**The 3rd International Conference on Vocational Innovation and Applied Sciences (ICVIAS) 2021**
Volume 2022
http://dx.doi.org/10.11594/nstp.2022.1603

NST PROCEEDINGS

OPEN ACCESS

**Conference Paper**

# The Effect of Covid-19 Pandemic on Increasing Rice Tiwul Business Income Using System Dynamic Approach

Titus Kristanto[1]*, Dewi Rahmawati[1], Ayu Endah Wahyuni[2], Muhammad Nasrullah[3], Reza Arindra Fadillah[1], Amanda Amalia[1]

[1]Department of Software Engineering, Institut Teknologi Telkom Surabaya
[2]Department of Industrial Engineering, Institut Teknologi Telkom Surabaya
[3]Department of Information System, Institut Teknologi Telkom Surabaya

*Corresponding author:*
E-mail:
titus.kristanto@ittelkom-sby.ac.id

ABSTRACT

In industry 4.0, the development of the food business is growing rapidly with the support of technology. His food business is tiwul rice. The establishment of the Nasi Tiwul SBR business began in March 2020 (coinciding with the beginning of the Covid-19 pandemic in Indonesia). The problem that occurs in Nasi Tiwul SBR is increasing the in-come of tiwul rice during the Covid-19 pandemic. The approach taken in this research is to use a dynamic system approach. The purpose of using a dynamic system approach is to provide feedback on the behavior of the systems involved in the research, especially the owner of the tiwul rice business. The result of this research is to increase the business income of tiwul rice and increase the market share of tiwul rice products.

*Keywords: Covid-19, rice tiwul, system dynamics*

## Introduction

In the industrial era 4.0, the development of the food business is growing rapidly with the support of technology (Nagy et al., 2018). The world of food business has an important role in the development of the creative economy (Mauri et al., 2018). One of the food business worlds is tiwul rice which is located in Malang. Tiwul is a food substitute for rice with the basic ingredients of cassava (Rembulan, 2019). The characteristic feature of Tiwul rice is a brownish color and served with side dishes, such as sea fish, vegetables, and chicken. Tiwul rice which is very famous in Malang is Nasi Tiwul SBR. Currently Nasi Tiwul SBR is managed by Mr. Sabar.

Nasi Tiwul SBR was established in March 2020, along with the arrival of Covid-19 in Indonesia (Kristanto et al., 2020). Until now, Covid-19 is still in Indonesia, so Mr. Sabar needs the right strategy to increase the income of tiwul rice. The strategies include promotion on social media, giving discounts or discounts, and providing the best service for customers (Kristanto et al., 2020). The approach taken to implement the strategy is a dynamic system approach (Putra et al., 2016).

System dynamics is a methodology and modeling technique in framing, packaging, and discussing complex systems (Hasan et al., 2015). The result of using a dynamic system in Nasi Tiwul is to focus on the structure and behavior of the system that will be studied and managed to achieve feedback from the system.

*How to cite:*
Kristanto et al. (2022). The effect of covid-19 pandemic on increasing rice tiwul business income using system dynamic approach. *The 3rd International Conference on Vocational Innovation and Applied Sciences (ICVIAS) 2021*. NST Proceedings. pages 17-23. doi: 10.11594/ nstp.2022.1603

## Material and Methods

### *Tiwul rice*

Tiwul is a traditional food made from cassava and eaten with grated coconut, as well as an alternative to rice as a staple food (Agustia et al., 2018; Astuti et al., 2019). Tiwul can be served in the form of tiwul rice. Serving tiwul rice with other side dishes, namely fried chicken, tempeh, eggs, chili sauce, and so on (Kristanto et al., 2021; Masniah, 2013).

### *System dynamics*

System dynamics is a very complex approach to testing and designing new policies in terms of decision-making (Kristanto & Lutfiyanti, 2014). System dynamics focus on the structure and behavior of the system as a feedback effort (Kristanto et al., 2018). The system dynamic model is made based on the causal relationship that affects the system structure (Shalihah, 2017).

### *Research method*

The research method was carried out within 15 months, from April 2020 to June 2021. The research location was in Nasi Tiwul SBR, Malang. In Figure 1, the research method is carried out in this research.

