Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Malaysian Journal of Social Sciences and Humanities (MJSSH)

Volume 5, Issue 8, August 2020

e-ISSN : 2504-8562

Journal home page:
www.msocialsciences.com

Warehouse Specification Proposition for Urbanis (Urban Farming Company) Using Discrete Event Simulation Method

Ali Aqsa[1], Meditya Wasesa[1]
[1]School of Business and Management, Bandung Institute of Technology, Indonesia

Correspondence: Ali Aqsa (Ali_aqsa@sbm-itb.ac.id)

Abstract

Two percent of the world's surface use for cities, yet it consumes 75 percent of its resources. Urban farming is an emerging alternative food network that could supply some of the food needs in cities with less emission, healthier food, and the environment. Urbanis is a company that likes to contribute to the acceleration of urban farming, especially in Indonesia, by utilizing vacant land and labor. In 2021, Urbanis plans to scale up the production capacity to 10 tonnes per month or 400 kg per day. It requires us to have a warehouse to store the food product that has not been absorbed by the market. The purpose of this study is to find warehouse specifications for Urbanis and the amount of labor and rack inside the warehouse alongside capital and operational expenditure. This research uses a layout with an area of 5x14 meters for experimental design. The model then translated into a discrete-event simulation model named Anylogic. The results show, for each amount of arrival, the number of labor that utilizes effectively are two labors with a maximum number of rack 50. Given these results, the author conducted operational and capital expenditure, which consist of variable analysis and additional variables such as a table, fan, and chair. The result is Urbanis need Rp 50.738.000 for capital expenditure while Rp 10.871.337 for operational expenditure.

Keywords: urban farming, warehouse specification, Urbanis

Introduction

Cities occupy only 2 percent of the world's surface, but they consume 75 percent of its resources (Girardet, 2008). In 2020 there are 154 million (56,4%) out of 273 million living in the urban area (Worldmeter, 2020). Currently, food needs in Indonesia are being fulfilled by conventional local farms and imports.

Urban agriculture is a localized food system wherein the production, processing, distribution, access/consumption, and disposal/recycling of food occur in and around the city (Smit, Ratta and Nasr, 1996). According to Dr. Sam C. M. Hui (2011), urban farming or urban agriculture has a wide range of benefits such as environmental sustainability, social sustainability, and economic sustainability.

There have been many countries that used policy to encourage the use of urban farming. For example, in Japan, the local government requires the building owner to devote 20% of the rooftop to urban farming. In Singapore, the local government has a target to supply 25% of vegetables needed from urban farming. In the UK, low-carbon policies have made London people produce 18% of their nutrition from urban farming (Hui, 2011).

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

There are three types of business model low-cost specialization, differentiation, and diversification. Low-cost specialization aims to produce high-added value food products with issues on transportation cost, freshness, and high perishability. Differentiation seeks to grow a niche or exotic as well as differentiate the production. Diversification aims to exploit urban farming outside selling the food itself; it could be recreational or education (Prados et al., 2017).

Meanwhile, according to Nasution (2015), the model that could be used on Urban Farming is Community Supported Agriculture (CSA). This model emphasizes the principles of risk-sharing, community building, and ecological (Vitari, 2018). In CSA, the majority of stakeholders could be divide into three segments; CSA organizer, members, and farmers (Empowerment Group). Here, urbanis position itself to be a CSA organizer.

Urbanis is choosing to adopt the CSA model on its business due to its connection with what urban farming offers, which are; sustainability and localization of food production. It is highly related to Urbanis vision to provide sustainable food through urban farming (Nasution, 2015).

Benchmarking to CSA pioneers in America, many companies conducted this model using membership payments for the community or members that want to join. This payment will allow them to get weekly/biweekly food produce from the farm (Harmon, 2014). To get higher productivity per farm, the farm needs to produce the food that has the highest productivity on each farm. As a CSA Organizer, Urbanis need to have the infrastructure to accommodate a variety of food products. In this case, Urbanis is planning to have its warehouse since it could become a place to store food meanwhile as a distribution center.

By then, this research will analyze the warehouses' specifications needed by Urbanis to accommodate the food produced.

Previous Research on Food Logistics

The food industry is becoming interconnected from farmer to customer. This relationship is called the Food Supply Chain Network (FSCN). There are 2 FSCN, fresh agriculture products, and processed food products. Fresh agricultural products are more vulnerable to the condition due to their freshness. Meanwhile, processed food products generally have been through a process that makes it hardly perishable (Vorst et al., 2009).

To deliver the product to the customer rightly, this requires the management of logistics in all nodes. Logistic management is a movement of goods to the customer with its objective to deliver the right product, in the right condition, with the right quality, in the right place, at the right time, and cost (Aghazadeh, 2004).

