Analysis of Export Development of Indonesian Craft Industry Products Using Business Intelligence Platform

Fansuri Munawar[1], Ghifari Munawar[2]

{fansuri.munawar@widyatama.ac.id[1], ghifari.munawar@polban.ac.id[2]}

Faculty of Economics and Business, Universitas Widyatama, Indonesia[1],

Department of Computer Engineering and Informatics, Politeknik Negeri Bandung, Indonesia[2]

Abstract. This study uses a business intelligence platform to examine the development of the craft industry in Indonesia's export market. To increase its competitiveness in the global market, it is necessary to analyze export developments adequately. The business intelligence (BI) approach is used to collect, analyze, and present relevant and accurate data related to the export development of the craft industry. The research method includes collecting primary and secondary data from various sources and its application to a business intelligence platform to analyze data effectively and efficiently. The data analyzed are export commodities with HS Codes 42, 44, 45, 46, 61, 68, 69, 70, 71, 82, 83, and 97. The results of this research can identify the development of craft industry exports based on the main destination countries and main export commodities so that they can provide concrete recommendations for stakeholders to accelerate craft industry exports in Indonesia.

Keywords: Export Development, Craft Creative Industry, Data Analysis, Business Intelligence Platform

1 Introduction

The creative industry sector is crucial in the modern economic framework. The creative industries have emerged as one of the most dynamic sectors in the contemporary economy, with an increasing role in driving economic growth and social welfare. As a component of the economy, the creative industries can be considered an area that reflects a long-term tradition of historical development and a new domain that has recently begun to show significant results in the world economy [1].

In Indonesia, the creative industry sector is expected to be able to create added value that exceeds the 2018 achievements of around IDR 1,105 trillion. In 2019, the creative industry sector's contribution to the Gross Domestic Product (GDP) increased to around IDR 1,165.30 trillion; in 2020, it continues to grow to around IDR 1,157.00 trillion. In the context of the export value of the creative industry, it was recorded at around US$22.07 billion in 2019 but decreased to around US$16.90 billion in 2020. The creative industry sector also provides employment opportunities for the younger generation, with an estimated workforce of around

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19.01 million people. In 2019, the number of workers in the creative industry sector reached 19.01 million people, but in 2020 it decreased to around 17.25 million people [2]. Despite a decline in several aspects in 2020, the creative industry sector in Indonesia remains a significant potential in driving the economy and providing opportunities for sustainable economic growth.

Indonesia has a rich cultural heritage and abundant ethnic traditions, making it a center rich in handicraft products. The variety of cultures that exist in Indonesia provides a variety of extraordinary arts and crafts products. Crafts have unique characteristics that reflect a particular culture through local craft skills and materials used. The Handicraft Industry is a sector with high work intensity, decentralized, and unorganized in Indonesia. The handicraft sector is a potential source of employment, has a significant share in the export economy, and plays a vital role in economic development in Indonesia [3]. Handicraft products are the work of craftsmen, either entirely by hand or with hand tools. The unique characteristics of this craft product come from its distinctive features, which can be utilitarian, aesthetic, artistic, creative, culturally related, decorative, functional, traditional, and symbolic meaning and are religiously and socially significant [4]. These handicraft items can be grouped into several categories: basketry, leather goods, metal, pottery, textiles, and wood. These handicraft products are made entirely by human hands without the involvement of complicated machines or equipment.

As Indonesia endeavors to foster its creative industry, it grapples with formidable obstacles concerning export performance and global competitiveness. The Indonesian government is aware that the export contribution from the handicraft sector needs to catch up to being competitive, lagging behind that of other nations [5]. A mere 1.09% of the world's handicraft exports originate from Indonesia, compared to Asian countries like China at 8.1%, Japan at 4.6%, Vietnam at 3.48%, and India at 1.37% [6]. This alignment underscores the evident requirement for concerted endeavors to elevate Indonesian handicraft exports to the international stage.

