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Efforts to accelerate the export of creative craft industries through business intelligence model framework

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ABSTRACT

This article seeks to develop a framework model for a business intelligence system mapping West Java's exports of creative crafts. The fundamental issue is that the craft industry's exports are underperforming due to a lack of responsiveness in capturing export opportunities. In addition, the lack of a business intelligence system in the craft industry to evaluate export mapping on the global market emphasizes the importance of this research. This body of literature employs the research methods of data gathering and consolidation, determining information needs, and developing a framework for business intelligence. This study investigates primary data regarding the export of handicrafts from West Java, including exporter data, export commodity data (HS code), export trade transactions, export destination country data, and the overall export value and volume. The proposed model is a framework for mapping the export of craft creative industries and the stages of business intelligence (BI) deployment. Based on the results and discussion, the proposed BI framework can serve as a basis for developing a business intelligence system to evaluate the export mapping of handcraft products in West Java.

INTRODUCTION

After examining, the Indonesian government found that the country's handicraft sector could not compete internationally regarding its export contribution to the handicraft industry (Kompas.com, 2020). Vietnam has left some furniture, home décor, and other handicrafts, for instance (Merdeka.com, 2020). In comparison to other Southeast Asian nations, the exports of Indonesia's handcraft industry (Kontan.co.id, 2020) are only average. It is because the government has been slow to capitalize on export potential. According to the Department of Industry and Trade data in West Java, the handicraft industry's export fluctuations have decreased during the previous five years, from 2015 to 2020 (Disperindag, 2020). This issue requires the attention of the government, numerous corporate entities, and other involved parties. Since the export market for handicrafts is rather expansive, the handicraft industry's products are extremely promising in driving the economy and boosting the prosperity of business actors. The handcraft sector product has a vast pool of potential clients. Especially now that we have entered the age of the fourth industrial revolution, which is an era in which the deployment of internet-based technology is necessary to considerably increase the export rate of goods from the craft industry.

After conducting interviews with the West Java Disperindag Head of Export, the West Java Deskranasda, the West Java Chamber of Commerce and Industry, and handicraft export actors, they reached this conclusion. These interviews lead them to conclude that export limits and hurdles must be eliminated as soon as feasible and that craft business operators in West Java must increase their ability to capitalize on export prospects. Therefore, to expedite the exporting process, it is necessary to utilize information technology that can do export mapping studies of products linked with West Java's craft and creative industries. Moreover, this is done so that business actors can realize the potential for their artisanal products to compete globally. Using a business intelligence system is one way that information technology can be utilized.

The phrase "business intelligence" (BI) refers to the technology, tools, and processes used to gather, store, access, and analyze data to make more informed decisions (Nyanga et al., 2020). BI is applied in a wide range of businesses, including the tourism industry (Vajirakachorn & Chongwatpol, 2017), the financial industry (Prayitno, 2018), educational institutions (Scholtz et al., 2018), and the

healthcare industry (Foshay & Kuziemsky, 2014). The Business Intelligence (BI) system was created to convert data into information and knowledge and establish several forums for effective company decision-making, strategic thinking, and action (Olszak & Ziemba, 2007). a BI system must be implemented so that business opportunities and constraints can be assessed using historical data to generate estimates of future business potential. The primary data sources include data on export sales of handicraft products from the West Java Province Disperindag, relevant government regulations or policies, and data from interviews and field surveys with craft businesspeople. The secondary data sources include data from other external data sources. Each of these data sources is amenable to analysis.

The author has undertaken preliminary research to identify the difficulties and causes contributing to the creative craft industry's weakness, which functions as an export barrier. The preliminary survey consisted of interviews with 32 craft business owners or managers in Bandung City, Bandung Regency, and Cimahi, Indonesia.

Sumber: Peneliti, 2021

Figure 1 Constraints faced by the craft industry

Figure 1 depicts the outcomes of a preliminary evaluation of several handicraft enterprises in Bandung and Cimahi, as well as the obstacles faced by these industries. According to the findings, there are nine primary challenges, with the most important being: (1) difficulties in marketing networks; (2) difficulties in obtaining opportunities; (3) difficulties in innovating; (4) low commitment; (5) financial difficulties; (6) unskilled labor; (7) high production costs; (8) difficulty in obtaining raw materials from suppliers; and (9) facilities and infrastructure.

