially polyclinic, because it is one of the units frequently visited by patients. A new focus is the healthcare quality assessment performed by determining how well its service meets the patient's expectations (Dorr *et al*, 2022). The polyclinic routine highly impacts hospital performance. A service quality evaluation is needed to enable the management to adopt strategies to satisfy patients' expectations.

3. Magetan leather industry challenges

Magetan, one of the regencies in the country, is known for its leather processing product SMEs. However, the pandemic severely affected this industry due to a decrease in sales. It was discovered that the Magetan leather industry does not use online markets. This led to the conclusion that there are still "untouched markets" because, to date, this industry only relies on the regional market. Several aspects need to be improved based on the production process, such as the work posture, procedure, etc. This is paramount to boost a more productive process and realize the "untouched markets." (Tolstoy *et al*, 2022).

4. Borobudur tourism industry challenges

The tourism industry is one of the firms highly impacted by the pandemic (Robina-Ramírez *et al*, 2022). For instance, the largest single Buddhist temple, known as Borobudur, was poorly promoted as a tourism destination by the government. However, the development process faced obstacles due to the low revisit intention rate. Some reviews showed that tourists were dissatisfied with some aspects of the service quality. Developing a model to boost visitors' satisfaction, revisit intention, and Borobudur's achievement target as the prioritized tourism destination is essential.

5. Online food delivery service industry challenges

The Covid-19 pandemic actually created a positive opportunity for the online food delivery service industries (OFDS) (Poon & Tung, 2022). OFDS became one of the solutions for providing food and ensuring the continuity of related businesses. During the pandemic, the online food delivery service became popular due to the increasing desire of people to enjoy their food at home and not dine in public as a form of self-protection (Jun *et al*, 2021). It is important to develop a strong attachment with customers to boost their loyalty by maintaining quality service.

6. Internet service provider industry challenges

Due to social distancing and stay-at-home policies implemented to curb the spread of Coronavirus, several activities initially executed offline have already switched to online. Meanwhile, in the new normal era where society has already adapted to the pandemic, the digitalization process has grown rapidly in terms of increasing internet usage (Meuter, 2022). Due to this phenomenon, the internet service provider (ISP) plays a crucial role (Arifiani *et al*, 2022). This is an opportunity for ISP companies to boost their market shares and acquire new customers. One way to enhance the company's competence is to improve service quality, thereby gaining customer loyalty (Rintyarna *et al*, 2022).

7. Organic food and vegetable industry challenges

Since the pandemic, a healthy lifestyle has already become popular (Alotaibi *et al*, 2021). This is supported by eating healthy food, especially organic. Vegetables are a type of organic food that was highly demanded during the pandemic (Hibino & Hayashida, 2022). *Rumah Roti Indonesia* Company is a firm that produces organic vegetables. However, it does not have a certification yet, which is an essential attribute of organic food products. This also affects the quality and credibility of these items. Certification is

important in order to promote organic foods securely in the market (Ayuya, 2019).

8. PLN – My Amin induction stove energy conversion challenges

One of the energy subsidy policies implemented by the government is the subsidization of 3 kilograms of liquefied petroleum gas (LPG) targeted at poor households and SMEs. However, this entails that it is sold freely, enabling the middle and even high-class society to purchase 3 kilograms of LPG. This proves that the policy is ill-targeted and burdens the state budget (al Irsyad *et al*, 2022). There is a need to subsidize other energy sources without burdening the state budget (Hakam *et al*, 2022).

On the other hand, Indonesia enjoys surplus electricity. To utilize this potency, PLN cooperated with My Amin as the induction stove manufacturer to provide induction stoves to the citizens. The project offered selected people a free induction stove with utensils and an increased power supply. This initiative became a pilot project in Surakarta and Bali. The induction stove substitution strategy has several challenges, such as the need for increased electricity, high investment in the stove and utensils, and less suitable design for Asian food. Nonetheless, the government constantly pursues opportunities for solving these problems in collaboration with research institutions and industries.

B. Knowledge Mapping

Based on the research results and FGD, the challenges faced by the industry partners were identified, where each requires the application of entirely different knowledge. PKPTKI industry partner challenges are shown in Table 1.

