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Research Article

Development of an Information System with an Herbal Database of East Java Suppliers and Distributors

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ABSTRACT

The development of an information system with an herbal database of East Java suppliers and distributors is necessary because the production and marketing activities of small businesses engaged in traditional medicine (UKOT) in Indonesia are heavily reliant on the choice and availability of distributors of herbal products and raw materials. Data were gathered via an interview with the Responsible Pharmacist (APJ) and documentation on PT X's records. Subsequently, the completed data generated from the chosen documentation was entered into the database which a component of PT X's internal information system. The analysis was conducted on PT X's internal database, with an emphasis on its completeness, correctness, and accessibility. Data preparation resulted in a number of suppliers (43 simplicia, 31 excipients and 13 packaging) and 80 distributors of finished products in East Java, which were entered into the PT X database. This result was obtained by 80% of data completeness evaluation ranges. All respondents properly answered questions about data about finished product suppliers and distributors from PT X's internal information system database. Ninety-three percent of respondents agree that the database in PT X's information system is very easy to access in terms of data display, language, and search feature functions.

INTRODUCTION

Indonesia is known as a country that has a diversity of herbal plants that have efficacy and can be used as traditional medicine (Pawarta, 2017; Sumayyah and Salsabila, 2017). This advantage is utilized by several traditional medicine manufacturers, one of which is the Small Traditional Medicine Business (UKOT) for producing herbal medicines. In carrying out UKOT, one of the critical aspects is the supply chain of herbal products consisting of raw materials suppliers and distributors of finished products (Chamid, Surarso, and Farikhin, 2015).

Through suppliers, manufacturers of herbal products can obtain appropriate raw materials. Raw materials from suppliers can come from farmers directly or from collectors. Raw materials can be directly used for production or first processed by specific factories so that they are completely ready to be used for the production process. Therefore, one herbal product can contain several herbal plant raw materials that come from one or more suppliers. Moreover, more than one product is produced, requiring many suppliers to ensure the availability of raw materials. Herbal products that have been produced can be delivered to consumers through direct sales by producers or distributors. Distributors can also distribute directly to consumers or through outlets such as pharmacies or supermarkets (Booker, Johnston, and Heinrich, 2012; Novita *et al*., 2020).

The availability and selection of suppliers of herbal raw materials and distributors of herbal products are important factors in the production and marketing activities of small traditional

medicine businesses (UKOT) in Indonesia. Manual recording or documentation can be one of the factors that can cause errors caused by human errors, so automation is needed to avoid these errors (Chamid, Surarso, and Farikhin, 2015; Santika, and Mahmudy, 2015; Septianur and Nurcahyati, 2017; Nisa, Subiyanto, and Sukamta, 2019). An internal information system containing a database of East Java suppliers and distributors can support the assurance of completeness and ease of access to supplier and distributor data at UKOT PT X in Surabaya, East Java.

METHODS

Data collection activities are illustrated in Figure 1 below, which represents the flow of activities carried out to obtain data related to suppliers and distributors for information system purposes at the UKOT company, namely PT X.

Two different types of data must be searched: supplier data and distributor data. Each piece of data is derived from two sources, notably documents held by UKOT PT X. The paperwork possessed by UKOT PT X consists of data on suppliers and distributors who have collaborated in the past. However, more data searches are conducted using the Internet to expand the reach of new suppliers and distributors. Therefore, before being loaded into the previously constructed database system, every acquired information will undergo further processing.

The respondents in this study are the users of the UKOT PT X data system, specifically the Responsible Pharmacist (APJ) and the admin that work in PT X. A questionnaire of respondents' opinions on the system was adapted from related research (Pranatawijaya *et al*., 2019; Yunita and Krisnawan, 2023). The evaluation describes respondents' opinions about the system using a Likert scale score assessment. Questionnaire validation includes content, construct and language validation carried out by relevant experts. The questionnaire is divided into four sections: (1) introduction and brief explanation of the system evaluation; (2) respondents' sociodemographic information; (3) assessment of the completeness of PT X's database system information; and (4) assessment of the system's accessibility.

