



Wooden Furniture Trade in Ethiopia: Current Conditions and Future Prospects

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ABSTRACT

Demand for wooden furniture in Ethiopia is rapidly increasing due to population growth, urbanization, and economic development. This demand is met through both local production and imports, yet limited information exists on the sector's trade dynamics. This study assessed the status and trends of Ethiopia's wooden furniture import-export market using data from the Ethiopian Customs Commission (2009–2020). Descriptive statistics and the ARIMA model in STATA were applied. Results show average annual imports and exports of 12,650.9 and 429.8 tonnes, respectively. Ethiopia spent an average of US\$ 22.6 million on imports while earning only US\$ 1.7 million from exports, indicating a trade deficit. By 2040, import costs are projected to rise to US\$ 29.2 million. However, with proper investment and policy focus, local wooden furniture production can boost national revenue and reduce import dependency. Thus, expanding domestic wooden furniture manufacturing is vital to meet future demand and support economic growth.

INTRODUCTION

The worldwide furniture market is expected to increase from \$564.17 billion in 2020 to \$671.07 billion in 2021, with a compound annual growth rate (CAGR) of 18.9%. Sub-Saharan Africa's wood product market is enormous and quickly developing (Larinde et al., 2010). Poor finished product quality, a lack of data technology to access overseas market knowledge, and government policies that are out of sync with global trends have all hampered processed wood product exports (Larinde et al., 2010). Furthermore, there was an increase in the region's import of wood goods (Kastner et al., 2011). The financial system benefits from statistical data on wood and wood product imports (Tajdini et al., 2011). Ethiopia, like many other countries in Sub-Saharan Africa, experienced a wood shortage (Lemenih and Kassa, 2014). To complement its limited supply of wood products from domestic sources, the country imports wood from other countries in the form of timber, plywood, panel products, wooden furniture, and other commodities (Nigatu, 2004; Bekele, 2011; Lemenih and Kassa, 2014; Alem, 2015; Alem, 2016).

Ethiopia has been producing wood and wood-related items for more than a century. However, due to internal and external challenges, this industry sector is no longer as measured as it once was (Birhan, 2014). Despite the possibility of producing timber locally, timber costs are among Africa's highest (Bekele, 2011). Because of the country's strong GDP growth rate over the last decade, wood products are fast expanding, and there appears to be a rapid timber supply imbalance (World Bank, 2017). Ethiopia's demand for wooden furniture is quickly expanding due to population growth, urbanisation, and economic development (Lemenih & Kassa, 2014). Wood and other forest products are sourced in Ethiopia from both domestic and international sources. Historically, indigenous timber species harvested from natural forests and agroforestry provided around 85% of wood demands (Desalegn and Tadesse, 2010).

Demand for wooden furniture is expected to grow by 400 percent by 2033, making it a high-value-added sub-sector. In 2013, total furniture consumption was expected to exceed 0.8 million m³, with a projected increase to roughly 1.8 million m³ by 2033. Furniture, joinery, and carpenter cottages are the most popular small-scale wood enterprises in Ethiopia (INDUFOR, 2016). In general, the number of small and cottage furniture manufacturing firms has increased over the last ten years (according to the industrial census) from about 8,500 to about 17,700, with employment engagement increasing from 23,000 to 290,000 people, all of whom contribute significantly to furniture production (INDUFOR, 2016). Furthermore, the country contains approximately 330-350 major and medium-sized furniture manufacturing enterprises (CSA, 2013). Addis Ababa, SNNPR, Oromia, and Amhara are the most populous regions. Individuals own the majority of them, with cooperatives and personal limited companies being the next most common ownership types. Ethiopia is the largest importer of wood products in East Africa (Roux-

Simula, 2016). Imported wood items include paper and paperboard, wooden tools, materials for joinery and carpentry, boxes and cases, and wooden furniture. Ethiopia, like all other Sub-Saharan African countries, experienced a wood shortage (Alem, 2015; Lemenih & Kassa, 2014). The statistical knowledge of wood and wood product imports is critical to the economic system (Tajdini et al., 2011). Despite this, there are currently no research findings on the state and trends of Ethiopian expenditures on the import and export of wooden furniture. The objective of this study is to analyze the overall pattern, performance, and dynamics of Ethiopia's wood furniture trade, including import and export quantities, trade partners, financial trends, and future trade prospects.