Deficiencies in performance and competitiveness characterize the difficulties that the craft industry faces. Profitability and revenue growth are metrics that can be used to evaluate success. When a company's sales growth, market share, and profitability are more significant, its performance is enhanced, and the converse is also true. Performance is the final result of the company's operations, including the actual results achieved by the company's utilized strategy (Wheelen & Hunger, 2012). Most export activities in developing countries, such as Indonesia, are conducted by small businesses (Adu-Gyamfi & Korneliussen, 2013), which adds to the low export performance of the handicraft industry. Small exporting companies are highly susceptible to the numerous difficulties associated with conducting business overseas. That is due to their size, location (typically far from the primary market), limited resources, limited management experience in exporting, high export barriers, and limited level of internationalization with other nations (Adu-Gyamfi & Korneliussen, 2013). It will also be challenging to boost export performance due to entry barriers in overseas markets. Internal market obstacles include functional and informational obstacles, whereas external market obstacles include regulatory and environmental limits (Narayanan, 2015). Also included among market barriers are marketing and informational obstacles. The craft business continues to struggle with responding to the rapid market, environmental, and technological changes and figuring out how to enhance inventiveness in product development.

Moreover, the craft business is not yet optimizing the exploitation of market prospects, maximizing resource potential, and controlling risks associated with entering new markets. Entrepreneurial marketing programs are becoming an increasingly important industry in marketing practice due to their potential to aid organizations in functioning effectively in a rapidly changing environment (Kilenthong et al., 2016). As a result, the author emphasizes the importance of building a business intelligence system for export mapping in West Java based on potential, trends, and features to accelerate the exportation of craft and creative products from the region.

BI is being used extensively in a variety of industries, including the tourism industry (Vajirakachorn & Chongwatpol, 2017), the financial sector (Prayitno, 2018), the healthcare sector (Scholtz et al., 2018), and educational institutions (Foshay & Kuziemsky, 2014). Thanatron et al. (2017), Vajirakachorn & Chongwatpol (2017) and Evan Hilmawan et al. (2019) are two researchers that have published several examples of their work in the tourism-related discipline of business intelligence (BI) (Saragih et al., 2021). In 2017, Thanathron and coworkers conducted a study utilizing business intelligence (BI) to analyze Thai food festival attendance data. The study's objective was to enable festival organizers to evaluate visitor behavior using business performance measurements (such as sales, profits, satisfaction scores, costs, loyalty, and visitation intentions). Re-visit) to improve the overall level of consumer satisfaction and increase future revenue and profits for the event's organizers (Vajirakachorn & Chongwatpol, 2017). Evan Hilmawan and his colleagues built a BI-based dashboard system to track Bali's tourism activity in 2019. This BI system was developed by analyzing tourist visit data from the preceding period to predict tourist visit data for the subsequent period (Saragih et al., 2021). Ridho Darman conducted research in 2018 on applying business intelligence (BI) to identify national export patterns in fishing (Darman, 2018). This research was conducted concerning export commerce. According to the research findings, a BI system can aid in providing critical market analysis. This analysis may comprise a time series of national fishery export value and volume, the highest export commodity, the lowest export commodity, the export destination nation with the highest export volume, and the export destination nation with the highest export value. Visualizing the data on export patterns can aid in generating strategic decisions and strategies to assess market knowledge and overcome obstacles to selling marine and fisheries products in other countries. According to these studies, businesspeople can gain from BI technology since it enables them to identify future opportunities.

RESEARCH METHODS

This study was conducted in three stages: identifying information requirements, collecting and aggregating data, and developing a business intelligence (BI) framework. Each phase has a variety of activities, some of which are depicted in Figure 3.

Data Collection and Consolidation

In order to explore data on the export trade of the handicraft sector in West Java, data collecting and consolidation were conducted. This comprised information on exporters, handicraft export commodities based on the HS code (harmonized system), trade transactions, export destination nations (importers), and export trade recapitulation reports. In order to collect primary data sources, the West Java Department of Industry and Trade (disperindag), the West Java Tourism and Culture Office (Disparbud), and the West Java Central Statistics Agency (BPS) were visited in the field. In order to have a better picture of the current state of the handicraft export trade in West Java, secondary data from a range of sources were also investigated.