However, enhancing export performance is a multifaceted challenge, entrenched with barriers in foreign markets. These market impediments encompass internal limitations like functional constraints, information gaps, marketing complexities, and external obstacles such as complicated procedures, regulatory prerequisites, and environmental policies [7]. The craft industry confronts difficulties in agility in adapting to rapid market dynamics, environmental shifts, and technological progress while simultaneously striving to cultivate innovative creativity in product development. Consequently, considerable potential exists for refining the exploitation of market openings, optimizing the utilization of available resources, and adequately managing risks linked to venturing into new markets [8]. Therefore, to develop handicraft exports, it is essential to utilize information technology capable of conducting an in-depth analysis of product export patterns in the creative handicraft sector in Indonesia. That aims to provide insight to business actors regarding handicraft products' potential to compete in the global market and support them in identifying existing opportunities. In this context, business intelligence systems emerge as information technology solutions that can provide valuable direction and information. One approach to information technology that can be used to analyze handicraft exports is a business intelligence platform [5].

The Business Intelligence (BI) platform emerged as an idea to retrieve and analyze business information for more effective decision-making [9]. Thus, BI is a real example of the application and utilization of current data. BI incorporates technologies such as Data Warehouse, online analytical processing (OLAP), data exploration, benchmarking, text search, and prospective analytics [10]. The strength of BI lies in its ability to manage various internal and external resources involving structured and unstructured data. BI architecture is quickly

becoming a well-respected choice as a solution in analyzing the development of handicraft exports.
In order to analyze exports of handicraft products, a BI platform can be designed to analyze export performance using historical data to estimate the export potential over time for the coming years. Data on handicraft export performance were taken from the Ministry of Industry and Trade of the Republic of Indonesia, the Central Bureau of Statistics, relevant government regulations or policies, and secondary data from other external data are some of the data sources that can be analyzed. This study aims to analyze the development of handicraft exports using a business intelligence platform. Therefore, the authors emphasize the importance of developing handicraft exports through a business intelligence platform to accelerate exports of handicraft industry products in Indonesia.

2 Method

This study uses primary and secondary data to analyze the export development of the creative craft industry using the BI platform. Primary data obtained through BPS data which has been published via https://www.bps.go.id/exim/ with the following filters: (1) search according to the 2-digit HS code, (2) the selected year of export is five years finally (2018-2022), (3) the selected ports are Soekarno-Hatta, Tanjung Priok, and Husein Sastranegara, (4) the selected HS code refers to the export commodities of craft industry products, namely: 42 for articles of leather; 44 for wood and articles of wood; 45 for cork and articles of cork; 46 for manufactures of plating materials; 61 for articles of apparel and clothing accessories (knitted); 68 for articles of stone, cement, asbestos, mica or similar materials; 69 for ceramic products; 70 for glass and glassware; 71 for precious metals and jewelry/precious stones; 82 for tools, implements of base metal; 83 for miscellaneous articles of base metal; and 97 for works of arts, collector's pieces, and antiques. The search results are Excel files containing export transaction data from 2018 to 2022 with data attributes in the form of year data, HS code, country, port, and month which can be selected based on net value (USD) or tonnage (Kg).
Secondary data is collected through various sources to see profiles of destination countries and export commodity profiles which refer to (1) country's Hofsted Index data (https://geerthofstede.com/), (2) country's gross domestic product (GDP) data (https://databank.worldbank.org/), (3) 2-digit HS code data (https://opendata.jabarprov.go.id/), and (4) country total population data (https://databank.worldbank.org/). Various primary and secondary data obtained are then analyzed using a business intelligence platform using MS Power BI. MS Power BI has provided facilities for the data acquisition process from various data sources through extract-transform-load (ETL) technology. ETL can import data into BI systems in various formats such as Excel, CSV, JSON, TXT, and database files. Besides that, MS Power BI has various data visualization components that can support comprehensive data analysis.
Primary and secondary data collected will be integrated into the business intelligence system through the ETL process. MS Power BI allows data transformation to be carried out so that each data attribute has a data type or format that suits your needs. The obstacle faced in the integration process is creating relationships between data because each source has different attribute names, formats, and types, so the data cannot be mapped directly. This problem can be solved through the ETL process when the data is imported or through the Power Query feature provided by MS Power BI. Based on the data obtained, there are five primary data

sources used, namely (1) export transaction data for 2018-2022, (2) country Hofstede index data, (3) country GDP data, (4) 2-digit HS code data, and (5) country population data. Besides that, three data masters were also created, namely the state master, the harmonized system master, and the port master, which was needed to form a relationship scheme between existing transactional data.