In research by Aghazadeh (2004), to make the food supply efficient, there should be a sharing of information electronically from the retail, distributor, and manufacturer. It helped all the chains could order or manufacture the "enough" amount of food, which led to a lower cost.

There are many KPI that could be used to see the effectiveness and efficiency of logistics. Table 1 KPI for logistics service provision.

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Table 1: Performance indicators for logistics service provision

Internal perspective - Management point of view		
Effectiveness		
Revenue ↑ Profit margins ↑ Capacity utilization ↑ Km per day ↑ Labour productivity ↑ Price ↑ Turnover per km ↑ Number of deliveries ↑ Benefit per delivery ↑ Trips per period ↑ Perfect order fulfilment ↑ *Storage surface ↑ *Storage volume ↑ *Storage racks ↑ *Number and characteristics of docks ↑	Total number of orders ↑ Number of customers ↑ Number of new customers ↑ Number of regular customers ↑ Number of profitable customers ↑ Continuous improvement, rate ↑ Product range ↑ Plan fulfilment ↑ Total loading capacity (for trucks) ↑ On-time delivery performance ↑ *Product variety ↑ *Amount of products* ↑ *Seperation of storage areas ↑ *Handling equipment (electric, gas and diesel/petrol forklifts) ↑ *Ventilation control ↑	Long term plans availability / development ↑ Market share width ↑ Number of markets that have been penetrated ↑ Successful contacts – % of successful deals out of the initial offers ↑ Effectiveness of distribution planning schedule ↑ % of orders scheduled to customer request ↑ % of supplier contracts negotiated meeting target terms and conditions for quality, delivery, flexibility and cost ↑ Competitive advantage ↑ Certification (ISO 9001/9002, SQAS, HACCP) ↑ *Dangerous item storage possibilities ↑ *Temperature control ↑ *Distance to highway ↓ *Distance to train ↓ *Distance to waterway connection ↓
Efficiency		
Total distribution cost ↓ Labour utilization ↑ Overhead percentage ↓ Overtime hours ↓ % Absent employees ↓ Salaries and benefits ↓ Controllable expenses ↓ Non-controllable expenses ↓ Customer service costs ↓ Order management costs ↓ Inventories ↓ Number of trucks in use ↑ Total delivery costs ↓ *Pallets per hour↓	Average fuel use per km ↓ Average delivery re-planning time ↓ Marketing costs ↓ Failure costs ↓ Prevention costs ↓ Appraisal/Inspection costs ↓ % of failed orders ↓ % of realized km out of planned km ↑ Performance measurements costs ↓ Human resource costs ↓ Variable asset costs ↓ Fixed asset costs ↓ Information system costs ↓	Overhead/management/administrative costs ↓ Quality of delivery documentation per truck/driver ↑ Effectiveness of delivery invoice methods ↑ % orders / lines received with correct shipping documents ↑ % product transferred without transaction errors ↑ Item/Product/Grade changeover time ↓ Order management costs ↓ Supply chain finance costs ↓ Total supply chain costs ↓ Total time in repair (for trucks) ↓ Ratio of realized orders vs. requested orders ↑ Average delivery planning time ↓ *Pallets/ m^2 ↑
Satisfaction		
Attrition of drivers ↓ Morale, motivation of personnel ↑	On-time delivery performance ↑ Number of customer complains ↓ Overall customer satisfaction ↑	% of orders scheduled to customer request ↑ Overall employees satisfaction ↑ Overall society satisfaction ↑
IT and innovation		
Information system costs ↓ Up-to-date performance information availability ↑ Utilization of IT equipment ↑ IT training costs ↓	Number of new products in the range ↑ % of information exchange through IT ↑ % of employees with IT training ↑ Availability of IT equipment ↑ Use of RFID/Barcoding ↑	% of information management assets used / production assets ↑ % of invoice receipts and payments generated via EDI ↑ Average time for new products development ↓ Average costs for new product development ↓
Internal perspective – Employee's point of view		
Km per trip ↓ Working conditions ↑	Weight to (un)load per labour hour ↓	Salaries and benefits ↑
External perspective – Customer's point of view		
Transportation price ↓ Insurance price ↓ Primary services price ↓ Goods safety ↑ Product variety ↑ Response time ↓ *Opening hours ↑ *On site offices ↑	Transparency for a customer ↑ Possible types of communication ↑ Available types of goods insurance ↑ Order size flexibility ↑ Timeliness of goods delivery↓ *Duration pickup until information is updated inventory information is available to shipper ↓	Services variety ↑ Order configuration flexibility ↑ Possibility to change order details ↑ Additional services price (priority transportation) ↓ Contact points (number of people to contact) ↓ *Assistance with customs ↑
External perspective – Society's point of view:		
Level of CO2 emission ↓ Society satisfaction ↑ Wasting resources ↓ Recycling level ↓ Employees satisfaction ↑ Disaster risk ↓	Solid particles emission ↓ Taxes to the national treasury ↑ Participation in charitable actions ↑ Reputation of a company ↑ Road maintenance costs ↓ Number of available work places ↑	Competition level among similar companies ↑ Care for animals/children around ↑ Use of innovation technologies ↑ Development of innovation technologies ↑ Cooperation with other companies ↑

(Source: Krauth, et al., 2005)

Food Warehouse Simulation

Inventory cost could be as high as 50% of the purchase cost in many companies (Hodson, 1992). Thus, many companies are trying to be as efficient as possible in storing material or products in the warehouse.