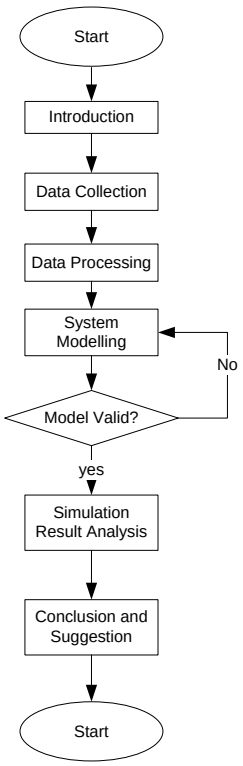


Figure 1. Research method

The following explanations of the stages of the research method are :

1. Introduction
   In the preliminary stages, learn the problems that happened to the tiwul rice business owner, and look for some literature on the problems faced. Literature search can be from journals, proceedings, and books.
2. Data Collection
   The data, collection stage is obtained based on the results of interviews, questionnaires, and observations directly from the owner of Nasi Tiwul SBR.

3. Data Processing
   The stage of data processing comes from questionnaire data and interview data from the owner of Nasi Tiwul SBR.
4. System Modelling
   System modeling was created using causal loop diagrams with Vensim application.
5. Simulated Analysis
   Results Simulated analysis of results from the causal loop diagram results

## Results and Discussion

### *Creating base models*

At the modeling stage, the system is made from a simulation model obtained from several variables, namely strength factors, weakness factors, opportunity factors, and threat factors. In making a system model using the Vensim application, it starts with creating a causal loop diagram, as shown in Figure 2.

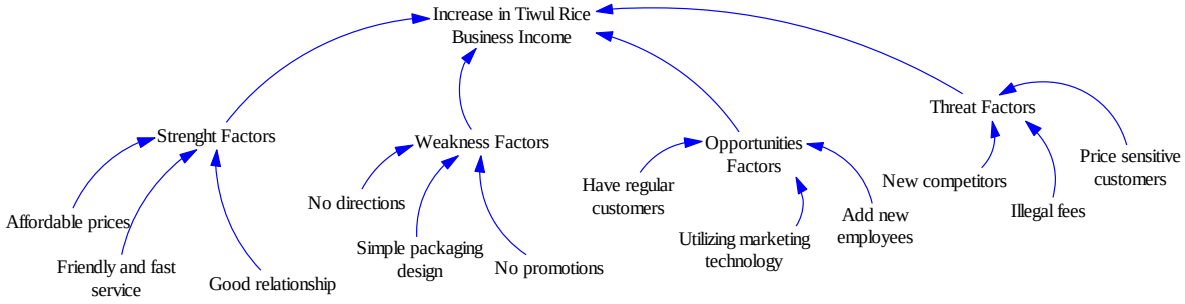


Figure 2. Causal loop diagram

In making the causal pie chart model, it is carried out for approximately 15 months from April 2020 to June 2021. The main models used in the causal pie chart are strength factors, weakness factors, opportunity factors, and threat factors. Figure 3 describes the Strength Factor sub model and Figure 4 describes the Weakness Factor sub-model. While Figure 5 describes the Opportunity Factors sub-model and Figure 6 describes the Threat Factors sub-model.

