

**CARISCA**

Centre for Applied Research and  
Innovation in Supply Chain – Africa

# GHANA LMI

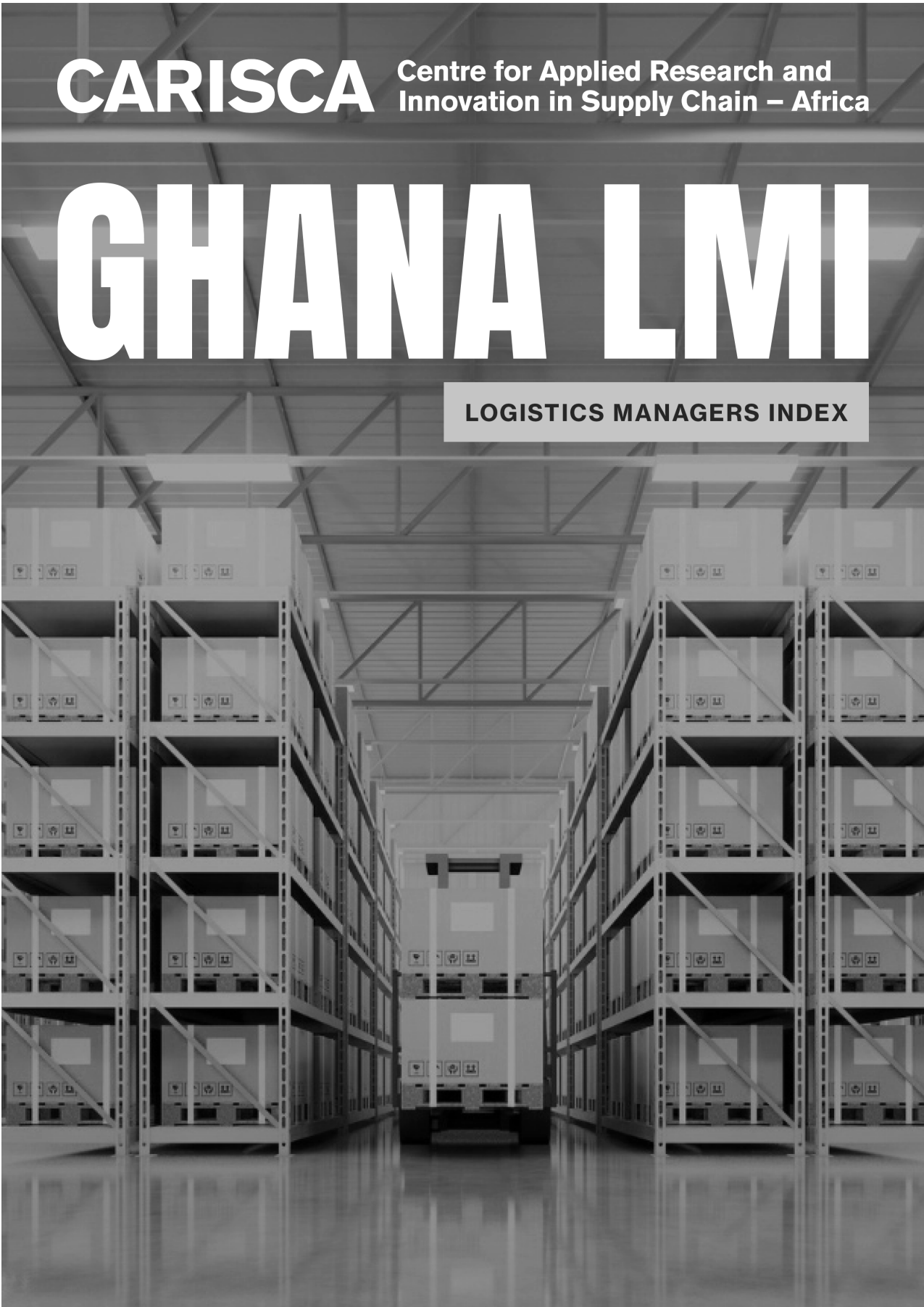
**LOGISTICS MANAGERS INDEX**



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# GHANA LMI

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The Logistics Managers Index is a new tool to measure the impact of eight logistics components on the Ghanaian macroeconomy. The LMI was established in the United States in 2016 by a team of researchers from Colorado State University, Arizona State University, Rutgers University, Florida Atlantic University and the University of Nevada, Reno. The LMI, which measures key logistics metrics on transportation, warehousing and inventory through monthly surveys from professionals in the logistics industry across the United States, and now, also in Africa.