Food warehouses have different challenges compared to other products. Food is a perishable product that requires special treatment such as temperature control, freshness date, and many more. Failure to

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

provide this gives risk to the product and will be waste due to the quality (Stragas & Zeimpekis, Unknown).
There are many types of food warehouses; cross-docking, 3PL, and private or lease warehouses. This type of warehouse has its function - See table 2.

Table 2: Type of Warehouse Function

Cross-Docking	3PL	Private or leased warehouses
No intermediate storage	Provision of warehouse services for a third party	Most commonly warehouse type used
Batches cut into smaller	Low investment costs	Usually established nearby the company's property
Goods are mixed	Saving human resources	Serve specific needs
Orders completion	Saving financial resources	Management conducted by the company
Goods loaded and shipped	Include indoor procedures	Management know-how required

There are many KPI to measure the efficiency of the warehouse. Previous articles have been write regarding the use of simulation as a tool in warehouse design (Senko and Suskind, 1990). More examples were written of articles discussing models of order picking systems (Daniels et al . 1998, Kim et al . 2002), cost models for inventory and inventory sizing models (Cormier and Gunn 1996), warehouse capacity expansion models (Cormier and Gunn 1999), storage allocation (Macro and Salmi, 2002).

One of the most common methods of analyzing warehouse operations has historically been a simulation. Through seminal work on the simulation ability in warehouse management (see, for example, Bafna, 1973 and Biles 1977) to recent publications, the simulation was mainly used to validate the efficiency of warehouse structures or material handling equipment.

Order Picking

In the internal distribution center operation, order picking could occupy up to 50% of the overall cost (Hsieh & Tsai, 2006). In order to minimize the cost, four typical strategies could be used. They are (1) layout design, (2) picking policies, (3) storage assignment policies, and (4) routing policies (Chan & Chan, 2010).

According to Ashayeri (1985), the warehouse layout design goal is minimum building cost or material handling. Meanwhile, storage assignment policies aim to reduce travel time. Generally, the storage assignment policies are as follows: random storage, classified storage, fixed storage, volume-based storage, etc. (Hsieh & Tsai, 2006). On the other hand, routing goals are to reduce unnecessary routes of picking orders. Lastly, picking policies determined how the order would be grouped (Chan & Chan, 2010).

According to Krauth (2016), one of the warehouse's measurements is labor utilization and fixed asset costs. For labor utilization, a success indicator of labor utilization could see if the utilization is going up. In contrast, the fixed asset cost measurement will be a success if it's going down. Hence, this research will be focusing on the measurement of labor utilization and fixed cost (rack and building).

Methodology

The method used in this research is the discrete-event simulation. The research will use the framework suggested by Banks (2014) in figure 1.

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Figure 1: Steps in Simulation Study

(Source: Banks, J. et al., 2014)

Problem Formulation

In early 2021, Urbanis will increase its production capacity up to 20 times its current capacity. Aside from that, the market will shift into community-supported agriculture (CSA), which will change the business model into subscription healthy food production. Due to various types of food products, the companies need to have a place where it can store and combine the food produce. These necessities

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

could be done in the warehouse. With high investment up front to make a warehouse, the company decided to measure the layout, consisting of the amount of rack and the utilization of labor.

Setting of Objective and Overall Project Plans

This research aims to find the amount of rack used by the companies when the production capacity increases. Meanwhile, it also measures the utilization of labor that works to store and prepare the food produced. From this measurement, then, the author will give the estimation of capital and operational expenditure that the company will be planned.

Model Conceptualization

The model will start with the truck coming to the warehouse. The supplier will unload the food products into the unloading area, from the truck, which will then be seized by the labor to put in the rack area. While putting in the rack area, the labor will then wait for the order.

After the order is received, the labor will collect the food products to be combined and packed. Then, it waited for the courier to come to the warehouse to bring the food products to the customer.

Data Collection

This research will use a quantitative approach to answering the problem. The data collected on this research will vary, ranging in observations, secondary data, and primary data (internal company data). In this research, the observations data will be the speed of pick-up car, labor, courier, and how many kgs could be brought per order by the courier.

The observation data will be collected by observing the speed of pick-up car, labor, courier, and how many kgs could be brought per order by the courier. Aside from that, it will also be strengthened by interviewing people who already work in similar situations.