Table 1: PKPTKI Industry Partner Challenges

Industry Partner Challenges	Knowledge Needed
Human resource in industry 4.0 and society 5.0	Human resource, quality management, or service
Product industry 4.0 and society 5.0	Biomedical engineering, ergonomic
Digital technology	Information technology, data science, internet of things (IoT)
Manufacturing and supply chain sustainability	Manufacturing system, operation, and project, project management
Technology and social	Public and social acceptance, technology readiness

C. SWOT Elaboration

After the challenges were identified and the relevant knowledge mapped, a SWOT analysis was carried out specifically to determine their respective strengths and weaknesses. It also explained the threats and

opportunities of each challenge. SWOT analyses and elaborations for each threat are shown in Tables 2 to 6.

Table 2. Human Resource in Industry 4.0 and Society 5.0 SWOT Elaboration

Strength	Weakness
- Great understanding from the experts regarding the required knowledge - Strong research background from PKPTKI members - Great community service and practitioner experience from PKPTKI members	- Research and community dedication (<i>penelitian dan pengabdian masyarakat</i> – P2M) results are still limited to scientific publication - Some prototypes have not been published because the website of PKPTKI is not properly maintained, and there are no intellectual property right (IPR) records - For the society 5.0 agenda, PKPTKI members do not have enough P2M tracks in this field.
Opportunity	Threat
- Identify prototypes from the P2M results and register on UNS IPR. - Display and promote the prototypes and their IPR in the PKPTKI website - Activate PKPTKI social media, such as YouTube, to promote the P2M results - Strengthen society 5.0 - Conduct webinars periodically in industry 4.0 and society 5.0	- Other entities are potentially duplicating the P2M results

Table 3. Product Industry 4.0 and Society 5.0 SWOT Elaboration

Strength	Weakness
- Great understanding from the experts regarding the required knowledge. - Strong research background from PKPTKI members. - Great community service and practitioner experience. - Many P2M publications - Several prototypes and IPR	- There is still an intermittent long-term collaboration with industries or stakeholders for commercialization. - Some prototypes have not been published on the website and social media pages of PKPTKI.
Opportunity	Threat
- Display the prototypes and their IPR on the website and all social media pages of PKPTKI and LPPM UNS. - Promote it to the public through webinar collaboration and podcasts.	- Other parties are potentially commercializing the P2M results.

Table 4. Digital Technology SWOT Elaboration

Strength	Weakness
- Great understanding from the experts regarding the required knowledge. - Strong research background from	- Information system software as prototypes in this area has not been published on the website and social

PKPTKI members. - Great community service and practitioner experience from PKPTKI members. - Several P2M results have been published.	media pages of PKPTKI. - There is no intensive industrial collaboration in this area - Lack of IPR - The expert failed to implement the P2M results consistently and sustainably.
Opportunity	Threat
- Display the software product results on all publication media of PKPTKI. - Collaborate with industries to promote the software results.	- This area is extremely important to support industry partners, and its growth is rapid. Therefore, if the P2M results are not implemented immediately, its service life becomes invalid. - There is a possibility that other entities are using the software implementation.

Table 5. Manufacturing and Supply Chain Sustainability SWOT Elaboration

Strength	Weakness
- Great understanding from the experts concerning the required knowledge. - Strong research background from PKPTKI members. - Great community service and practitioner experience from PKPTKI members. - Many P2M results have been published.	- Lack of prototypes - Lack of IPR - Some P2M product results have not been published on the website and social media pages of PKPTKI.
Opportunity	Threat
- Display and promote the prototype and its IPR on the website and all social media pages of PKPTKI and LPPM UNS - Initiate webinars and podcast in this area - Encourage the IPR registration of the P2M results - Create an annual bulletin on the PKPTKI website	- Other parties are potentially commercializing the P2M results.

Table 6. Technology and Social SWOT Elaboration

Strength	Weakness
- Project experience in 2022, related to analyzing and evaluating the energy conversion of LPG 3 kilogram to induction stove project - Collaboration with practitioners	- Lack of experience in socially applied technology - The module and software lacks IPR - There is still no scientific publication of the project result.