In the US LMI, these metrics are then aggregated, and the results are released the first Tuesday of every month. The US LMI has been incredibly beneficial to business leaders, members of the media and government officials in gauging the potential movements of the overall American economy. It has been featured in media outlets ranging from the Wall Street Journal, NPR Marketplace, Supply Chain Quarterly, DC Velocity and many other media outlets.

When we first started the Center for Applied Research and Innovation in Supply Chain-Africa (CARISCA) in 2020, we were analyzing the type of research that could be beneficial to industry players and policy makers in Ghana and Africa at large. Given the success of the LMI in America, we immediately landed on recreating the LMI within the African context. There is a lack of hard data on Africa's supply chain indicators, and the LMI meets a real need for Ghanaians – providing a clear snapshot of the state of Ghanaian logistics quarter by quarter. The demand for the LMI in Ghana has grown each quarter. For example, the number of respondents to the first survey in Q1 2022 was 130. Just one year later, in the Q1 2023 report, 433 industry professionals participated in the survey. They are eager for the clear, overall view of the supply chain industry in Ghana provided by the LMI.

As the LMI continues to thrive and grow in Ghana, we plan to expand the research project to other areas of the continent, in key markets such as Nigeria and Kenya. As the LMI and CARISCA grows, we continue to seek new opportunities for expansion and potential partners to further our success.

Thank you for your support and your engagement.

Sincerely,

**Dr. Dale Rogers and Dr. Nathaniel Boso**



**Dr. Dale Rogers**

is the Executive Director and Principal Investigator of CARISCA, as well as Professor and ON semiconductor Professor of Business at Arizona State University's W.P. Carey Supply Chain Management Department



**Dr. Nathaniel Boso**

is the Director of the CARISCA Centre and the Component 1 Co-Lead, as well as the Dean of the Business School at Kwame Nkrumah University of Science and Technology (KNUST)



# CARISCA

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Innovation in Supply Chain – Africa

# GHANA LMI

**LOGISTICS MANAGERS INDEX**

## FIRST QUARTER LOGISTICS MANAGERS INDEX REPORT

**(January – March 2023)**

**Kwame Nkrumah University  
of Science and Technology  
(Kumasi, Ghana)**

Emmanuel Kweku Quansah (Ph.D.)  
Nathaniel Boso (Ph.D.)  
Abdul Samed Muntaka (Ph.D.)

**The LMI Value for Ghana for the first quarter of 2023 is 67.1**

**The LMI for the first quarter of 2023 increased by 3.1 to 67.1 from the fourth quarter (2022) value of 64.0.**

**Growth is INCREASING AT AN INCREASING RATE for Inventory Levels, Warehouse Capacity, Warehouse Utilization and Transport Utilization.**

**Growth is INCREASING AT A DECREASING RATE for Inventory Cost, Warehousing Prices, Transportation Prices and Transportation Utilization.**

The Logistics Managers' Index recorded a value of 67.1, which is the highest reading for the overall index since its inception in March 2022. This is being driven by an increasing inventory level (61.2) and a reduction in the cost metrics of inventory (80.6), and rising transportation

(91.9) and warehousing (81.2) prices. The fact that transportation and warehousing, which both contribute to the cost of holding inventory, are growing at a decreasing rate is a good indication that the high supply costs that have characterized the past two quarters is beginning to subside. This in itself is reflected in the gradually declining inflation rate in Ghana.

The rate of growth in logistics activities, which slowed down beginning September (Q3-2022) due to the high cost of inventory and the associated cost of warehousing and transportation prices, has picked up and reached a new high of 67.1. The recorded growth in logistics activities may be indicative of a general improvement in Ghana's economic condition.



The overall LMI score is a combination of eight distinct metrics that make up activities in the logistics sector: inventory levels and costs, warehousing capacity, utilization and prices, and transportation capacity, utilization and prices. A diffusion index is used to evaluate the overall LMI with a range between 1 and 100. A reading above 50.0 indicates that logistics activities

are expanding while a reading below 50.0 reflects a contraction of logistics activities.

The LMI summarizes the responses of supply chain (including operations) managers from multiple industries in Ghana. Data for the first quarter was collected from January to March 2023.