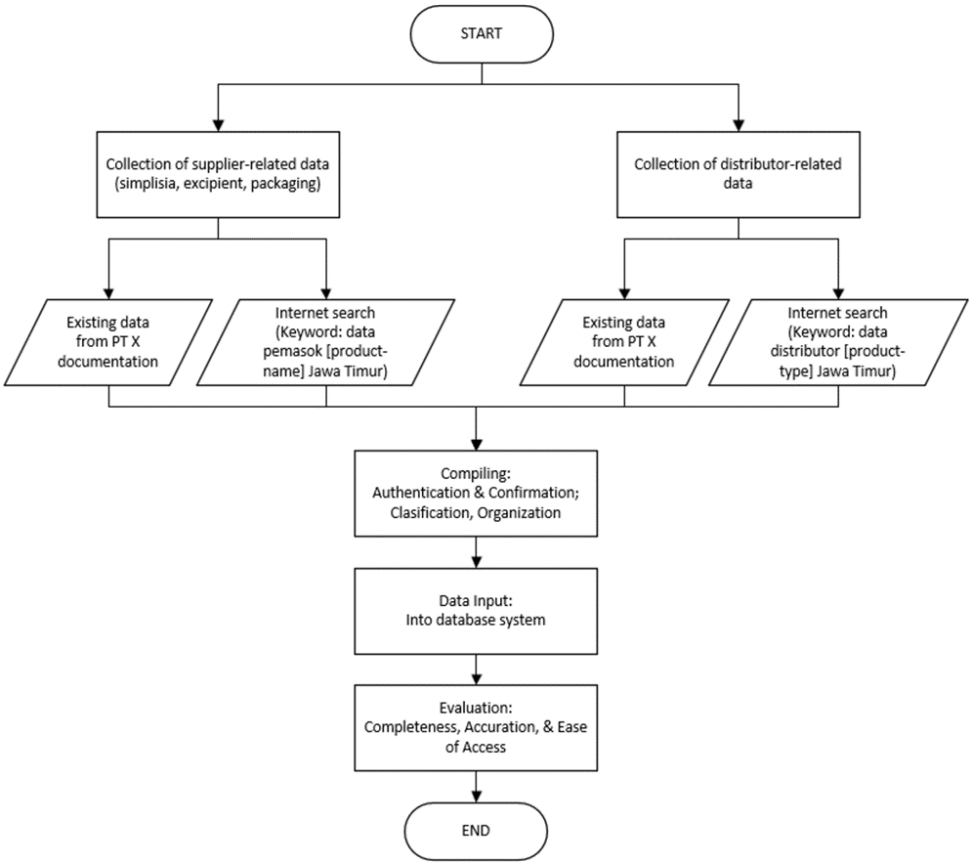


Figure 1. Methodology of Data Collecting

RESULTS AND DISCUSSION

Internet search results for supplier data are shown in Table 1 below. Meanwhile, distributor data acquired from Internet search results are included in Table 2.

Internet-based searches for supplier data are required to expand PT X's chances of acquiring raw material suppliers. The addition of supplier data is to prevent enterprises from relying on a single source for specific raw materials. One of the most essential aspects of meeting the needs of the firm consistently and at an acceptable cost is the selection of suppliers (Chamid, Surarso, and Farikhin, 2015). A decision support system is used to select suppliers by selecting suppliers with the greatest potential. However, not all suppliers might be used as raw material sources since the raw material used for the manufacturing process must fulfill the set quality criteria. Consequently, the selection of providers must also include delivery distance. Therefore, providers outside the province of East Java will be omitted from the list. Golonko *et al.* (2021) show that the level of integration in the supply chain in the herbal business at Poland was discovered to be low, which was influenced by the restricted relationships and types of dependencies between the chain's members. The enormous fragmentation and collection of herbs from natural places by hundreds of independent collectors contributed to the low level of integration. On the recipient side, the degree of integration was in the middle range, which was slightly better.