Table 3: Interview

M. Faza Zharfan	CEO of Urbanis
Ryan	Head of Logistic in Harvest Supply

Secondary data will be pick-up car size, labor size, motorcycle size, and box size. The secondary data will be collected from official website companies or third party commerce such as tokopedia and rumah123. Lastly, primary data collected from internal companies data, which is the future projection of production capacity and schedule of food produce arrival per day in the warehouse.

Model Translation

Because most real-world programs result in models needing much information storage and computation, the model must be entered in a computer-recognizable format. In this research, the model will be computerized using a discrete-event simulation software application. The author chose Anylogic since this software is used by some Fortune 500 companies.

Verified

Verification applies to the simulation model. Will the machine system run properly? Since it is challenging, if not impossible, to effectively turn a concept into its model without any testing. When the functional and feedback parameters. The system structure is described correctly on the machine, and verification is done.

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Validated

Validation is the determination that a model represents the actual system accurately. Validation is typically accomplished by model validation, an iterative method that matches the model against real system actions and utilizes the inconsistencies between the two against refinement of the model and the observations obtained. This cycle is replicated before the consistency of the model is considered appropriate.

Experimental Design

In this research, the model will have six scenarios. This scenario differs in the supplies arriving in the warehouse and the amount of labor working inside the warehouse. From these differences, the author will then choose one scenario suitable for Urbanis in case of the maximum amount of equipment (rack) and average utilization of labor.

Production runs and analysis

The analysis of the simulation will measure the performance that has been selected in the research objective. In this research, two performances should be measured, maximum rack, and utilization of labor. After collecting the data from 6 scenarios, the researcher will choose which is the most suitable one.

More runs?

Based on the analysis of completed runs, the analyst will determine if additional runs are needed and how those additional experiments should be designed.

Documentation and Reporting

After the simulation has been done, the researcher will make a documentation of the program and progress that will be put on this research. This documentation will consist of the maximum amount of rack used, the average utilization of labor, and total product shipped monthly.

Implementation

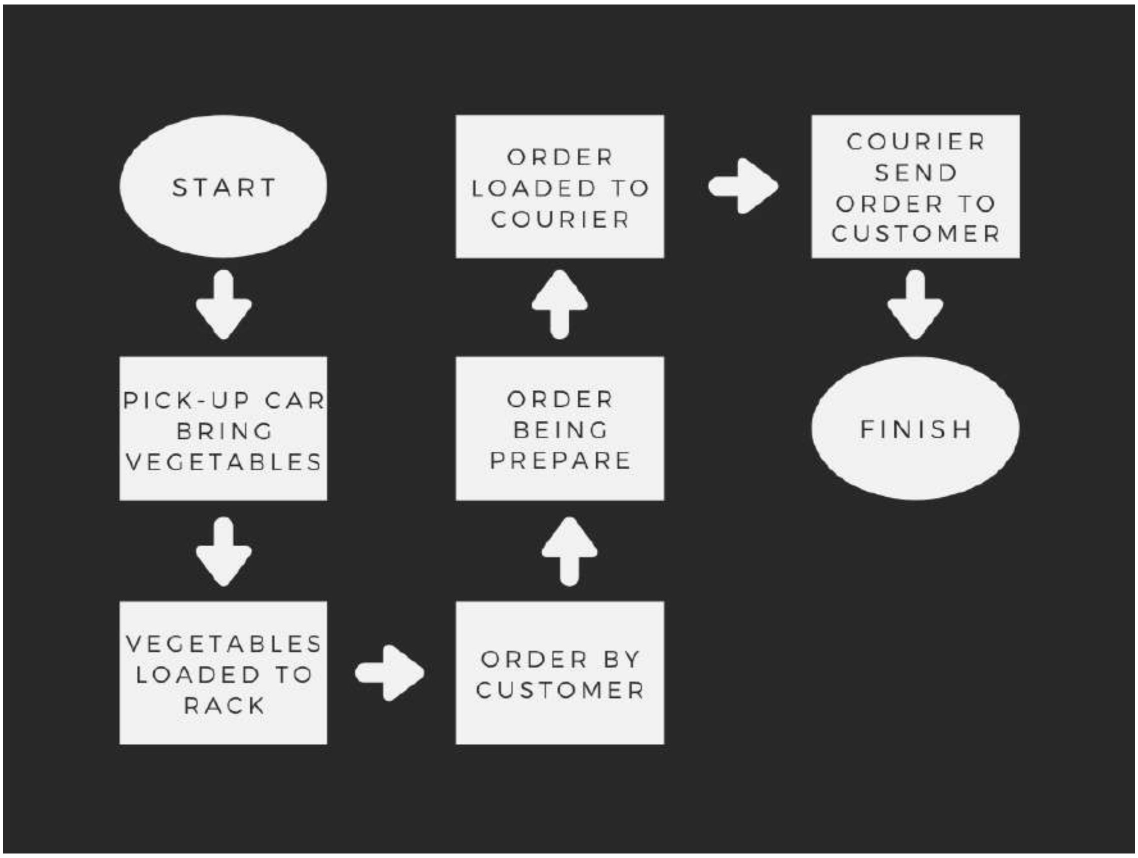
Lastly, the researcher in this research in which management of the company will make the implementation plan according to the analysis of the simulation. The implementation will consist of the company's timeline and resources to implement the business solution suggested by this research.