## IMPORTANT TAKEAWAYS FROM THE FIRST QUARTER 2023 LOGISTICS MANAGERS INDEX

- ✓ **The overall Logistics Managers Index (LMI) for Ghana for the first quarter of 2023 stands at 67.1, up 3.1 basis points from 2022's fourth quarter reading of 64.0.**

This increase could be pointing to the beginning of a rebound in the growth of Ghana's logistics activities because of improvements in the country's economic condition stemming from the appreciation of the cedi against the dollar (currently at 10.7 cedis to 1 dollar, 11th April, 2023<sup>1</sup> - see **figure 2**) and improved inflation rates (currently 45% in March 2023, down from a two-decade high of 54.1% in December<sup>2</sup>).

- ✓ **All the indicators for the first quarter were above the threshold of 50%.**

Findings from the Q1 report indicate increasing inventory levels, with several companies restocking after a period of reduced purchasing due to the high cost of doing business experienced in the last two quarters. Particularly, companies from the food and beverage industry that were affected by low inventory levels in the third and fourth quarters of 2022 have restocked in anticipation of increasing consumer demand.

- ✓ **Logistics cost indicators have decreased from the previous quarter: inventory costs have decreased from 85.1 to 80.6, warehouse prices from 89.7 to 81.2 and transport prices from 95.2 to 91.9.**

The change in the growth trajectory of these cost metrics is welcome news for Ghana's economy, as it points to a gradual improvement in the country's macroeconomic condition. The slowing of global fuel prices may also have contributed to the drop in transportation prices (currently at 1.090 USD per liter)<sup>3</sup>.

- ✓ **Warehouse capacity has increased slightly to 52 from the previous quarter's value of 50.5.**

The demand for warehouse capacity slowed down in the previous quarters but shows signs of improvement in this quarter. With the rise in inventory levels, we see an increase in warehouse utilization this quarter, moving from 50.5 in the previous quarter to 52. The increased inventory levels have generated a corresponding increase in warehouse capacity utilization.

- ✓ **Logistics activities are expected to continue to grow in the next quarter of 2023, with a predicted LMI of 69.3.**

The expected growth in the next quarter may be reflective of a return of investor confidence in Ghana's economy as the country edges closer to finalizing a \$3 billion injection of credit and inflation begins to subside going into the second quarter of the year.

- ✓ **Like the LMI, the Electronic Payment System (EPS) Index increased, with the EPS rising to 67 from the previous quarter's value of 62.9.**

This increase may be attributed to a gradual buildup of investor confidence in the Ghanaian economy, a recent reduction in E-levy rate and the decline in the cost of doing business in Ghana. The government's efforts at financial inclusivity by supporting and promoting Mobile Money Interoperability service may also have played a role in the growth of EPS. We expect the EPS index to continue to grow to a projected index of 81.7 in the next quarter.

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1. [xe.com/currencyconverter/convert/?Amount=1&From=USD&To=GHS](https://xe.com/currencyconverter/convert/?Amount=1&From=USD&To=GHS)
2. [tradingeconomics.com/ghana/inflation-cpi](https://tradingeconomics.com/ghana/inflation-cpi)
3. [globalpetrolprices.com/Ghana/gasoline\\_prices/](https://globalpetrolprices.com/Ghana/gasoline_prices/)

# RESULTS OVERVIEW

Results from this first quarter study suggest that Ghana's economy, overall, is rebounding from what could have been a recession last year. Economic activities seem to be picking up, and the logistics sector is growing at an increasing rate. This rebound is reflected in the LMI value of 67.1 for March 2023 (first quarter), up by 3.1 from last quarter's 64.0 (December 2022 – fourth quarter).

Despite the growth recorded in logistics activities in Ghana, growth in Ghana's Gross Domestic Product (GDP) has slowed down from 5.4% in 2021 to 3.2% in 2022.<sup>4</sup> The World Bank has attributed this decline in GDP growth to the high inflation rate (which reached 54.1% in December 2022) and increased interest rates. Both factors have led to reduced private consumption. The government's lack of access to international capital markets has also been a contributor to the GDP growth rate decline (Worldbank, 2023).

The appreciation of the Ghanaian cedi against the United States dollar and the anticipated financial bailout by the IMF may have contributed to the current optimism reflected in the LMI index score of 67.1, which is the highest recorded since the Ghana LMI's inception.