MATERIALS AND METHODS

The data for this study were obtained from the Ethiopian Customs Commission (ECC), which offered raw statistics on the international trade of wood furniture, including import-export data from 2009 to 2020. Data consisted of annual time series data for (i) import value and volume, and (ii) export value and volume of Ethiopian wood furniture from 2009 to 2020. The analysis included cost, insurance, and freight (CIF) values for imported wood furniture and free on board (FOB) values for exported wood furniture.

We converted the import-export value of the local currency (Birr) into US dollars using exchange rate data acquired from the National Bank of Ethiopia (NBE) for various months and years. The trend in wood furniture import-export was calculated using Excel (Microsoft Corp., Redmond, WA, USA). The trade balance was computed by subtracting the imported quantities/expenses to import from the exported quantities/incomes earned over the same time period. Data were examined using descriptive and inferential statistics, and the results were presented as graphs and tables.

The wooden furniture trade prediction was also generated using the Autoregressive Integrated Moving Average (ARIMA) model. The ARIMA equation is written as AR (p=degree of the autoregressive part), I (d=degree of the difference involved), and MA (q=degree of the mean part). George Box and Gwilym Jenkins developed the ARIMA model in the 1970s to characterise variations in time series using a mathematical approach known as the BOX-Pierce model. Box and Pierce refer to a collection of processes for discovering, fitting, and testing ARIMA models using time-series data. Forecasts are derived from the fitted model (Box and Pierce, 1970). The ARIMA model is described as follows:

1. Autoregressive model: AR (p) is the general form:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \dots + \beta_p Y_{t-p} + \varepsilon_t \dots \dots \dots (1)$$

Where, Y_t = Response (dependent) variable at time t

$Y_{t-1}, Y_{t-2}, Y_{t-3}, \dots, Y_{t-p}$ = Response variable at time lags t-1, t-2, -----, t-p respectively

$\beta_0, \beta_1, \beta_2, \dots, \beta_p$ = Coefficients to be estimated ε_t = Error term at time t

2. Moving average model: MA (q) which has the general form

$$Y_t = \mu + \varepsilon_t - \theta_1 \varepsilon_{t-1} - \theta_2 \varepsilon_{t-2} - \dots - \theta_q \varepsilon_{t-q} \dots \dots \dots (2)$$

Where, Y_t = Response (dependent) variable at time t

μ = Constant mean of the process

$\theta_1, \theta_2, \dots, \theta_q$ = Coefficients to be estimated

ε_t = Error term at time t

$\varepsilon_{t-1}, \varepsilon_{t-2}, \dots, \varepsilon_{t-q}$ = Errors in previous time periods that are incorporated in the response Y_t

3. Mixed Autoregressive Integrated Moving Average (ARIMA)

Model: ARIMA (p,d,q) which has the general form:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \dots + \beta_p Y_{t-p} + \varepsilon_t - \theta_1 \varepsilon_{t-1} - \theta_2 \varepsilon_{t-2} - \dots - \theta_q \varepsilon_{t-q} \dots \dots (3)$$

Consider the graph of ACF to determine whether or not the series is stationary. If a graph of the ACF of a statistic shows that the time series values either cut off or die down pretty fast, the statistic time series is stationary. If an ACF graph decays very slowly, the statistical time series is non-stationary. If the series is not stationary, data can be turned into a stationary series via differencing. To determine the model, examine the graph of the autocorrelation function (ACF) and, as a result, the correlation function (PACF).

RESULTS AND DISCUSSION

Ethiopian wooden furniture import-export trends and market status

Between 2009 and 2020, Ethiopia imported wooden furniture at a total cost of \$US 271.3 million. Importing wood furniture costs the government an average of \$22.6 million each year. The total amount of wood furniture imported into the country was 151,810 tonnes. According to the data, overall expenses for importing wooden furniture into Ethiopia reduced by 2.3 percent each year on average between 2009 and 2020. From 2018 to 2020, the country reduced the amount of imported wooden furniture, even though the expense value was at its highest and the price was at its lowest. It could be due to a security concern within the country. The average price of wooden furniture fell from 2014 to 2020, reaching \$1,789 in Table 1. Imports of wooden furniture have expanded as the country's real estate (asset) value, growth, population, and interior design have all grown. In Ethiopia, forest products are mostly provided via domestic production and import.