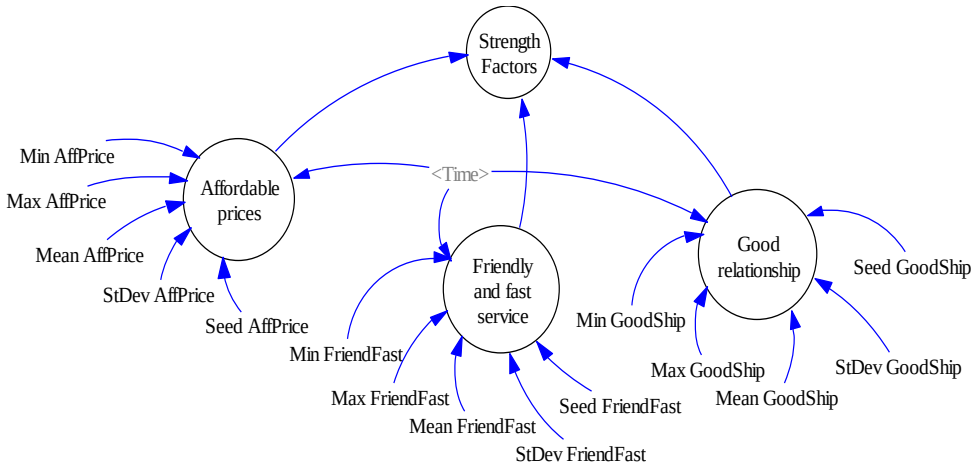


Figure 3. Sub model Strength factors

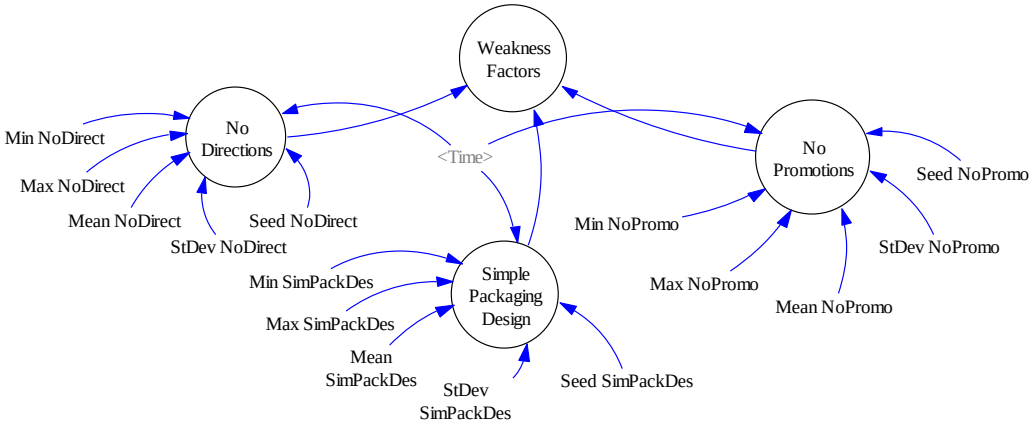


Figure 4. Submodel weakness factors

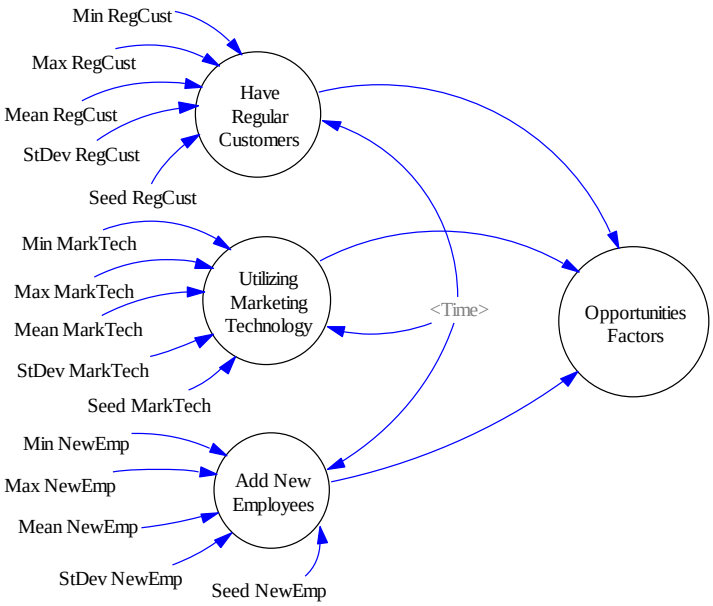


Figure 5. Sub model opportunities factors

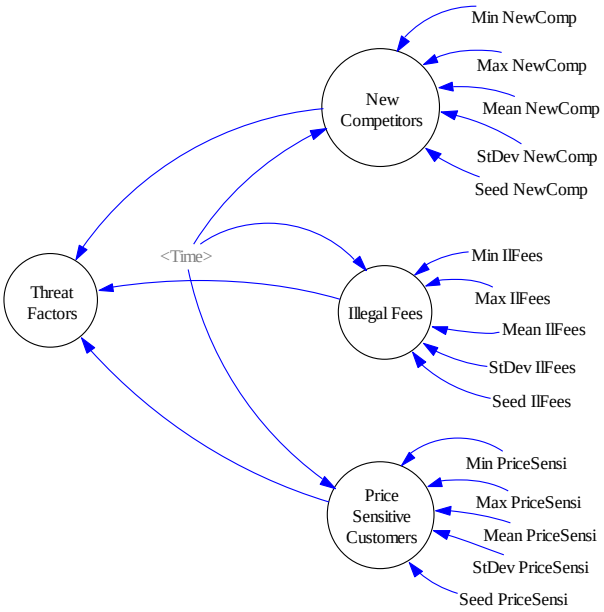


Figure 6. Sub model threat factors

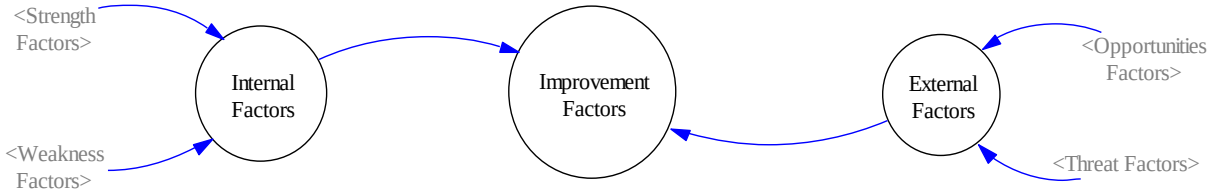


Figure 7. Base model making

***Model validation***

Making model validation is based on the development of a model that is presented in real terms. The simulation model is based on the behavior of the system for about 15 months. Validation of the model for the variables of strength factors, weakness factors, opportunity factors, and threat factors. The average value of a variable can be seen in Table 1.