Table 1. Search Result of Supplier Data

Raw Material Supplier							
No.	Category of Raw Material	Supplier which supply raw material for PT X	Raw Data of Suppliers from internet	Suppliers located outside East Java	Supplier who do not supply raw material for PT X	Total suppliers from the internet	Final Result
1	Simplisia	4	48	-4	-5	39	43
2	Excipient	7	40	-13	-3	24	31
3	Packaging	6	23	-12	-4	7	13

Table 2. Search Result of Distributor Data

List of Pharmaceutical Wholesalers (PBF)*								
Distributor for PT X.	Number of PBF data search results on the website	PBF is located outside East Java	PBF license revoked	Not registered on the BPOM website	Not distributing traditional medicine	Duplication	Total distributors from the internet	Final Result
2	286	-1	-36	-67	-103	-1	78	80

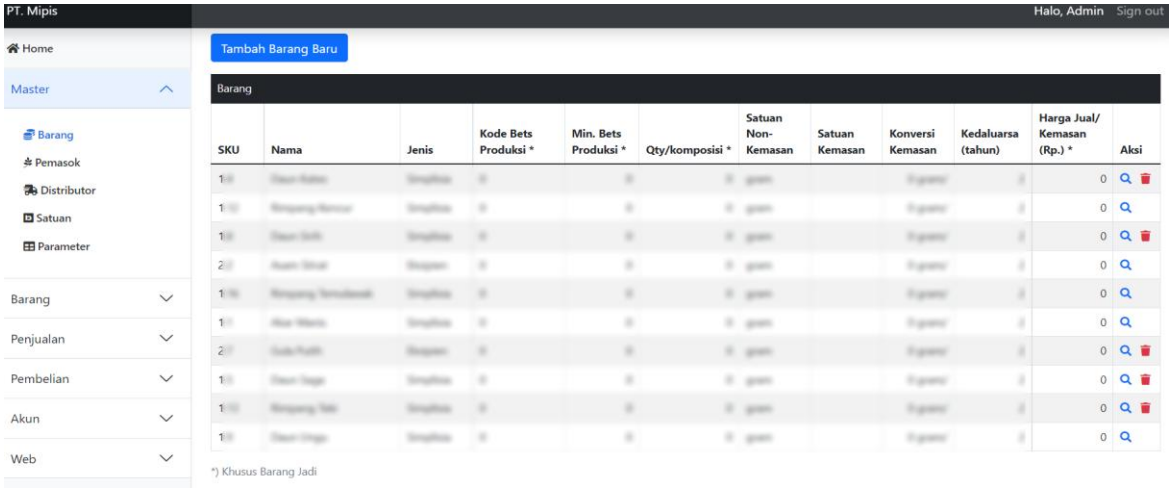


Figure 2. Result Of Input Data Of Products/Raw Materials at PT X's Database System