From 2009 to 2020, the government gained a total of \$US 20.5 million from selling wooden furniture to various countries. Imported wooden furniture earns the country an average of \$1.71 million each year. The country shipped a total of 5,157.7 tonnes of wooden furniture. In 2020, the most amount of wooden furniture exported was 2,079 tonnes, with the highest income of \$3,879,831 USD. Table 1 shows that the average exports over the past 12 years were 430 tonnes, with an average price per tonne of \$5,289. The country's wooden furniture exports fell

from 2015 to 2020, however they increased in 2020 at a low price of \$1,866. Table 1 shows a growth in the volume and value of wooden furniture between 2009 and 2019.

Table 1. Trends of imported -export wooden furniture (2009-2020)

Year	Export			Import		
	Volume (ton)	value(\$US)	Value/Volume (\$US)	Volume (ton)	Value (\$US)	Value/Volume (\$US)
2009	362.6	1,346,715	3,713.7	9,293.7	14,668,934.4	1,578.4
2010	424	1,855,483.7	4,375.8	9,983.4	20,376,911.7	2,041.1
2011	288.1	2,155,708.3	7,482.5	11,085	23,948,370.7	2,160.4
2012	350.4	2,105,369.1	6,008.6	1,1842.7	26103434.2	2,204.2
2013	358.8	2,065,063.5	5,755.5	11,727.1	25,832,864.3	2,202.8
2014	350.7	1,741,824.5	4,966.1	15,386.7	28,559,073	1,856.1
2015	291.2	1,377,948.4	4,731.4	18,713.8	35,073,733.4	1,874.2
2016	208.1	1,232,031.5	5,919.5	19,148.1	28,861,810.6	1,507.3
2017	142.2	1,111,053.5	7,815	21,252.3	31,877,819.5	1,500
2018	137.8	850,925.2	6,173.5	11,510	18,454,413.9	1,603.3
2019	164.5	766,297.5	4,658.2	6,441.8	10,307,506.4	1,600.1
2020	2,079.2	3,879,830.6	1,866	5,425.9	7,248,724.5	1336
Total	5,157.7	20,488,098.2		151,810.4	271,313,597	
Average	429.8	1,707,341.5	5,288.8	12,650.9	22,609,466.4	1,788.7

Source: Ethiopian Custom Commission (2021)

Wooden furniture expense value has a propensity to rise faster than revenue value; nevertheless, beginning in 2018, the value has begun to fall quicker. While the revenue value of wooden furniture begins to rise from 2019 to 2020 at some level, as shown in Figure 1.