Table 1. The average value of original data and simulated results

| | Average Value of Original Data | Average Value ofSimulated Results |
|---|---|---|
| Strength Factor | 15,5375 | 15,63695 |
| Weakness Factor | 0,591333 | 0,591767 |
| Opportunities Factor | 15,98853 | 15,99356 |
| Threats Factor | 2,3042 | 2,298608 |

The average value of the original data with the average simulation of the strength factor and weakness factor can be seen inf Figure 8 and Figure 9. While comparing the average value of the original data with the average simulation of the opportunities factor and the threat factor can be seen in Figure 10 and Figure 11.

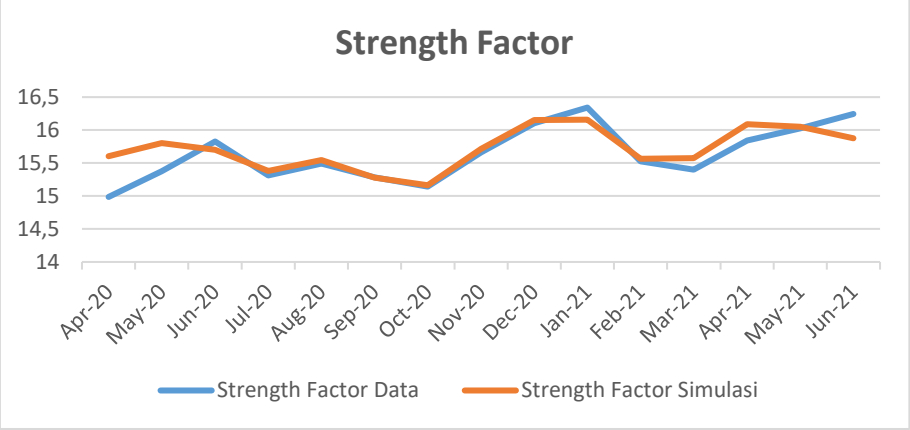


Figure 8. Comparison of the original strength factor data with the simulated data