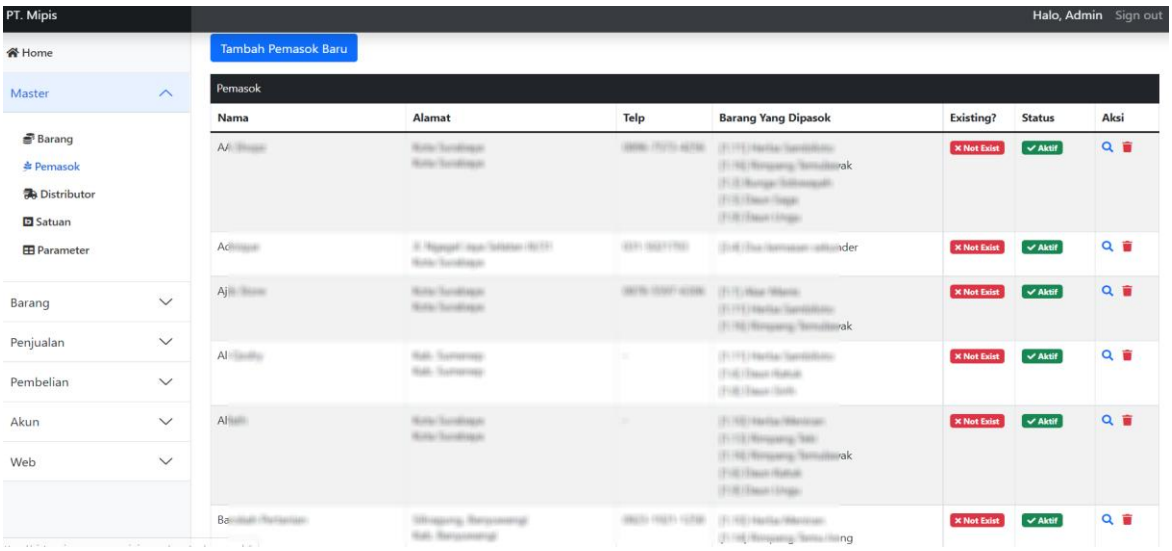


Figure 3. Supplier Data Input Results (simplicia, excipients, packaging) at PT X's Database

PT X is a manufacturer of custom-made herbal medications. Small and medium-sized firms (often abbreviated as SME) make up a significant portion of Make-to-order (MTO) businesses. Make-to-order is a word that refers to businesses that make customized and personalized products to specific customer specifications, however these products are not repeated regularly or in a predictable manner. In the manufacturing-to-order (MTO) industry, some or all of the production does not begin until after the customer order has been received. MTO enterprises tend to have a limited selection of typical products and demand that is highly unpredictable (Saniuk and Waszkowski, 2016). Consequently, this organization lacks a concrete manufacturing timetable. If the distributor places an order, the actual production process will commence. Therefore, the organization must be able to extend the market by collecting new distributor data in addition to the existing data.

The results of an Internet search for new distributor candidate data yielded 286 distributor data. However, the data must be processed beforehand, which includes determining whether or not it is legally registered on the BPOM website. The outcomes of this new distributor's data processing yielded a total of 80 prospective data.

All acquired information is stored in a database system that was previously established. This data is recorded as a repository required by the system as a source of input to generate company-beneficial information. The recorded

supplier information includes the provider's name, location, contact information, and the type of raw material delivered. For this reason, raw material data must be loaded into the system first, as seen in Figure 2. Figure 3 shows the outcome of entering supplier data into the system, whereas Figure 4 shows the outcome of entering distributor data.

To validate the data that were entered into the database system, ten system users were requested to complete the questionnaire. The findings of this questionnaire are crucial for determining if the results of prior data collection have satisfied the demands of users in terms of data completeness and accessibility. We asked four questions to evaluate the completeness of the data in the initial survey. These questions are:

Q1 = How complete is the information on simplicia supplier data in East Java in the system?

Q2 = How complete is the information on the excipient supplier data in East Java in the system?

Q3 = How is the completeness of information on packaging supplier data in East Java in the system?

Q4 = How is the completeness of the data information on the finished product distributor in East Java on the system?

In the second questionnaire, we posed three questions to obtain user feedback on the system's data accessibility. The three concerns are:

Q1 = Is the presentation of data on the system easy to understand?

Q2 = Is the language used in the system easy to understand?

Q3 = Can the search for suppliers and distributors of finished products in the system be used properly?

Figure 5 illustrates the findings of the initial questionnaire. For each question item, the proportion of respondents who agreed that the gathered data was comprehensive and slightly incomplete was proportional. This is logical given that the collected data are sourced from internet search results. Not all suppliers and distributors provide comprehensive information about themselves. Some providers, for instance, do not supply a phone number. Some individuals do not mention the delivered items.