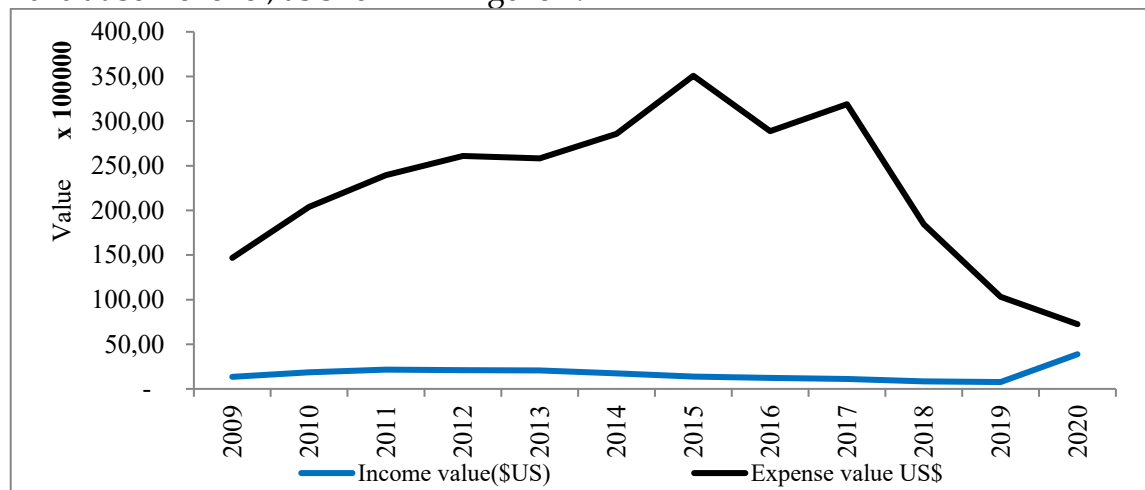


Figure 1: Trend of Wooden furniture value 2009 to 2020.

Source: Ethiopian Custom Commission (2021)

The wooden furniture Trade Balance

Ethiopia's wooden furniture commerce is characterized by import focus. Ethiopia also exports wood furniture to overseas markets. The country shipped an average of 430 tonnes of wooden furniture each year, valued at \$US 1,707,342. However, the export was incomparable to the import, which had an average volume of 12,651 tonnes per year and a value of \$US 22.6. According to the data, the trade balance is negative on average by \$US 20.9 million every year. According to the report, the country should strengthen its industrial forest plantation and wood sector. Figure 2 depicts Ethiopia's falling wooden furniture trade balance during the last two decades.

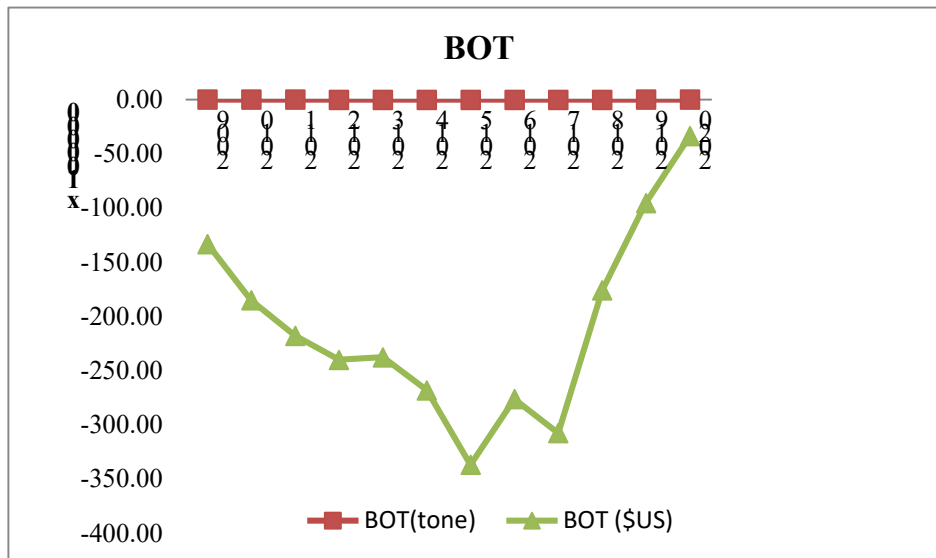


Figure 2: Balance of Trade wooden furniture in Ethiopia (1997-2020)

Note: Balance of Trade (BOT)

Source: Ethiopian Custom Commission (2021)

The volume of wood furniture imported and exported from Ethiopia to various nations

According to the data, between 2009 and 2020, Ethiopia bought wooden furniture from 149 different nations. Figure 3 depicts the major wooden furniture-supplying countries, as well as the relative costs of importing wooden furniture from each country throughout the research period. According to data, China is the biggest supplier of wooden furniture, accounting for around 82% of total imports, followed by Italy (6%). Ethiopian charges account for over 66% of total expenditure on Chinese hardwood furniture imports (Table 3).