Model Conceptualization

The flow chart of the simulation will start with the pick-up car coming with the food produced. Then, it unloads all the food produced into an unloading area, which will then be loaded to the rack by the labor inside the warehouse. After it is loaded, the labor then waits for the order by the customer. After the order is received, the labor then brings the food products to the packing station to be prepared. Lastly, the order produced will then be given to the courier who will ship it to the customer.

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

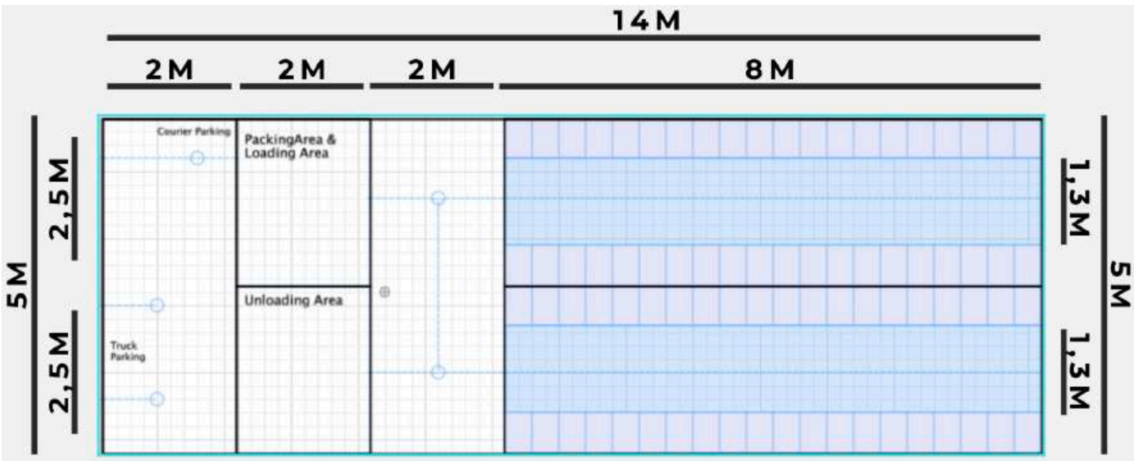
Figure 2: Urbanis Model Conceptualization



Layout Design

In this research, researchers will experiment with a layout with a total length and width of 14 and 5 meters, respectively. In front of the building, there will be parking space totaling 10m2 (2x5m). Inside the building, there will be three areas; unloading area (2,5x2m), packing and loading area (2,5x2m), and rack area (5x8m). The rack area will then be divide into two categories based on the food produced; bok choy and water spinach. The rack could be level up to 3 levels, with each linear rack could store up to 60 boxes. In each rack, it will have an aisle with a width of 1,3 meters.

Figure 3: Layout Design



Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Data Collection

Future Projection

Production capacity

Future projection of the production capacity of urbanis warehouses will be divide into two scenarios. The first scenario will start in the first quarter of 2021, which will use total production capacity (8 tonnes/month) that partnered with DISPANGTAN. In the second quarter, we will add the production capacity with the *Rumah Sakit Jiwa Provinsi Jabar*, which will add up to 2 tonnes per site.

Table 4: Amount of food produce per month

1st quarter of 2021	8 tonnes/ month
2nd quarter of 2021	10 tonnes/ month

The amount of food arrive at the warehouse will be the division between total production and the average number of working days (6 days per week) per month (25 days) which estimated will be:

Table 5: Amount of food produce per day

1st quarter of 2021	320 kg/day
2nd quarter of 2021	400 kg/ day

The proportion of the food produced will be 50% each, which will be scheduled to be received 50% at 9 A.M. and 12 P.M on the working day (Monday - Saturday).

Table 6: Schedule of food supply

	9 A.M.	12 P.M.
1st quarter of 2021	160 kg	160 kg
2nd quarter of 2021	200 kg	200 kg

Market

As our company is planning to focus on Community Supported Agriculture (CSA) using a membership model, there will be a significant change in the percentage of food produced being absorbed by each channel. The strategic management projection will be:

Table 7: Market Proportion

Selling Channel	Percentage
B2B (Restaurant, catering, cafe, and etc)	25%
B2C / CSA (Social Media)	60%

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Local Resident	15%

As our members will mostly be people who are interested in sustainable products, most of the B2C market will be people who have middle-high income. The amount of product shipped by Urbanis will be linear to the amount of food available in the warehouse.