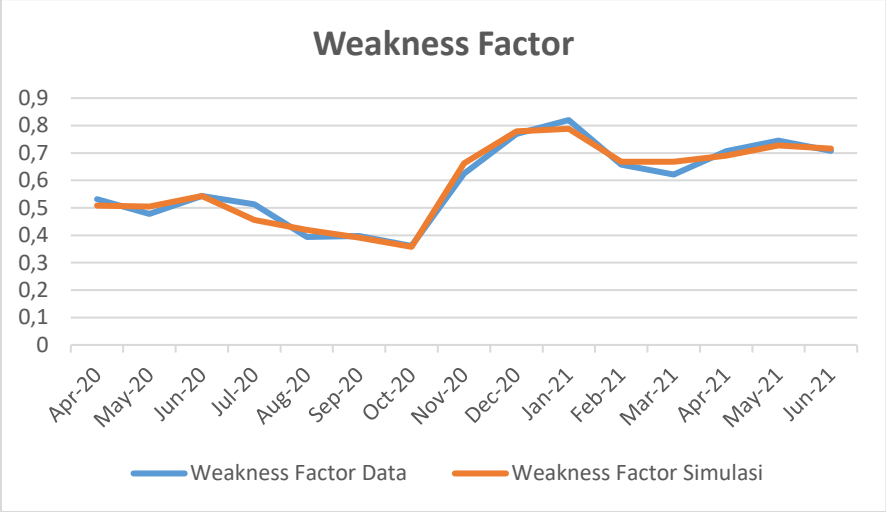


Figure 9. Comparison of Weakness Factor original data with the simulated data

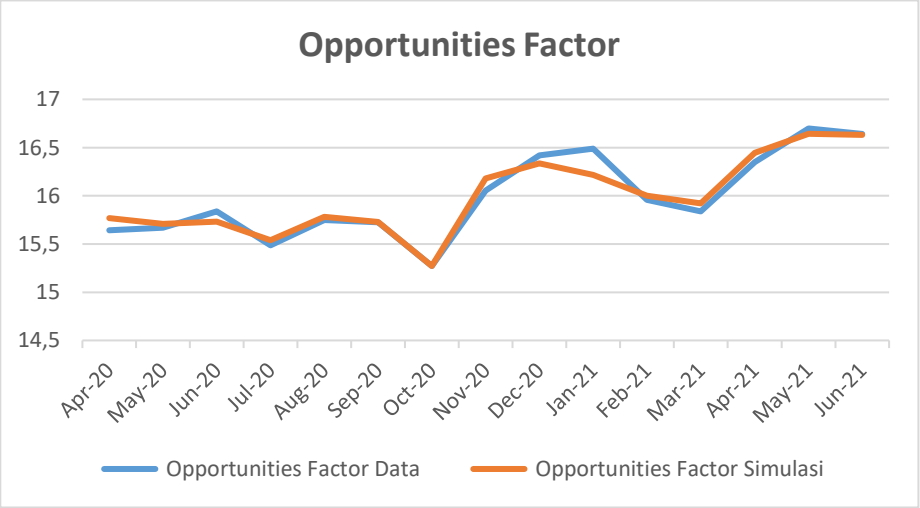


Figure 10. Comparison of Opportunities Factor original data with the simulated data

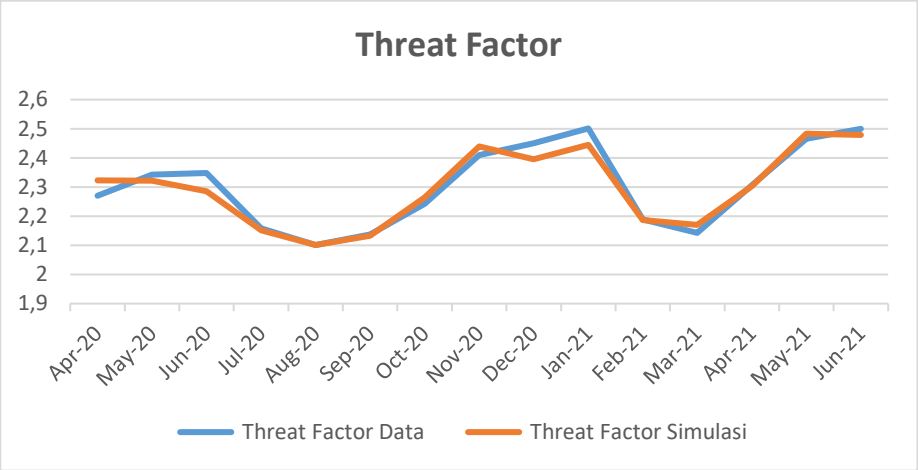


Figure 11. Comparison of Threat Factor original data with the simulated data

## Conclusion

Based on the results and discussion of the research, it can be concluded:

1. The business owner of Nasi Tiwul SBR can take advantage of information technology by following the development of the industrial era 4.0.
2. The owner of the Nasi Tiwul SBR business can apply an affordable price by giving discounts or discounts to customers.