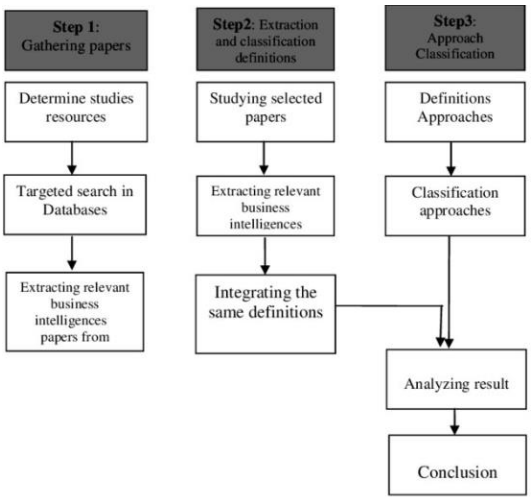

Figure 2 Research Methodology

Interviews were conducted with up to sixty respondents who are craft exporting enterprises with an existing company entity and at least two years of export experience. These interviews were done to study the obstacles that craft industry participants experience when attempting to export their products. Figure 4 depicts the formulation of the Slovin formula, which serves as the basis for sampling.

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{151}{1 + 151(0{,}1)^2}$$

$$n = \frac{151}{1 + 1{,}51}$$

$$n = 60{,}1 \approx 60 \text{ sampel}$$

Lokasi Penelitian	Populasi	Sampel
Cirebon	53	21
Tasikmalaya	35	14
Purwakarta	27	11
Bandung	26	10
Sukabumi	10	4
Total	**151**	**60**

Figure 3 Sampling formulation using the slovin formula

This study focuses on exports of goods with HS codes 44 for wood and woodworking, 46 for base materials, 67 for prepared feathers and penguins and related works; artificial flowers; hair works, 69 for ceramic products, and 96 for miscellaneous works.

Table 1 *HS Code of Handicraft Export Commodities*

No	Chapter Code	Chapter Description
1	44	HS Code for Wood and woodworking
2	46	HS Code for Articles of base
3	67	HS Code for Prepared feathers and penguins and their works; artificial flowers; hair work
4	69	HS Code for Ceramic products
5	96	HS Code for Miscellaneous works

Identification of Information Needs

To give knowledge to stakeholders, the BI system's information requirements must be designed efficiently. This stage involves examining the information required by the BI system for mapping handicraft exports, beginning with the handicraft export business indicators, information kinds, and data sources.

BI Framework Design

This stage is used to develop the BI framework into three elements, namely (1) data collecting, (2) data access, and (3) data analysis, as outlined in the study Khan & Quadri (2012) on the BI concept. The data utilized in the BI process are operational data owned by the firm and data received from other sources such as the government, agencies, suppliers, consumers, competitors, the internet, etc. The quantity of heterogeneous data BI will manage will be extracted, transformed, and loaded (ETL) before being placed in the data warehouse. The studied data warehouse will provide stakeholders with the knowledge to aid decision-making.

RESULTS AND DISCUSSION

Craft Export Business Indicators and Types of Information

In establishing business indicators for handicraft exports, it is required to determine the quality index of the components that are the determinants of handicraft export sales, such as commodities, export players, market trends, export reach, infrastructural facilities, etc. It is also vital to identify the type of information and its data sources to identify the data that the BI system will manage.

Table 2 ***Craft Export Business Indicator***

No	Craft Export Business Indicator	Information Type
1	Commodity Quality Index	Craft Export Commodities (Based on HS Code)
2	Business People Quality Index	Craft Export Company
3	Quality Index of Handicraft Export Sales	Total Craft Export Sales
4	Market Trend Quality Index	Time Series of Handicraft Export Sales
5	Export Market Acceptance Quality Index	Total Craft Trade in Percentage of GDP
6	Export Reach Quality Index	List of Craft Importing Countries and Geographical Distances
7	Market Size Quality Index	Total Country Population and Urban Population
8	Infrastructure Facility Quality Index	Logistics Supporting Infrastructure Facilities (Length of Highways, Railroads, Ports, Airports)
9	Cultural Comparison Quality Index	Hofsted Index Countries

Table 2 identifies nine business indicators as export sales drivers for handicrafts. These indicators acquire information from several data sources, including historical systems' databases, spreadsheets, and application programming interfaces (APIs). The ETL procedure will transform these diverse data into a data warehouse.