Secondary Data

The secondary data is collected in the retail price of plastic rack and minimum wages in Bandung (*Upah Minimum Kota Bandung)*. The plastic rack's retail price will be collected via e-commerce, while minimum wages in Bandung will be referred to as *Surat Edaran Nomor: 561/75/Yanbangsos*. The price and wages will be shown in table 8.

Table 8: Price and wages

Plastic Rack	Rp 84.500 / rack
Minimum Salary in Bandung	Rp 3.623.778,91 / month

Meanwhile, the size of the agent (labor, pick-up car, courier (motorcycle), and box) will be collected by looking at the official site or third-party commerce such as tokopedia. The size of the stakeholders will be in table 9.

Table 9: Size of agent in the warehouse

	Width (in cm)	**Length (in cm)**
Labour	60	15
Pick-up Car	150	240
Courier (motorcycle)	70	180
Box	40	60

Observational Data

Observational data collected will be the speed of the agent in the warehouse, labor, pick-up car, and courier. This data collected by observing the agent then strengthens by interviewing people who work or have responsibilities in similar situations, such as Faza and Ryan, as CEO of Urbanis and Head of Logistics in Harvest Supply, respectively.

Table 10: Speed of agent in the warehouse

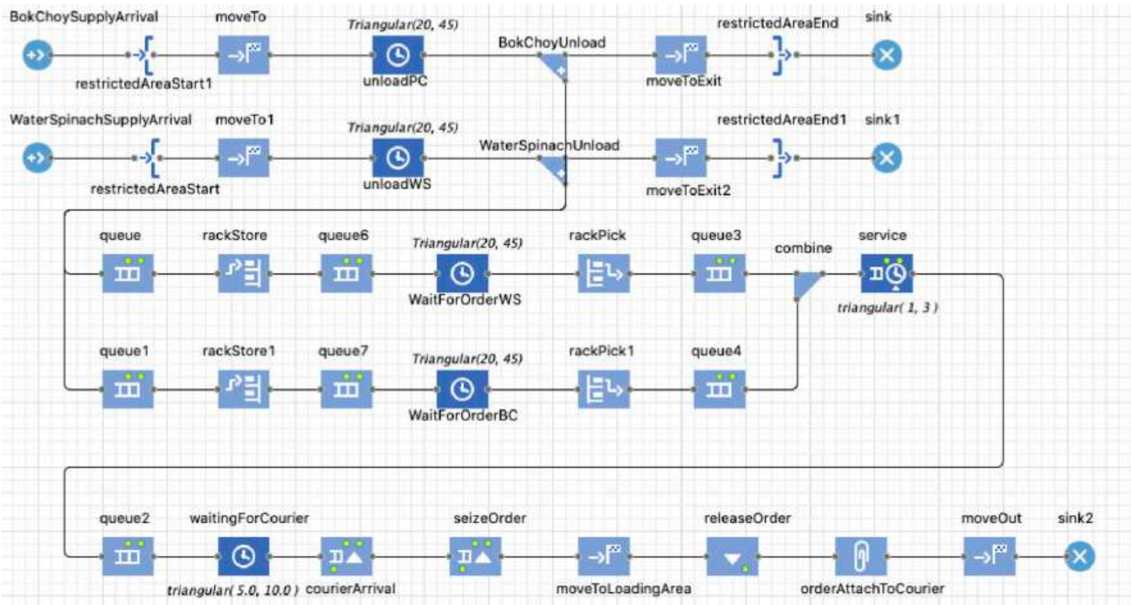
	Speed (Km/H)
Labour	2
Pick-up Car	2
Courier (motorcycle)	2

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Model Translation

The conceptual model then translated into a simulation software application named Anylogic. In this model, the researcher mimics the real-world event based on the previous part's data.

Figure 4: Business Translation



While testing in the simulation software, Anylogic, this model is verified to run well. Aside from that, this model is also validated to mimic real-world events inside the warehouse. Hence, this model could be used to simulate the Urbanis warehouse.

Experimental Design

In the 1st quarter and 2nd quarter of 2021, there will be three scenarios conducted for each quarter. Each quarter, the scenarios will be the amount of food arrive per schedule (Table 11) and the labor that works inside the warehouse. All the scenarios will be shown in Table 11.

Table 11: Experimental Design Scenario

1st quarter (320 kg of food arrive each day)	1 labour
	2 labour
	3 labour
2nd quarter (400 kg of food arrive each day)	1 labour
	2 labour
	3 labour

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Documentation and Reporting

From the simulation conducted, the data shown for each scenario will be shown in table 12 and 13.