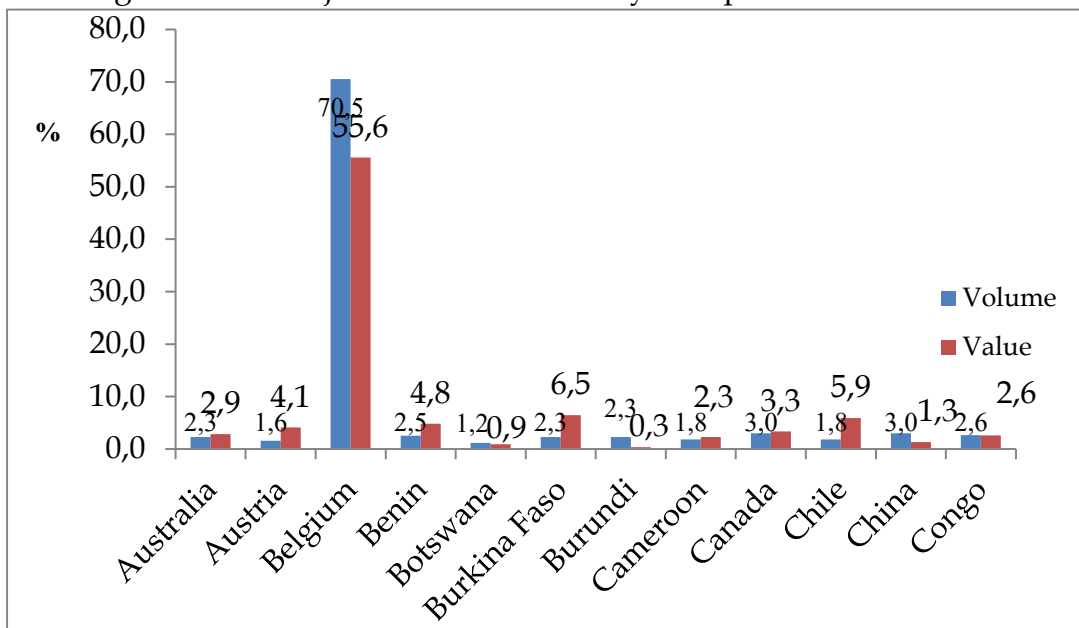
Table 2: Major importer countries of wooden furniture from Ethiopia (2009-2020)

Countries	Relative net weight import (%)	Relative net spends to import (%)
China	81.74	66
Malaysia	5.87	4.51
Indonesia	3.52	1.65
United Arab emirate	1.36	2.29
Turkey	1.22%	2.94%
Italy	1%	4.92%
United Kingdom	0.26%	2%
United State	0.90%	3.11%
Germany	0.31%	1.99%
	96%	89%

Source: Ethiopian Custom Commission (2021)

Figure 3 depicts the top destination countries for exported wood furniture across the study period, as well as the relative income earned from each destination country (2009-2020). During the study period, the country shipped wood furniture to 28 other countries. Ethiopia sells over 75% of its wood furniture to Belgium. Belgian wood furniture accounted for 55.6 percent of Ethiopia's income. This information could indicate that Ethiopia's primary destination for wood furniture exports was Belgium. Despite the fact that the volume of wood furniture delivered to the United Kingdom, the United States, and Italy was only approximately 0.3 percent, 0.9 percent, and one percent, respectively, the result demonstrated that the cash gained from export was large (Figure 4).

Figure 3: The major destination country to export wooden furniture



Source: Ethiopian Custom Commission (2021)

Predicting the trade for wooden furniture

The forecast of wood furniture trade is analysed from 2021 to 2040, for 12 years (Figure 5). The import and export value, the time series, ACF, and PACF plots of the first-difference time series are also presented in the result. In Figure 4 of the expense and income value, the time series, ACF, and PACF plots of the first-difference time series can be shown. The first difference time series is clearly stationary, as can be seen from the time series plot (constant mean and approximately constant variance). The ACF and PACF charts in the spending and income instance demonstrate that the model is suitable for the first-differenced data. The best models are picked from among the competing models based on the smallest value of the root mean square error (RMSE), mean absolute error (MAE), mean absolute percentage error (MAPE), maximum coefficient of determination (R²), and, of course, model coefficient significance. Diagnostic checks on the best-fit models are performed using the auto correlation function (ACF) and partial autocorrelation function (PACF) of the residuals in Figure 4.