Six databases have been identified as data sources for the identified handicraft export business indicators: Db Commodity, Db Exporter, Db Country, Db Importer, Db Export Trade, and Db Hofstede Index. Online analytical processing (OLAP) will be used to acquire the data for analysis needs and information that can support decisions. Table 3 shows types of informatin and data sources

Table 3***Types of Information and Data Sources***

No	Information Type	Data source
1	Craft Export Commodities (Based on HS Code)	DB Commodity
2	Craft Export Company	Db Exporter
3	Total Craft Export Sales	Db Commodity, Db Export Trade
4	Time Series of Handicraft Export Sales	Db Commodity, Db Export Trade
5	Total Craft Trade in Percentage of GDP	DB Export Trade
6	List of Craft Importing Countries and Geographical Distances	Db Importer, Db Country
7	Total Country Population and Urban Population	Db Country
8	Logistics Supporting Infrastructure Facilities (Length of Highways and Length of Railroads)	Db Country
9	Hofsted Index Countries	Db Hofstede Index, Db Country

BI Framework Design

Figure 5 shows the BI framework design developed in this study. The main components of the BI framework consist of three parts: data acquisition, data access, and data analysis and visualization. The developed BI system must be able to generate knowledge for craft export actors by processing dynamic export trade data so that they can see the latest export market mapping based on the export commodities owned.

The following are the steps carried out for each of the main components of the BI framework developed:

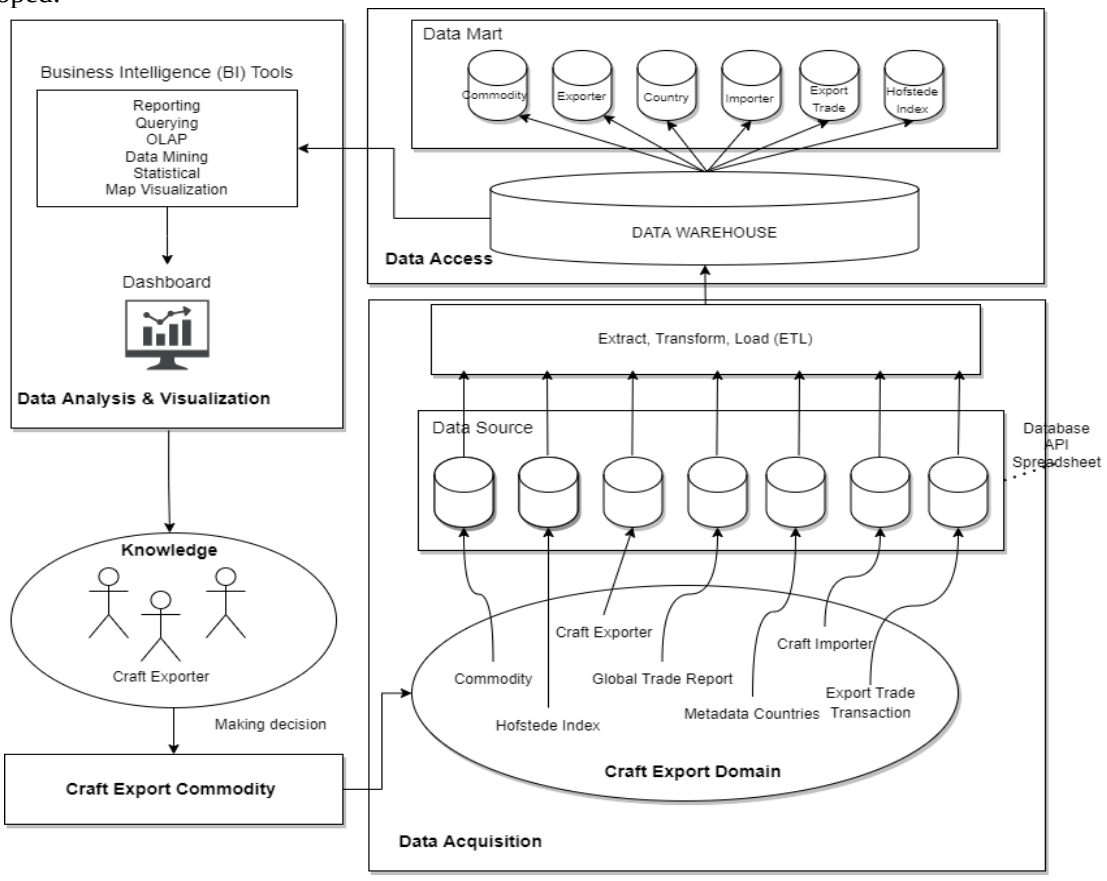

Figure 4 BI Framework for Mapping Craft Exports

Data Acquisition: various data related to the craft export domain, as identified in table 2, will be loaded into a data warehouse through the online transaction processing (OLTP) mechanism and stored in the operational database. The data format to be processed allows it to come from various legacy systems and other structured data sources. So that the data format will vary, both in database form (such as SQL Server, Oracle, DB2, Informix), spreadsheet form (CSV file, XLS), or API forms (JSON files, XML). Before the data is loaded into the data warehouse, it will first be processed through the following stages: (1) extraction and cleanse as a preprocessing stage to filter data from inconsistencies, missing values, or invalid data so that it can be properly extracted into an operational database, (2) transform as a step that will integrate various data formats and map them to fit the data warehouse schema, and (3) load to load the cleaned data into the data warehouse.

Data Access (Storage): after ETL data is stored in a data warehouse, the data can be accessed and analyzed further through a subset of data warehouses or data marts. This stage will produce 6 data marts (DM), namely DM Commodity, DM Exporter, DM Country, DM Importer, DM Trade Export, and DM Hosted Index. Each data mart can be formed into a BI prototype through the access component owned by BI tools; this can accelerate the development of BI visualization for individual data marts.

Data Analysis and Visualization: This stage is carried out to analyze and visualize data through reports or dashboards. BI tools have a graphical user interface (GUI) component that can represent data in various visual forms. Standard features possessed by BI tools include reporting,

querying, data analytic tools (OLAP/ROLAP), data mining, statistical, machine learning, and visualization tools. Data analysis can be carried out according to the information that needs to be measured at BI; this process will process the data warehouse that has been formed to measure the craft business indicators as identified in table 2. The output of this stage is the formation of a BI dashboard mapping handicraft exports as knowledge for the perpetrator's craft business.

The designed BI framework has an interconnected flow. The dashboard produced by BI may assist the decision of craft business players to export handicraft goods, and the outcomes of export commodity trading become input for the BI system to be reprocessed into the most current information. It enables the BI system to improve its craft output mapping data continually.

Stages of BI Implementation

Developing a data warehouse is the initial stage in implementing the designed BI architecture. The star schema, which separates the data table into dimension and fact tables, is one of the available schemas. The fact table contains measurements from a business process, but the dimension table contains the data's contex.. The dimension table for this study is Commodity, Exporter, Importer, Country, and Hosted Index, while the fact table is Export Trade (see Table 3).

The data analytic part of decision-making should be increased, and the BI dashboard's visual design must be built efficiently, as the improper use of visuals might mislead users and divert their attention to the wrong things (Orlovskyi & Kopp, 2021). Several phases must be completed while developing a BI dashboard, including (1) Data sources within the BI system must be organized as a data mart (DM) or data warehouse (DW) before being translated into a dataset. (2) create a subset of data from the dataset to be visualized; (3) pick the threshold for the visualization data; (4) determine the appropriate visualization based on the demands of the dataset; and (5) install the visualization on the dashboard and link it to the dataset (Orlovskyi & Kopp, 2021).

Spago BI, Power BI, Tableau, Qliksense, and Jaspersoft are a few BI solutions that may be used to create enterprise dashboards. The comparative results [19] indicate that Power BI offers benefits in terms of ease of use, support for various data sources, data security aspects, and interaction with the cloud. It can be taken into account while using BI in future studies.

CONCLUSION

Through developing a framework model for a business intelligence system that maps the handicraft sector in West Java, this study seeks to identify a solution that will accelerate the exports of creative craft products. In order to construct an acceptable framework for a business intelligence system, the model produced for this study is based on a survey of the pertinent literature and the collection of data from several notable institutions. It is envisaged that the owner or manager of the creative craft firm in West Java will have access to important information offered by the BI solution to make export decisions with the potential to boost sales. Moreover, the data supplied in this study can serve as the foundation for developing a business intelligence system that can analyze the mapping of handcraft exports in West Java.

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