Weiskopf and Weng (2013) proposed three key characteristics of data quality, and our study solely measures data completeness. The term "completeness" refers to the total availability of data regarding a given context that the user is interested in. The models that are proposed in this research for computing the quality of websites taking into consideration the criterion "Completeness" is straightforward, open to expansion, and straightforward to put into practice (Bhanu *et al.,* 2019). Based on the results of the evaluation survey on the completeness of information on the PT X database, it can be seen that in providing data on suppliers (Simplicia, excipients, packaging) and distributors of finished products, a percentage of 50% is obtained for respondents who state that the data on the PT X database are very complete. Another

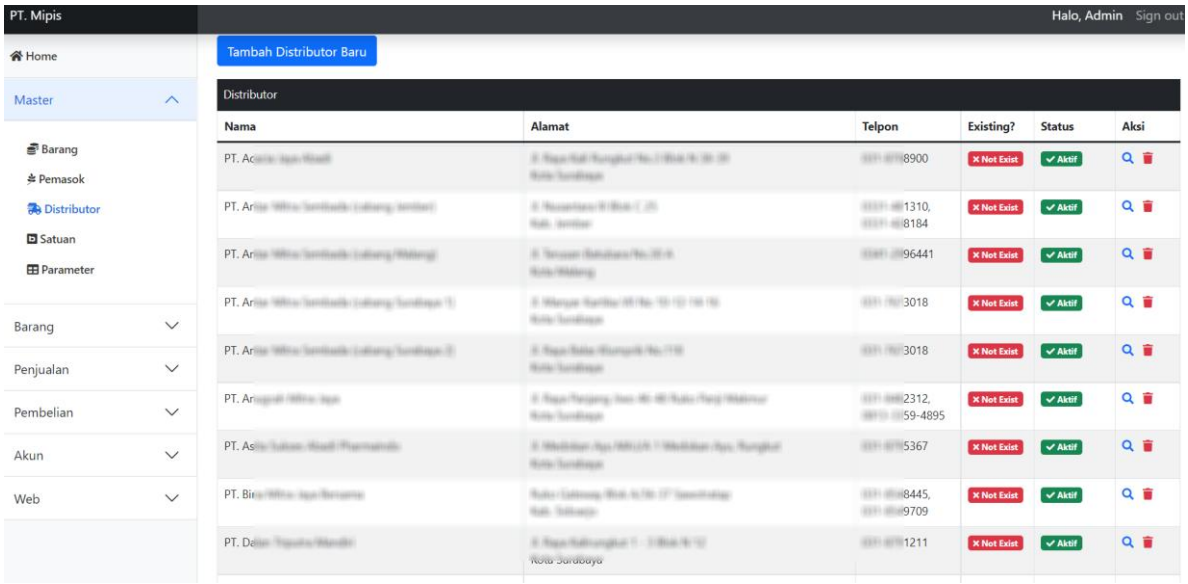


Figure 4. Data Input Results of Distributors at PT X's Database System

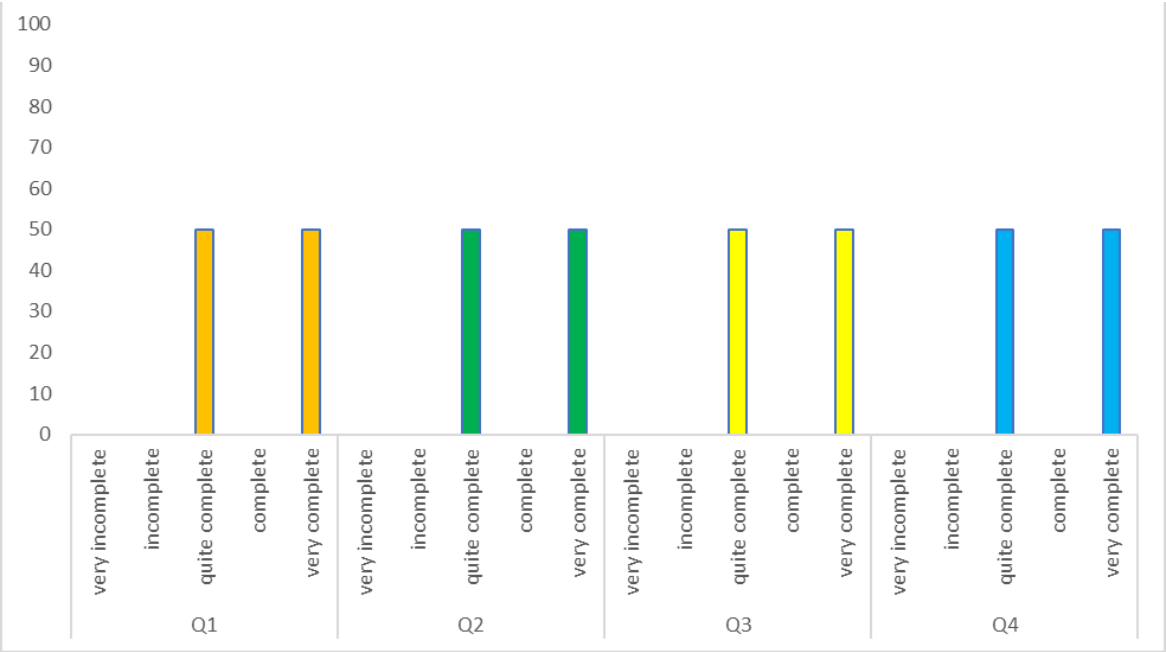


Figure 5. Evaluation of completeness of data at PT X's system

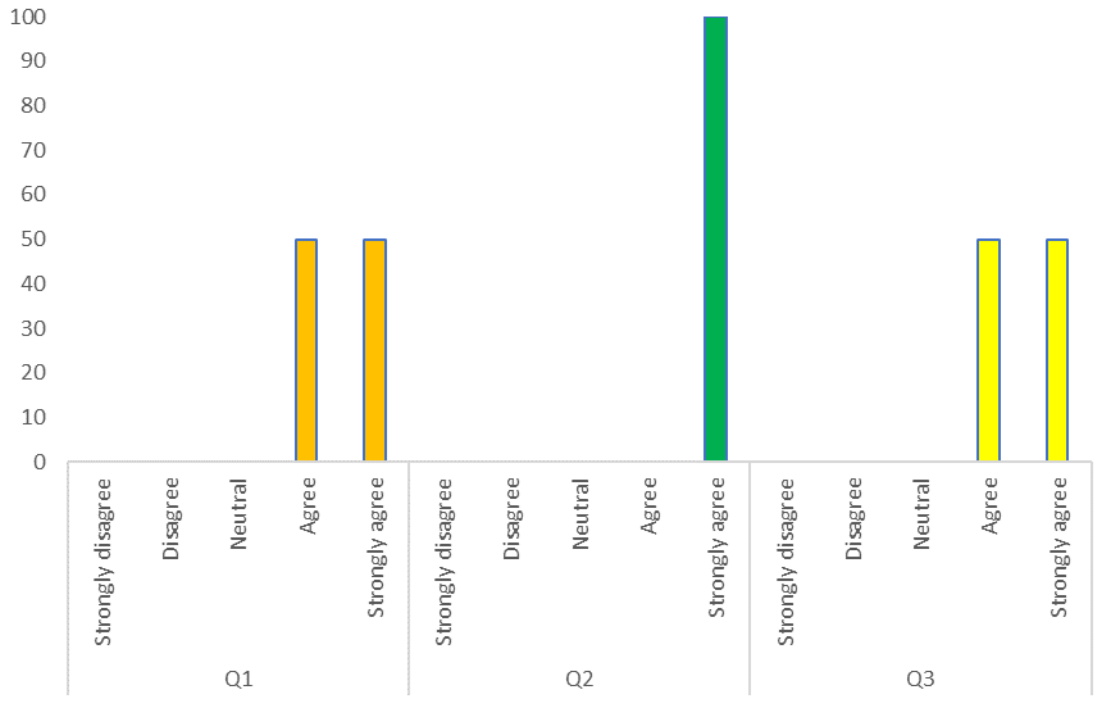


Figure 6. Evaluation of easy access to PT X's system

percentage of 50% was obtained from respondents who stated that the data on the PT X database were very complete. This difference of opinion could be due to a bias in the appearance of suppliers which are not separated by category. The percentage obtained from respondents from the results of the evaluation of the completeness of the data was then analyzed with assessment intervals. Calculations with assessment intervals obtained 80% results for the four questions. This shows that the data presented on the PT X database are very complete.