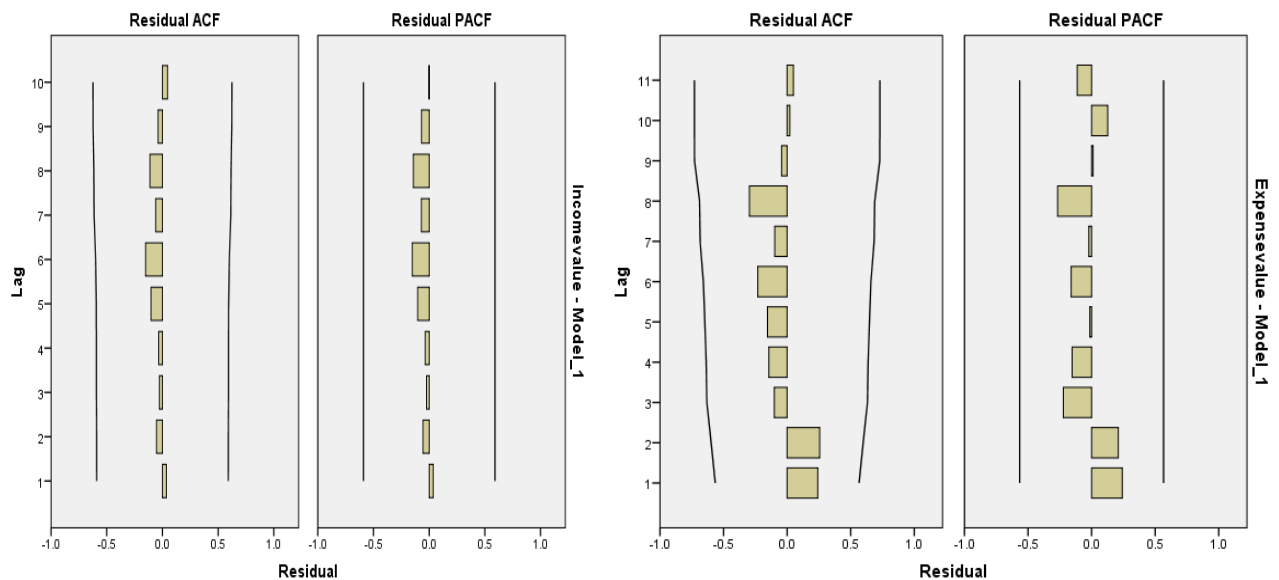


Figure 4: Residuals plots of ACF and PACF for the expense and income value of wooden furniture

The ARIMA model was used to anticipate Ethiopia's yearly import-export of wooden furniture from 2021 to 2040. Tables 3 and 4 show that the ARIMA (0,1,1) and ARIMA (2,0,1) models for revenue and expense value forecasting are suitable for yearly forecasting.

Table 3: Model Statistics, selection criteria

WF	Model	R-square	RMSE	MAPE	MAE
Expense value	ARIMA(1,1,1)	0.476	6,980,508	21.03	4,407,731
	ARIMA(0,1,1)	0.460	6,679,129	24.7	4,863,721
	ARIMA(1,1,0)	0.458	6,691,271	22.17	4,616,363
	ARIMA(1,0,0)	0.525	6,213,733	28.58	5,015,582
	ARIMA (2,0,0)	0.545	6,410,277	22.85	4,554,596
	ARIMA 2,0,1	0.455	5,731,109	18.14	3,715,315
Income Value	ARIMA(1,1,1)	-0.248	1,085,029.79	29.271	552,618.21
	ARIMA(0,1,1)	-0.251	1,021,735.68	28.846	549,208.48
	ARIMA(1,1,0)	-0.286	1,037,182.68	29.76	561,807.06

Table 4: Coefficient Of Estimate

WF	Model		Coefficient	SD	Z	P> Z
Expense Value	ARIMA(2,0,1)	Constant	4546.71	448.42	10.13	0.000
		AR1	1.682	0.431	3.904	0.005
		AR2	-0.914	0.197	-4.650	0.002
		MA	0.987	14.005	0.07	0.946
Income Value	ARIMA(0,1,1)	Constant	2843.32	1046425.9	0.03	0.979
		MA	-0.9978052	0.0046991	-212.34	0.000