- Project modules and software - Strong project publication in PKPTKI social media	
Opportunity	Threat
- Collaborate with social experts outside PKPTKI - Propose the IPR for project modules and software - Scientific publications of project results - Establish a journal with the theme "Project and Applied Technology" to accommodate the relevant result publications, its implementation, and collaboration with a practitioner.	- The public weakly accepted the analysis results about social aspects - Other entities carry out p - roject result publications.

D. Strategy Formulation

The strengths, weaknesses, opportunities, and threats of each *triple challenge* have been identified. Subsequently, the strategies were formulated using FGD to optimize those SWOT analysis points. Table 7 shows SWOT strategies that are formulated based on the initial mapping.

Table 7. SWOT Strategy Formulation

S-W-O-T Combination	Strategy
S-O Strategy	1. Develop a website to display product results, prototypes, design, software, and IPR with the inventor's data. 2. Develop social media platforms for more information, promotion, and support the collaboration of PKPTKI members, including internal and external industry partners. 3. Webinar and podcast concerning biomedical, ergonomic, manufacturing, and supply chain because these areas are firmly mastered in PKPTKI but are not widely exposed to the public 4. Organize a virtual exhibition event about PKPTKI products.
W-O Strategy	1. Initiate and collaborate with other study center and groups such as LPPM UNS, internal and external UNS (example: Universitas Gadjah Mada Research Group: GamaPro Project Management), vocation field, social science department, and practitioner communities (project management institute). 2. Establish a journal with the theme "Project and Applied Technology" as a dissemination estuary of the result of PKPTKI and other study centers in LPPM UNS, as well as a forum for research analysts and practitioners' publications, both national and international. 3. Follow up the initiation of cooperation or collaboration with PKPTKI partners for commercialization purposes by offering industry consultation services, especially in biomedical, ergonomic, manufacture, supply chain, data science and information system, and project management fields. 4. Encourage PKPTKI members who do not have IPR yet to join

	socialization and training classes held in UNS. 5. Publish online bulletin periodically to popularize hardware products, design, and software from PKPTKI members
S-T Strategy	1. Structure the information system database of PKPTKI containing the output of P2M and the IPR from the Intelligent Research and Innovation Services (IRIS) UNS. 2. Recruit staff to support the administration in maintaining the website, information system, and social media platforms. 3. Write down the research and community results online and offline media to create public awareness.
W-T Strategy	1. Initiate research and community dedication in collaboration with technology and social scope. 2. Conduct seminars or webinars about the collaboration of technology and social fields with various internal and external parties.

In 2022, PKPTKI focused on re-matching the application of theory, knowledge, and technology to support these industries in facing *triple challenges*. Due to this process, the institute successfully reconnected with some old and new industry partners. A new challenge and solution mapping of the industries in Surakarta and its environs were also successfully established to support the post-pandemic recovery facing the new normal in industry 4.0 and society 5.0. PKPTKI also successfully initiated the consultation service and academic study for the energy conversion project of 3 kilograms LPG to induction stove in Surakarta.

Based on the SWOT analysis and discussion between the expert at PKPTKI and industry partners, some improvement programs were initiated in the 2023 to 2025 roadmap. Those projects are listed as follows.

1. Implementation of diffused and applied technology programs by regional industry partners.
2. The collaboration in respect to the network development between internal study center and research group in UNS.
3. Develop and strengthen the website and social media (YouTube and Instagram) of PKPTKI.
4. Initiate practitioner collaboration in the project area to support the regional consultant service. Examples are Project Management Institute and Gadjah Mada Project Management.
5. Activate and conduct regional and national webinar, seminar, and PKPTKI exhibitions regularly and also initiate international events.
6. Initiate PKPTKI journal "Project and Applied Technology."
7. Increase the IPR of PKPTKI members.
8. Initiate online bulletin periodically to popularize hardware products, design, and software from PKPTKI members.

CONCLUSION

This research successfully identified the industrial challenges in Indonesia, especially the PKPTKI partners during the post-pandemic era. These are human resources, products, and innovation in industry 4.0 and society 5.0, digital

technology, manufacturing and supply chain sustainability, and applied technology and social.