After the data has been prepared, the next step is visualizing the data. The data visualization carried out in this study was by designing two BI dashboards, namely: (1) a profile dashboard for export destination countries and (2) a dashboard for main export commodity profiles. The dashboard is used to analyze the development of exports of creative craft industry products based on export destination countries and export commodities. Data visualization designed in BI must be able to provide an overview of the latest export developments so that it can assist decision-making for stakeholders. This whole process is done entirely through MS Power BI.

3 Result and Discussion

3.1 BI Implementation Using MS Power BI

Based on the BI implementation that has been carried out, two visualization dashboards have been built, namely (1) a dashboard profile of export destination countries (Dashboard A) as shown in **Figure 1**, and (2) a dashboard of export commodity profiles (Dashboard B) as shown in **Figure 2**. Dashboard A contains several visualizations that display information in the form of total GDP, total population for 2023, list of export destination countries (sorted by highest net value), country index graph, pie chart of top 5 export commodities, graph of export development for 2018-2022 (based on net value) and export development charts for 2018-2022 (based on net weight). Dashboard view A will display data dynamically based on the filter of the selected export destination country so that users can see the progress of their exports between destination countries. Dashboard B contains several visualizations that display information in the form of a list of craft export commodities (sorted by highest net value), a list of the top 5 importing countries, a visual mapping treemap, graphs of export ports based on net value, charts of export ports based on net weight, graphs of export development in 2018 -2022 (based on net value) and export development charts for 2018-2022 (based on net weight). This Dashboard B display can filter data based on the selected export commodity. In addition, a trendline for export development is displayed based on net value (USD) and net weight (Kg), whether the trend is increasing or decreasing.

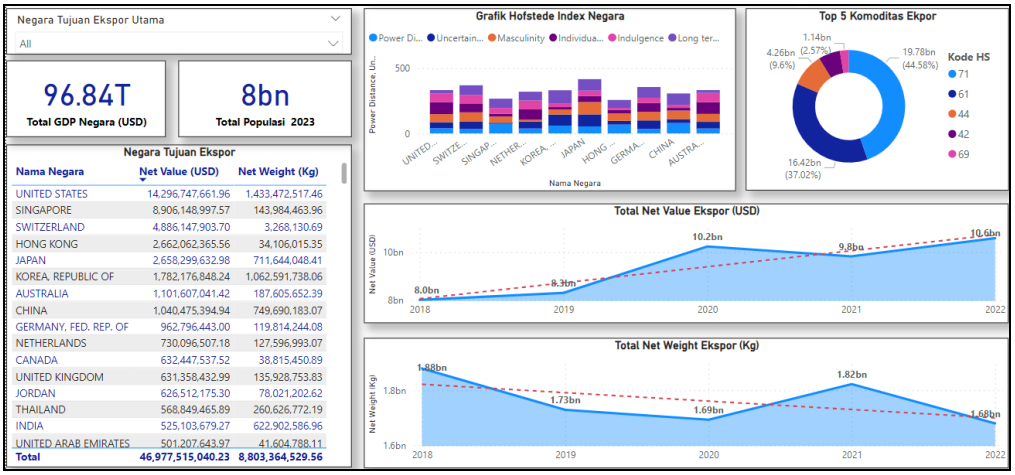

Fig. 1. Export Destination Country Profile Dashboard (Dashboard A)