Table 12: Simulation results 1st quarter

	Maximum Rack Used in a month	Average Labor Utilization / month	Total Product Shipped in a month (26 days)
1 Labour	Water Spinach Rack Full at day 8	0.932	240 kg
2 Labour	32	0.717	8,32 tonnes
3 Labour	33	0,48	8,32 tonnes

Table 13: Simulation results 2nd quarter

	Maximum Rack Used in a month	Average Labor Utilization / month	Total Product Shipped in a month (26 days)
1 Labour	Bok Choy Rack Full at day 6	0,906	80 kg
2 Labour	50	0,914	10,28 tonnes
3 Labour	46	0.614	10,36 tonnes

Analysis

Based on the data collected, it will then be calculated by using the average cost per kg for each scenario. Since in scenario 1, the rack reached full capacity and could not keep up to manage upcoming supply for the next day, by then, it was eliminated from the option. Table 14. below is the analysis for the cost.

Table 14: Analysis of labour cost per product

	Wages (A)	Total Product Shipped in a month in kg (B)	A/B
1st Q, 2 Labour	Rp 7,247,558	8320	Rp871
1st Q, 3 Labour	Rp 10,871,337	8320	Rp1,307
2nd Q, 2 Labour	Rp 7,247,558	10280	Rp705
2nd Q, 3 Labour	Rp 10,871,337	10360	Rp1,049

As the results show that, the least cost by each quarter is using two labors. Therefore, the author suggested using two labors for both the 1st quarter and 2nd quarter.

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Warehouse Specification

Building

For warehouse purposes, the author suggested finding a building that fits the amount of rack needed by the warehouse. Based on Rumah123.com, rent for the building is to pay for a minimum yearly. For this reason, we used the maximum amount of rack used in the 2nd quarter since it has a higher amount.

In the second quarter, the amount of rack needed will be in total is 50. Divided into three levels of rack, the amount of size that needed by the company will be 16,67 rack or rounded to 17 racks. With this amount, the size for the rack only will need around 40,8m2.

Gathering the data from Rumah123.com, the researcher suggested one suitable place that could be used by the company.

Figure 5: Building Suggestion

In the figure above, the building will have a total surface area of 100m2, with a total building area of 95m2. The area's length and width are 5x20m, which is larger than the layout conducted in the simulation. In rumah123.com, the yearly rent for the building is Rp 45.000.000/year.

By having a larger area, this building could become a warehouse and office space for Urbanis. Meanwhile, the left area could also become the input space in the model, such as the toilet.

Additional Warehouse Equipment

There is a lot of material that needs to be in the warehouse yet not measured in the simulation. Such as a chair for the labor to sit or take a rest.

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Table 3.15: Additional Warehouse Equipment

Material	Qty
Table	3
Chair	5
Fan	2

The table will be used for multi-purpose purposes such as packing, eating tables, etc. Meanwhile, chairs will be used for labor, courier, and supply to take a rest. Lastly, the fan is used to make sure the place is well ventilated.

Additional Warehouse Human Resource

With labor focus on the hard work inside the warehouse, there is a need to have people manage the warehouse data. Aside from that, this person will be responsible for supervising the labor while receiving guests. Hence, the company hypothetically needs one admin to control and manage the warehouse.

Expenditure

Capital Expenditure

The equipment price is collected via Tokopedia (e-commerce), while building data is collected in Rumah123.com.

Table 16: Capital Expenditure

	Price	qty	Total Price
*Building	Rp 45.000.000	1	Rp 45.000.000
*Rack (50)	Rp 84.500	50	Rp 4.225.000
Table (3)	Rp 280.000	3	Rp 840.000
Chair (3)	Rp 65.000	5	Rp 325.000
Fan (2)	Rp 174.000	2	Rp 348.000
		Total	Rp 50.738.000

Operational Expenditure

On admin wages, the author assumed the wages are similar to labor wages. Hence, the operational expenditure will be wages multiplied by three.

Table 17: Operational Expenditure

	Wages	qty	Total Cost
*Labour Wages	Rp 3.623.779	2	Rp 7.247.558

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Admin	Rp 3.623.779	1	Rp 3.623.779
		Total	Rp 10.871.337

Conclusion

On answering the research problem, the author conducted discrete-event simulation via application software, Anylogic. The data collected comes from 3 resources, such as primary data (Urbanis internal data), secondary data (online data collection), and observation data (Interview and observation). Then, the data will be analyzed using Anyogic to find how many people and equipment (rack) need by the Urbanis to provide food products in the future. The discrete-event simulation results will be the basis for answering the problem statement of this research. The problem is satiated as follows:

Urbanis need to have a warehouse with a maximum rack dimension of 50 racks while having two labor to work on food produce storing and picking. Looking at rumah123.com, the layout suitable for urbanis is locate in Bandung with a minimum land area requirement of 5x14 meters. Aside from that, the author acknowledges there is a need for additional equipment not yet analyzed in this research, such as furniture, detailed order picking equipment, table, chair, fan, etc.