It also mapped diverse knowledge and theories needed to support these industries. Interestingly, the required knowledge are human resource and quality management, biomedical engineering and ergonomics, information technology, data science, internet of things (IoT), manufacturing system, operation and project management, as well as technology readiness and public acceptance.

SWOT analysis was carried out on every challenge. It became the basis for formulating the solution strategies to solve these issues. Some improvement programs were also formulated for 2023 to 2025 based on the strategies employed to support the industries facing the *triple challenges*.

SUGGESTION

The results of this study, become as reflection for PKPTKI for improvement, therefore suggestions that can be given to the study center are the need to strengthen short and long term collaboration and partnership networks through various research and community service activities. For further research, it is recommended for PKPTKI to implement and evaluate the SWOT strategy in the form of improvement projects for technology studies and industrial collaboration.

REFERENCES

- al Irsyad, M.I., Anggono, T., Anditya, C., Ruslan, I., Cendrawati, D.G, Nepal, R. 2022. Assessing the feasibility of a migration policy from LPG cookers to induction cookers to reduce LPG subsidies, *Energy for Sustainable Development*, 70. 239-246. <https://doi.org/10.1016/j.esd.2022.08.003>.
- Alotaibi, N., Al-Sayegh, N., Nadar, M., Shaye, A., Allafi, A., Almari, M. 2021. Investigation of Health Science Students' Knowledge Regarding Healthy Lifestyle Promotion During the Spread of COVID-19 Pandemic: A Randomized Controlled Trial. *Front Public Health*. Nov 8 (9):774678. <https://doi.org/10.3389/fpubh.2021.774678>.
- Ayuya, O.I. 2019. Organic certified production systems and household income: micro level evidence of heterogeneous treatment effects. *Organic Agriculture*. (9), 417–433. <https://doi.org/10.1007/s13165-018-0236-8>.
- Arifiani, L., Prabowo, H., Furinto, A.F. and Kosasih, W. 2022, Respond to environmental turbulence sparks firm performance by embracing business model transformation: an empirical study on the internet service provider in Indonesia, *Foresight*, 24 (3/4), 336-357. <https://pesquisa.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/resource/pt/covidwho-1416169>.
- Belousova, O., & Walsh, S & Groen, A. 2021. COVID-19 as Industry Forcing Function: Challenges for Entrepreneurship in the Post-Pandemic Future, *Foresight and STI Governance*, 15(4), 33-41. <https://doi.org/10.17323/2500-2597.2021.4.33.41>.
- Dorr, M.C., van Hof, K.S., Jelsma, J.G.M., Dronkers, E.A.C., Baatenburg de Jong, R.J., Offerman, M.P.J., de Bruijne, M.C. 2022. Quality improvements of