The current optimism also seems to reflect the increasing activity at the country's major ports (Tema and Takoradi), which had experienced a decline in traffic beginning mid-year 2022 and into the early part of this year.<sup>5</sup> The decline had been attributed to increases in the general costs of doing business (mid-2022) and the reversal of the benchmark policy, as well as increases in import duties and the introduction of new taxes. Importers that sought alternative ways of doing business seem to be turning back to patronizing the ports. Import volumes moving through the ports are gradually creeping back up.

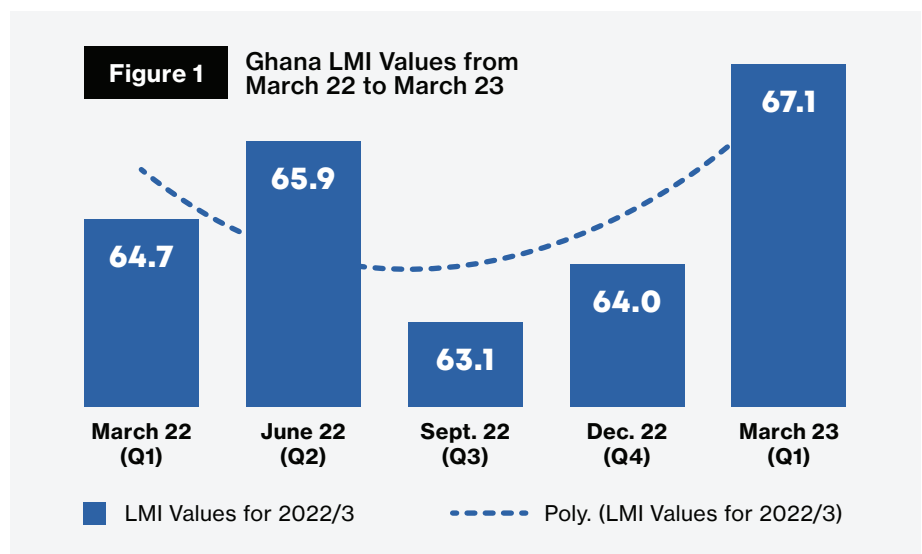
Inventory levels have grown by 10.7 points and currently stand at 61.2, up from last quarter's 50.5. This rebound is a significant improvement from the previous quarter, when inventory levels fell below the threshold value of 43.2 in September 2022 (Q3). This rebound may be linked to growth in the retail and consumables sector due to marginal appreciation of the Ghanaian cedi against the United States dollar in early December 2022.

It is expected that inventory levels will continue to increase as consumer spending continues to grow through the second and third quarters. Large retailers are expected to bring in new inventory to meet growing demand for goods in the second and third quarters. The reduction in inventory cost recorded (from 85.1 in December 2022 to 80.6 in March 2023) means that companies can purchase more goods with the same amount of money. Since the inception of the LMI, inventory costs have always been in the 80s and 90s with an all-time high value of 94.1 in the third quarter of 2022.

It is expected that inventory levels will continue to rise while inventory costs continue their downward

trend over the next two quarters. A continued decline in inventory costs would be a relief to consumers and companies at every level of the supply chain. It remains to be seen, however, if inventory costs will ever fall below 70 (currently stands at 80.6), which is the cutoff point for significant rates of growth.

Warehousing capacity has slightly increased to 52 from last quarter's 50.5 (+1.5). Rental rates have been quite consistent. However, the slight improvement in the economy may be pushing demand for warehousing capacity. The increase in warehousing capacity has led to a decrease in warehousing prices, from 89.7 in the last quarter of 2022 to 81.2 in this quarter (-8.5). This number is still in the realm of significant expansion. Except for the first quarter of 2022, which had a value of 78.4, warehouse prices have always been in the 80s. The other warehousing metric that is showing growth is warehouse utilization, which climbed from 52.1 to 63.8 (+11.7). Boosted by growing inventory levels, managers have been able to make better use of available inventory space, leading to an improvement in utilization.



4. [worldbank.org/en/country/ghana/overview](https://worldbank.org/en/country/ghana/overview)

5. [ghanaweb.com/GhanaHomePage/business/Ports-traffic-drop-is-affecting-our-businesses-Freight-Forwarders-1751939](https://ghanaweb.com/GhanaHomePage/business/Ports-traffic-drop-is-affecting-our-businesses-Freight-Forwarders-1751939)



Transportation metrics also showed a healthy growth, with a reduction in the transportation price index (from 95.2 to 91.9). Transportation prices peaked in September 2022 (Q3) with a value of 97.1. However, in late December 2022 and early January 2023, global fuel prices stabilized, which led to a 15.3% reduction in local public transportation fares.<sup>6</sup> Major logistics companies in Ghana such as DHL, UPS and TPL are also benefiting from the reduced fuel prices as they begin to see increasing volumes of transport services. This is consistent with other metrics that suggest that consumers are beginning to increase spending on direct retailing activities.