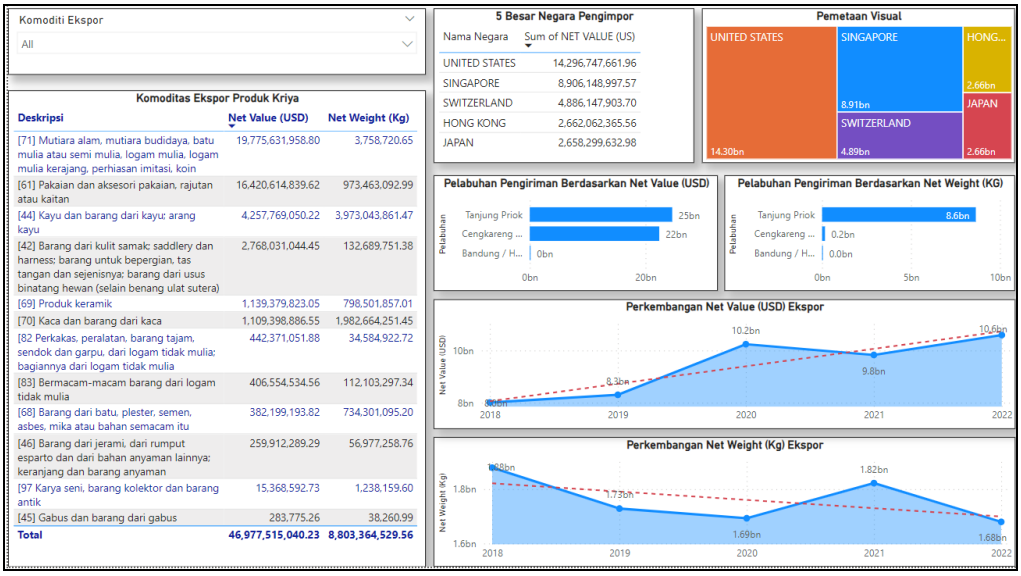

Fig. 2. Primary Export Commodity Profile Dashboard (Dashboard B)

MS Power BI provides an analysis feature to explain an increasing or decreasing trend based on the selected points. For example, in **Figure 2**, the graph of export development based on net value has increased from 2019 to 2020 and decreased from 2020 to 2021. To find out more in detail, a waterfall chart display can be displayed as shown in **Figure 3** and **Figure 4**. In **Figure 3**, there is a trend of increasing exports of 23.35% from 2019 to 2020, where the increase that occurs is exported to Switzerland (CH), which increased by 1.9bn, Australia (AU) increased by 0.2bn, United States (US) increased by 0.2bn, and Hongkong (HK) increased by 0.1bn. Whereas in **Figure 4**, there is a downward trend of 4.01% from 2020 to 2021, where the most significant decrease is in HS code 71, which is a decrease of -1.9bn or a

decrease of -33.33% compared to exports in the previous year. This information can explain data trends to provide stakeholders with better knowledge.