- healthcare trajectories by learning from aggregated patient-reported outcomes: a mixed-methods systematic literature review. *Health Res Policy Sys*, 20 (90). <https://doi.org/10.1186/s12961-022-00893-4>.
- Fayek, A.R. and Golabchi, A. 2022. Framework for identification of performance metrics for research and development collaborations: Construction Innovation Centre, *Built Environment Project and Asset Management*, 12 (5), 837-852. <https://doi.org/10.1108/BEPAM-04-2021-0063>.
- Hakam, D.F., Nugraha, H., Wicaksono, A., Rahadi, R.A., Kanugrahan, S.P. 2022. Mega conversion from LPG to induction stove to achieve Indonesia's clean energy transition. *Energy Strategy Reviews*, 41(100856). <https://doi.org/10.1016/j.esr.2022.100856>.
- Hibino, S.; Hayashida, K. 2022. Modifiable Host Factors for the Prevention and Treatment of COVID-19: Diet and Lifestyle/Diet and Lifestyle Factors in the Prevention of COVID-19. *Nutrients*, (14), 1876. <https://doi.org/10.3390/nu14091876>.
- Jain, V., Ajmera, P. and Davim, J.P. 2022, SWOT analysis of Industry 4.0 variables using AHP methodology and structural equation modelling, *Benchmarking: An International Journal*, 29 (7), 2147-2176. <https://doi.org/10.1108/BIJ-10-2020-0546>.
- Jun K, Yoon B, Lee S, Lee DS. 2021. Factors Influencing Customer Decisions to Use Online Food Delivery Service during the COVID-19 Pandemic. *Foods*. Dec 28;11(1):64. <https://doi.org/10.3390/foods11010064>.
- Leigh, D. 2010. SWOT Analysis. In *Handbook of Improving Performance in the Workplace* (2), 115–140. Pfeiffer. <https://bit.ly/3Ex5221>.
- Mariani, G. 2017. *M&A and Value Creation: A SWOT Analysis*. G. Giappichelli Editore. <https://bit.ly/3CQBECm>.
- Meuter, M.L. 2022, Viewpoint: internet revolution lessons applied to post-pandemic service delivery (a North American perspective), *Journal of Services Marketing*, 36 (4), 476-481. <https://doi.org/10.1108/JSM-05-2021-0183>.
- Mourtzis, D., Angelopoulos, J., & Panopoulos, N. 2022. A Literature Review of the Challenges and Opportunities of the Transition from Industry 4.0 to Society 5.0 *Energies* 15 (17): 6276. <https://doi.org/10.3390/en15176276>.
- Namugenyi, C., Nimmagadda, S. L., & Reiners, T. 2019. Design of a SWOT analysis model and its evaluation in diverse digital business ecosystem contexts. *Procedia Computer Science*, (159), 1145–1154. <https://doi.org/10.1016/j.procs.2019.09.283>.
- Poon, W.C. and Tung, S.E.H. 2022, The rise of online food delivery culture during the COVID-19 pandemic: an analysis of intention and its associated risk, *European Journal of Management and Business Economics*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/EJMBE-04-2021-0128>.
- Rintyarna, B.S.; Kuswanto, H.; Sarno, R.; Rachmaningsih, E.K.; Rachman, F.H.; Suharso, W.; Cahyanto, T.A. 2022. Modelling Service Quality of Internet Service Providers during COVID-19: The Customer Perspective Based on Twitter Dataset. *Informatics*, 9 (11). <https://doi.org/10.3390/informatics9010011>.

- Robina-Ramírez, R., Sánchez, M.SO., Jiménez-Naranjo, H.V. & Castro-Serrano, J. 2022. Tourism governance during the COVID-19 pandemic crisis: A proposal for a sustainable model to restore the tourism industry. *Environ Dev Sustain* (24), 6391–6412. <https://doi.org/10.1007/s10668-021-01707-3>.
- Saihi, A., Awad, M. and Ben-Daya, M. 2021. Quality 4.0: leveraging Industry 4.0 technologies to improve quality management practices – a systematic review, *International Journal of Quality & Reliability Management*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/IJQRM-09-2021-0305>.
- Shrivastava SR, Shrivastava PS. 2020. Coronavirus disease 2019 pandemic: Improving hospital readiness to meet the rising health-related needs. *Int J Acad Med* 2020; (6), 54 – 65. <https://www.ijam-web.org/text.asp?2020/6/2/54/287949>.
- Souza, F.F.d., Corsi, A., Pagani, R.N., Balbinotti, G. and Kovalski, J.L. 2022, Total quality management 4.0: adapting quality management to Industry 4.0, *The TQM Journal*, 34(4), 749-769. <https://doi.org/10.1108/TQM-10-2020-0238>.
- Susantiningrum, S., Triharyanto, E., & Hantari, D. 2020. Analisis SWOT Penelitian dan Pengabdian Masyarakat Pusat Pengembangan Kewirausahaan. *Jurnal Kewirausahaan Dan Bisnis*, 25(2), 96. <https://doi.org/10.20961/jkb.v25i2.45511>.
- Tolstoy, D., Nordman, E.R., Vu, U. 2022. The indirect effect of online marketing capabilities on the international performance of e-commerce SMEs, *International Business Review*, 31 (3). <https://doi.org/10.1016/j.ibusrev.2021.101946>.
- Widianti, T., & Damayanti, S. 2015. Analisis SWOT: Strategi Pengembangan Kelompok Penelitian. *10th Annual Meeting on Testing and Quality*, 250–260. <http://lipi.go.id/publikasi/analisis-swot-strategi-pengembangan-kelompok-penelitian-/15545>.