## Acknowledgment

We from the research team would like to thank LPPM ITTelkom Surabaya for trusting in carrying out research activities. We also did not forget to say to the Dean of the faculty.

## References

Agustia, F. C., Rukmini, H. S., Naufalin, R. (2018). Formulasi tiwul instan tinggi protein dari tepung ubi kayu yang disubstitusi tepung koro pedang dan susu skim. *J Apl Teknol Pangan. 7*(1),15–20. https://doi.org/10.17728/jatp.2132

Astuti, S. D., Edi, K., Furqon, & Nuraeni, I. (2019). Pengembangan diversifikasi produk tiwul instan untuk meningkatkan daya saing UKM di Kabupaten Wonosobo. *Agrokreatif J Ilm Pengabdi Kpd Masy.,* 5(2), 123–34.

Hasan, N., Suryani, E., & Hendrawan, R. (2015). Analysis of soybean production and demand to develop strategic policy of food self sufficiency: A system dynamics framework. *In: Procedia Computer Science,* 605–12.

Kristanto, T., & Lutfiyanti, A. (2014). Analisis pengguna kartu BPJS di ruang rawat inap RSUD Dr. Soetomo Surabaya Menggunakan Simulasi Sistem Dinamik. In: Seminar Nasional Sains dan Teknologi Terapan (SNTEKPAN), 2014.

Kristanto, T., Azizah, A. F., Akbar, F. S., Albana, A. S., & Istyanto, N. P. (2020). Sosialisasi pencegahan penanganan wabah covid-19 terhadap komunitas tunarungu di Kota Surabaya. *Abdidas J Pengabdi Masy., 1*(2), 43–7.

Kristanto, T., Muliawati, E. C., Arief, R., Rozi, N. F., & Hidayat, S. (2018). Analisis peningkatan omset UKM percetakan menggunakan sistem dinamik. *In: Seminar Nasional Sistem Informasi Infonesia (SESINDO)*, 1-5.

Kristanto, T., Rahmawati, D., Wahyuni, A. E., Nasrullah, M., Fadillah, R. A., & Amalia A. (2021). Pelatihan dan pendampingan pemasaran online produk nasi tiwul di masa pandemi covid-19. *JMM (Jurnal Masy Mandiri), 5*(4), 1-5.

Kristanto, T., Rozi, N. F., Muliawati, E. C., Arief, R., & Sadiyah, H. (2020). pelatihan peningkatan omset pendapatan industri rumahan nasi krawu Di Kabupaten Gresik. *JPMK J Pengabdi Masy Khatulistiwa, 3*(1), 25–31.

Masniah, Y. (2013). Potensi ubi kayu sebagai pangan fungsional. *In: Prosiding Seminar Hasil Penelitian Tanaman Aneka Kacang dan Umbi*, 580–7.

Mauri, C., Vlegels, J., & Ysebaert, W. (2018). The Cultural and creative economy in brussels-capital region. *Brussels Stud., 126*, 1-5. https://doi.org/10.4000/brussels.1721

Nagy, J., Oláh, J., Erdei, E., Máté, D., & Popp, J. (2018). The Role and Impact of Industry 4.0 and the Internet of Things on the Business Strategy of the Value Chain - The Case of Hungary. *Sustainability, 10*(10), 3491. Doi:10.3390/su10103491

Putra, A. P., Sarno, R., & Suryani, E. (2016). Dynamics Simulation Model of Demand and Supply Electricity Energy Public Facilities and Social Sector Case Study East Java. *In: Proceedings of 2016 International Conference on Information and Communication Technology and Systems (ICTS),* 26–33.

Rembulan, G. D. (2019). Pengembangan industri kecil dan menengah tiwul instan sebagai alternatif pendukung ketahanan pangan dalam perspektif konsumen. *Ind J Teknol dan Manaj Agroindustri, 8*(2), 87–94.

Shalihah, A. H. (2017). *Model sistem dinamik untuk meningkatkan rasio pemenuhan dan efisiensi pada manajemen rantai pasok biodiesel Nasional*. Institut Teknologi Sepuluh Nopember; 2017.