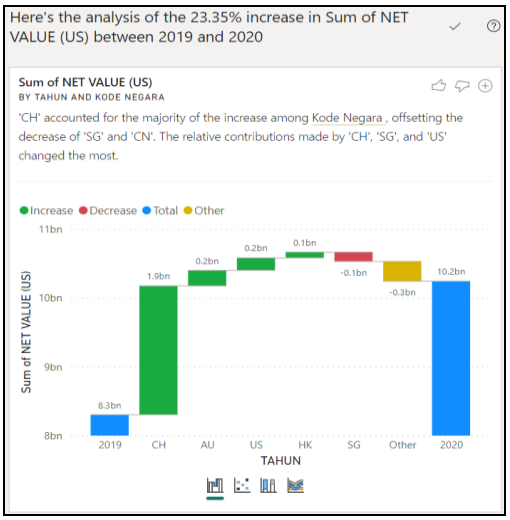

Fig. 3. Analysis of Increasing Exports (Net Value) in 2020

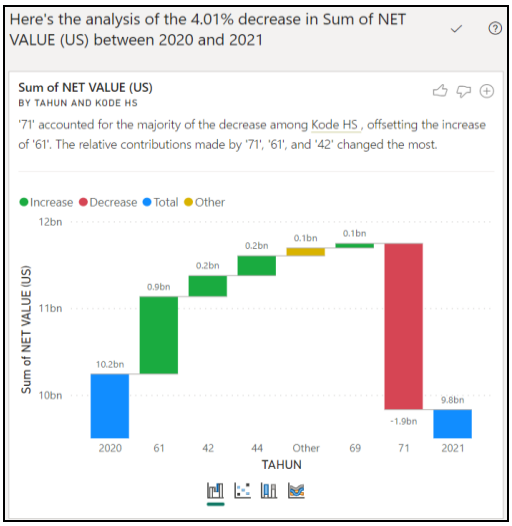

Fig. 4. Analysis of Decrease in Exports (Net Value) in 2021

3.2 Export Development of 5 Primary Destination Countries

Table 1. Table of Export Development in 5 Main Export Destination Countries (2018-2022)

Export Destination Countries	Total Net Value (USD)	Total Net Weight (Kg)	Primary Export Commodities (HS Code)
United States (US)	14,296,747,661.96	1,433,472,517.46	61 (69.48%); 71 (10.85%); 42 (10.71%); 44 (7.26%); 69 (1.7%)
Singapore (SG)	8,906,148,997.57	143,984,463.96	71 (97.6%); 61 (1.14%); 42 (0.66%); 44 (0.31%); 83 (0.3%)
Switzerland (CH)	4,886,147,903.70	3,268,130.69	71 (99.35%); 61 / 42 / 44 / 70 (0.65%)
Hongkong (HK)	2,662,062,365.56	34,106,015.35	71 (92.91%); 61 (3.75%); 42 (2.48%); 69 (0.52%); 44 (0.34%)
Japan (JP)	2,658,299,632.98	711,644,048.41	61 (52.44%); 44 (25.97%); 69 (8.61%); 71 (7.29%); 70 (5.68%)

The central export destination countries for the creative craft industry based on the net value (USD) from 2018-2022 are the United States (US), Singapore (SG), Switzerland (CH), Hong Kong (HK), and Japan (JP). Generally, two export commodities dominate these countries: HS code 61 (US and JP) and HS code 71 (SG, CH, and HK). United States (US) has an increasing export trend with a net value (USD) of 2.4bn in 2018 to 3.4bn in 2022, with a total net value of 14.30bn for the last five years. Export commodities that dominate the US are HS codes 61

(69.48%), 71 (10.85%), 42 (10.71%), 44 (7.26%), and 69 (1.7%). Singapore (SG) has a declining export trend with a net value of 1.8bn in 2018 to 1.1bn in 2022, with a total of 8.90bn for the last five years, with the most dominant export commodity being HS code 71 of 97.6% followed by the rest by other commodities (61, 42, 44, and 83) of 2.4%. Switzerland (CH) had the most significant export increase from 2018 to 2022, with an initial net value of 0.1bn in 2018 to 1.6bn in 2022 for a total of 4.89bn for the last five years. The most dominant CH export commodity is HS code 71 of 99.35%. Hong Kong (HK) has a stagnant export trend where the net value in 2018 is 0.50bn, and in 2022 it is 0.53bn, with a total net value for 2018-2022 of 2.66bn. The export commodity that dominated HK was HS code 71 at 92.91%, while other commodities were: 61 (3.75%), 42 (2.48%), 69 (0.52%), and 44 (0.34%). Like Hong Kong, Japan (JP) has a stagnant export trend with a net value starting point of 0.56bn in 2018 and 0.57bn in 2022, with a total of 2.66bn for the last five years. The commodities that dominated JP's exports were HS codes 61 (52.44%), 44 (25.97%), 69 (8.61%), 71 (7.29%), and 70 (5.68%).