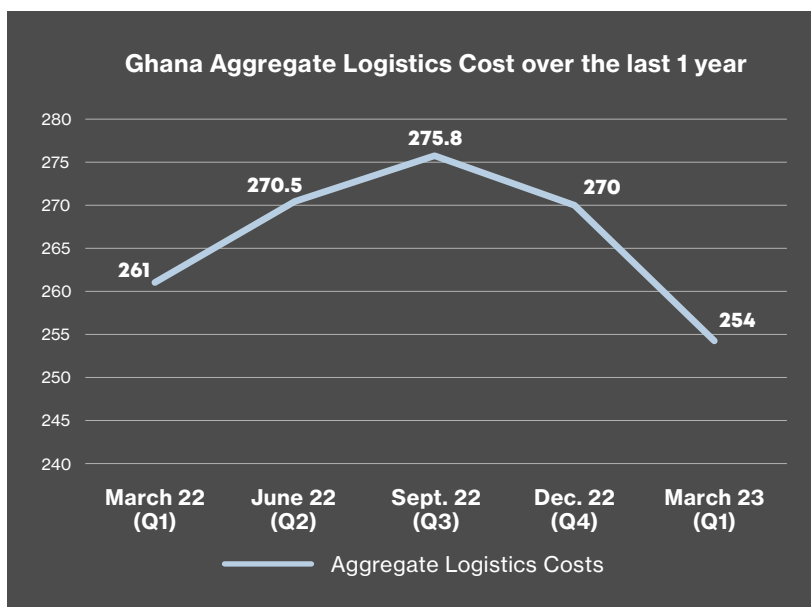
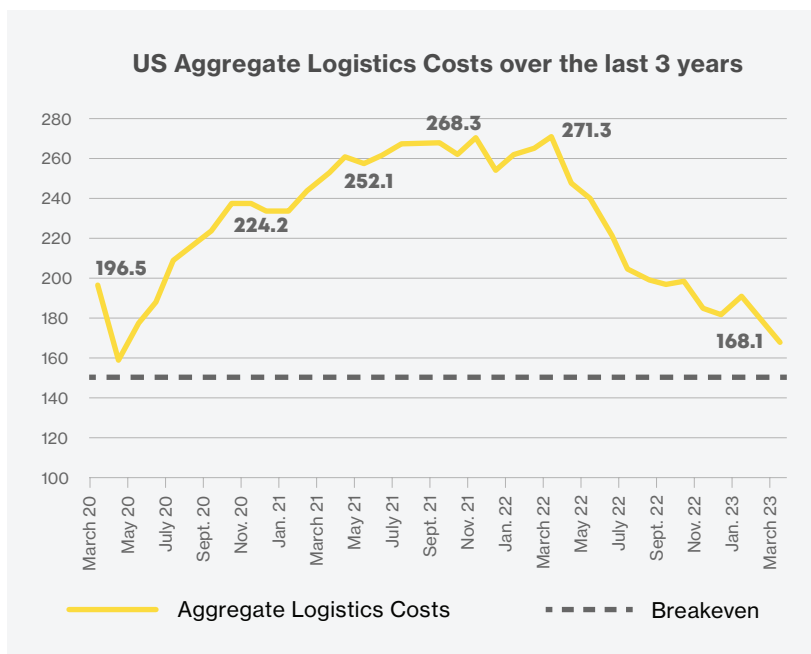
Transportation capacity index for the quarter declined from 69.2 to 60.3 (-8.9) due to an increase in inventory levels, which has led to the improvement we see in transportation utilization from 59 to 69.7 (+10.7).