Figure 6 displays the findings of the second questionnaire, which relates to the convenience of data access in the database system. Based on the results of the evaluation survey on the ease of access to the PT X database, it was found that 50% of respondents strongly agreed that the presentation of data on the system was easy to understand. The percentage obtained from respondents from the results of the evaluation of the ease of access of the data was then analyzed with assessment intervals. The average of the three questions, percentage result is 93.33%. From these results, it can be concluded that respondents strongly agree that the PT X database is easily accessible in terms of data presentation, language used, and search features. Singh *et al*. (2016) showed that when evaluating the quality of a website in terms of the "usability" element, it is necessary to take into account both how simple it is to use the website and how much one can learn by using the website. The term "usability" refers to the several ways in which website visitors can interact with the platform.

The designed information system is a website-based system (Jonathan and Lestari, 2015; Takalelumang, Rindengan, and Sambul, 2018; Nugroho and Rohimi, 2020) that is accessible through a PC or smartphone. The system is also designed with a responsive display for smartphones with small screens. This is a distinguishing feature that provides consumers with flexible data access. Kalem *et al*. (2016) stated that using mobile internet-connected devices, such as smartphones and tablets, allows all parts of the supply chain to obtain real-time product information and respond rapidly to demand. However, supply chain management systems in businesses should handle the input-output data traffic of mobile internet-connected devices.

The requirement for PT X as UKOT for complete and easily accessible supplier and distributor data demonstrates the need for an integrated supply chain system, where these requirements frequently encounter roadblocks in the field. According to Golonko *et al.