3.3 Export Development of 5 Primary Export Commodities

Table 2. Table of Export Developments in 5 Main Export Commodities (2018-2022)

Export Commodities	Total Net Value (USD)	Total Net Weight (Kg)	Export Destination Countries
[71] precious metals and jewelry/precious stones	19,775,631,958.80	3,758,720.65	Singapore (8.63bn); Switzerland (4.85bn); Hongkong (2.47bn); United States (1.52bn); Australia (0.56bn)
[61] articles of apparel and clothing accessories (knitted)	16,420,614,839.62	973,463,092.99	United States (9.74bn); Japan (1.20bn); South Korea (0.76bn); Germany (0.68bn); Canada (0.53bn)
[44] wood and articles of wood	4,257,769,050.22	3,973,043,861.47	United States (1.02bn); South Korea (0.64bn); Japan (0.59bn); China (0.41bn); Netherlands (0.18bn)
[42] articles of leather	2,768,031,044.45	132,689,751.38	United States (1.50bn); Netherlands (0.20bn); Belgium (0.18bn); South Korea (0.12bn); Japan (0.11bn)
[69] ceramic products	1,139,379,823.05	798,501,857.01	United States (237.83M); Japan (196.63M); South Korea (80.46M); China (69.98M); India (68.31M)

The primary export commodities for creative craft industry products based on the net value (USD) from 2018-2022 are HS codes 71, 61, 44, 42, and 69. The total net value for HS code 71 is 19.78bn, with the primary destination country being Singapore, Switzerland, Hong Kong, the United States, and Australia. The export trend for this commodity has increased from 2.5bn in 2018 to 4.4bn in 2022, with the highest export sales of 5.7bn in 2020. The United States is the most dominant export destination for the HS 61 code, where the total net value exports reached 9.74bn out of 16.42bn or 59%. In comparison, the export trend

increased from 3.3bn in 2018 to 3.8bn in 2022, with other export destination countries being Japan, South Korea, Germany, and Canada. HS Code 44 has a stagnant export trend, with no significant export development from year to year. The total net value in 2018 was 0.92bn; in 2022, it became 0.86bn, with a total of 2018-2022 amounting to 4.26bn. Export destination countries for this commodity are the United States, South Korea, Japan, China, and the Netherlands. HS Code 42 has export developments that increase almost yearly, even though they are insignificant. Total net value in 2018 was 0.45bn to 0.75bn in 2022, with a total of 2.77bn for the last five years. Export destination countries for this commodity are the United States, the Netherlands, Belgium, South Korea, and Japan. Like HS code 44, HS code 69 has a stagnant export development trend with a total net value of 0.26bn in 2018 to 0.24bn in 2022. There has been no significant increase in exports from year to year. Export destination countries for this commodity are the United States, Japan, South Korea, China, and India.

4 Conclusion

The creative industry sector has enormous potential for economic growth and societal progress. In Indonesia, despite the challenges, this sector has shown positive development. Business Intelligence (BI) platforms can be leveraged as powerful tools to analyze historical data, predict export trends, and improve decision-making. This study implemented business intelligence by designing two visualization dashboards: the Export Destination Country Profile Dashboard (Dashboard A) and the Main Export Commodity Profile Dashboard (Dashboard B). These two dashboards provide in-depth insight into the export dynamics of the creative crafts industry, allowing stakeholders to dynamically analyze developments based on export destination countries and export commodity profiles. The "Dashboard A" includes a variety of visualizations, including total GDP, 2023 population data, a list of top exporting countries by net value, a country index graph, a pie chart highlighting the five main export commodities, and development trends from 2018 to 2022 both in net value and net weight. Similarly, "Dashboard B" focuses on a detailed export commodity profile, featuring high net value craft goods, top five importing countries, a tree map for visual mapping, a graph of ports by net value and net weight, and an export development graph for the year 2018 to 2022. MS Power BI, as the BI platform used in this study, has been able to provide detailed and in-depth explanations regarding the analysis of increases and decreases in exports. Suggestions for further research are to develop BI using artificial intelligence (AI) methods such as clustering, prediction, and classification to understand the creative industry export market in more depth and more appropriate market segmentation to support the creative industry's sustainable development.

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