The study found that the wooden furniture market increased rapidly, with annual average growth rates of up to 90% for expenses and 40% for income value throughout the forecasted years. The trade balance is currently imbalanced as a result of the industry's rapid growth. Between 2021 and 2040, the anticipated expense value for importing wooden furniture is expected to rise by 167% to 29,157,218 US dollars. While the earnings from exporting wooden furniture will be 11,290,257 US dollars (Figure 5). As seen in the graph, the predicted import-export value is increasing; yet, the country's income from wooden furniture exports will be insufficient to cover the cost of wood furniture imports.

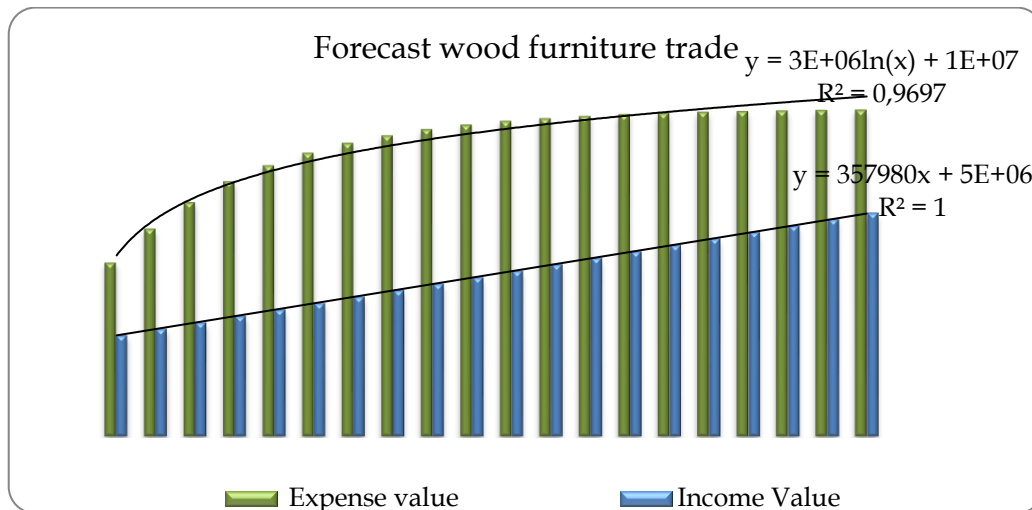


Figure 5: Forecast of import-export wooden furniture value in Ethiopia.
 Source: Ethiopian Custom Commission (2021)

CONCLUSION AND POLICY IMPLICATION

The goal of this study is to provide information about the current state and progress of wooden furniture in Ethiopia. According to the survey, wooden furniture imports in Ethiopia rose from \$9,213.7 in 2009 to \$31,877,819.5 in 2020. On average, Ethiopia exports 430 tonnes of wooden furniture. Between 2009 and 2020, the country generated approximately \$US 20,488,098 from wood furniture. Similarly, from 2009 and 2020, the trade imbalance in wooden furniture increased by an average of \$20.9 million. The ARIMA (0, 1, 1) and ARIMA (2, 0, 1) models are suited for Ethiopia's wood furniture market. From 2021 to 2040, the expected cost of wooden furniture will be 29,157,218 dollars, while the estimated cost of wooden furniture exports will be 11,290,257 dollars. Furthermore, the report lacks data on the illegal wooden furniture trade, notably cross-border trading. As a result, it is advised that 1) Wooden furniture manufacturing firms in Ethiopia be developed so that they can meet local demand while also earning money through exports 2) The country has paid adequate attention to the provision of jobs for young people, and wooden furniture production might thus be considered a key source of youth employment 3) Policymakers and the timber industries must put a major emphasis on adopting wooden furniture.

Ethiopia imports more wooden furniture than it exports, with a negative trade balance and projection. This demonstrates that Ethiopia is not capitalizing on its wooden furniture production potential; the government and practitioners must consider it in order to reduce import costs while improving the country's foreign currency income.

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