It shows that for both the 1st quarter and 2nd quarter warehouse scenario, urbanis need a similar amount of labor, which is two manpower for order picking activities. For the rack, it has differences in both quarters, in the first quarter, with the labor used 2, the maximum racked used will be 32. Meanwhile, in the second quarter the maximum rack used is 50.

We found that the building is rent for a minimum yearly based on data collected in Rumah123.com. For this reason, the author suggests finding a suitable building with a maximum rack used in all quarters, 50 racks. Based on rumah123.com, the suitable place (least expensive and could accommodate future projection), will cost the company Rp 45.000.000 each year.

The author then calculates capital and operational expenditure. The author found that the company's capital expenditure will be Rp 50.738.000 per year, while operational expenses will be Rp 10.871.337 for a month**.** This expense consists of the variable data analyzed in the simulation (labor and rack) and not analyzed or additional such as fan, chair, table, and admin.

References

Ashayeri, J. & Gelders, L. (1985). Warehouse design optimization. *European Journal of Operational Research, 21*(3), 285–294.

Banks, J. et al. (2014). Discrete-event system simulation, Harlow, Essex: Pearson Education.

Chan, F.T. & Chan, H. (2011). Improving the productivity of order picking of a manual-pick and multi-level rack distribution warehouse through the implementation of class-based storage. *Expert Systems with Applications, 38*(3), 2686–2700.

Deelstra, T. & Girardet, H. (1999). Urban agriculture and sustainable cities, Proc. of the International Workshop "Growing Cities Growing Food", Havana, Cuba. *Thematic Paper*, 2, 43-65.

Girardet, H. (2008). Cities people planet: urban development and climate change, John Wiley & Sons.

Hsieh, L.-F. & Tsai, L. (2005). The optimum design of a warehouse system on order picking efficiency. *The International Journal of Advanced Manufacturing Technology, 28*(5-6), 626–637.

Indonesia Population (LIVE). Retrieved April 26, 2020, from https://www.worldometers.info/world-population/indonesia-population/

Jual rak tv/rak/meja tingkat/meja/meja rak/meja susun 2/meja kayu/furniture - Jakarta Utara - HAGA MAS. (n.d.). Retrieved August 18, 2020, from https://www.tokopedia.com/hagamas/rak-tv-rak-meja-tingkat-meja-meja-rak-meja-susun-2-meja-kayu-furniture

Malaysian Journal of Social Sciences and Humanities (MJSSH), Volume 5, Issue 8, (page 117 - 132), 2020
DOI: https://doi.org/10.47405/mjssh.v5i8.485

Liu, T., Yang, M., Han, Z., & Ow, D. W. (2016). Rooftop production of leafy vegetables can be profitable and less contaminated than farm-grown vegetables. *Agronomy for Sustainable Development, 36*(3). http://doi.org/10.1007/s13593-016-0378-6

M, S. C. Green roof urban farming for buildings in high-density urban cities. Retrieved from https://www.researchgate.net/publication/228933623_Green_roof_urban_farming_for_buildings_in_high-density_urban_cities

Maxwell, D. G. (1995). Alternative food security strategy: A household analysis of urban agriculture in Kampala. *World Development, 23*(10), 1669–1681. http://doi.org/10.1016/0305-750x(95)00073-l

Mincyte, D. & Dobernig, K. (2016). Urban farming in the North American metropolis: Rethinking work and distance in alternative food networks. *Environment and Planning A: Economy and Space, 48*(9), 1767–1786. http://doi.org/10.1177/0308518x16651444

Nakamura, H., Kajikawa, Y., Suzuki, S. (2012). Multi-level perspectives with technology readiness measures for aviation innovation. Sustain Sci. 8, 87e101.

Pölling, B., Prados, M.-J., Torquati, B. M., Giacchè, G., Recasens, X., Paffarini, C., … Lorleberg, W. (2017). Business models in urban farming: A comparative analysis of case studies from Spain, Italy and Germany. *Moravian Geographical Reports, 25*(3), 166–180. http://doi.org/10.1515/mgr-2017-0015

Thomaier, S., Specht, K., Henckel, D., Dierich, A., Siebert, R., Freisinger, U. B., & Sawicka, M. (2014). Farming in and on urban buildings: Present practice and specific novelties of Zero-Acreage Farming (ZFarming). *Renewable Agriculture and Food Systems, 30*(1), 43–54. http://doi.org/10.1017/s1742170514000143

Xiao, Y.-B., Chen, J., & Xu, X.-L. (2008). Fresh Product Supply Chain Coordination under CIF Business Model with Long Distance Transportation. *Systems Engineering - Theory & Practice, 28*(2), 19–34. http://doi.org/10.1016/s1874-8651(09)60009-0