* (2021), for instance, each side is frequently hesitant to cooperate because there are no additional benefits or economic bonuses for combined effort. This was indicated in their research. At the neighborhood level, the industry resembles a monopoly since one processor has the power to dictate conditions to other market participants, most notably suppliers. Drying chambers and storage facilities are found on relatively few farms. Receivers are less likely to enter into formal agreements with suppliers when there is a dearth of competition in the local market. Other than oral arrangements, there are no written agreements, contracts, or other sorts of legal ties that are utilized in this situation. In most cases, the collection sites and direct delivery are how the raw materials are acquired. As a consequence of this, the efforts that have been made to construct a database of suppliers and distributors for PT X are, in essence, an effort to begin the integration of various parties participating in the process from upstream to downstream by building an integrated database within a system.

CONCLUSIONS

The results of the preparation of data on suppliers (simplicia, excipients, and packaging) and distributors of finished products in East Java for Small Traditional Medicines PT X indicate that 43 data on simplicia suppliers, 31 suppliers of excipients, 13 packaging suppliers, and 80 distributors of finished products have been entered into PT X's database.

At least 80% of respondents think that PT X's database system is extremely comprehensive in its coverage of suppliers (simplicia excipients, and packaging) and distributors (of completed goods). 93.33% of respondents are in agreement that PT X's database system is user-friendly in terms of data presentation, language, and search capabilities.

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CONFLICT OF INTEREST

All of the Authors declare that there is no conflict of interest.

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