**Figure 2** Comparison of the Ghana cedi against the dollar from April 2022 to April 2023 (Source: xe.com)

### Aggregate Logistics Costs

To generate an overview of logistics costs, the three cost metrics (i.e. inventory costs, warehousing and transportation prices) were aggregated. **Figure 3** shows the aggregate logistics costs for Ghana represented by the chart on the right with the blue line (movement in aggregate logistics costs from March 2022 - March 2023). The chart on the left of **figure 3** shows the aggregate logistics costs for the USA, represented by the green line (movement in aggregate logistics costs from March 2020 - March 2023). The vertical axis of the chart ranges from 0 – 300 because the scores of the three metrics are aggregated, with 150 representing the break-even point. The chart reveals that, in March 2023, the aggregate costs in the USA were down to 168.1 while that of Ghana were down to 254. In simple terms, the charts suggest that the cost of logistics activities in Ghana is higher than in the USA. Being a developing economy, Ghana's infrastructure challenges, bureaucracy, currency depreciation and high cost of doing business have contributed to its high aggregate logistics cost. Despite the high costs, the 254 value for the first quarter of 2023 is the lowest reading so far for Ghana in the history of the Ghana LMI. In previous quarters, the aggregate cost had crested at 275.8, in September 2022 (Q3), while inflation in Ghana was at its highest (54.1%) in December before declining to 45% in early 2023.



**Figure 3** Comparison of the total cost of logistics between the US and Ghana (as at March 2023)

6. [graphic.com.gh/news/general-news/transport-fares-down-by-15-3-from-today.html](http://graphic.com.gh/news/general-news/transport-fares-down-by-15-3-from-today.html)

# FIRST QUARTER 2023 OBSERVATIONS

## Overall LMI

The overall LMI metric for Ghana has increased for a second consecutive quarter (up by 3.1) to a reading of 67.1 in March 2023 from December 2022's reading of 64.0. This also happens to be the highest reading of the Ghana LMI so far. The rise has been propelled by improvements in inventory levels and the decline in the three cost metrics of transportation, warehousing and inventory.

In general, there were significant drops in the areas of inventory cost (-4.5), warehouse prices (-8.5), transportation prices (-3.3) and transportation capacity (-8.9). These drops in the cost-related metrics played a major role in expanding logistics activities. Metrics that showed growth were inventory levels (+10.7), warehouse capacity (+1.5), warehouse utilization (+11.7) and transportation utilization (+10.7). All the LMI metrics for Ghana have registered values above the threshold of 50%.









As of the first quarter of 2023, the LMI metric for Ghana is showing significant growth. This growth is influenced by improved consumer spending and the expectation that the ongoing negotiation with the International Monetary Fund (IMF) will be concluded in time to provide

an economic stimulus for the Ghanaian economy. There is also a gradual improvement in inflation and a marginal appreciation of the cedi against major currencies.

The index scores for each of the eight components of the Logistics Managers Index, as well as the overall LMI score for the first quarter of 2023 are presented in **table 1**. For the fifth consecutive time, transportation prices dominated the readings as the metric with the highest value, recording a score of 91.9. That metric was followed by warehousing prices (at 81.2) and inventory cost (at 80.6). These three metrics have always had the highest values since the inception of the Ghana LMI, with transportation price readings always being in the 90s.

Supply chain managers predict that the growth observed in the logistics sector will continue to rise to a future LMI value of 69.3 (an improvement on last quarter's prediction of 64.8). The results from the next survey (second quarter 2023) will show whether these predictions hold. However, expectations are high with the impending \$3 billion IMF bailout and expected World Bank \$1 billion credit injection into the Ghanaian economy.

**Table 1: LMI Values for Ghana for the First Quarter 2023 and Fourth Quarter 2022**

LOGISTICS AT A GLANCE – Q1 2023					
Index	March 2023 Index	Dec. 2022 Index	Quarter-Over-Quarter Change	Projected Direction	Rate of Change
<b>LMI®</b>	<b>67.1</b>	<b>64</b>	3.1	Growing	Increasing
 <b>Inventory Levels</b>	61.2	50.5	10.7	Growing	Increasing
 <b>Inventory Costs</b>	80.6	85.1	-4.5	Growing	Decreasing
 <b>Warehousing Capacity</b>	52	50.5	1.5	Growing	Increasing
 <b>Warehousing Utilization</b>	63.8	52.1	11.7	Growing	Increasing
 <b>Warehousing Prices</b>	81.2	89.7	-8.5	Growing	Decreasing
 <b>Transportation Capacity</b>	60.3	69.2	-8.9	Growing	Decreasing
 <b>Transportation Utilization</b>	69.7	59	10.7	Growing	Increasing
 <b>Transportation Prices</b>	91.9	95.2	-3.3	Growing	Decreasing



## Historic Logistics Managers' Index Scores

The reading for this quarter along with readings from the last four quarters of the LMI are presented in **table 2**:

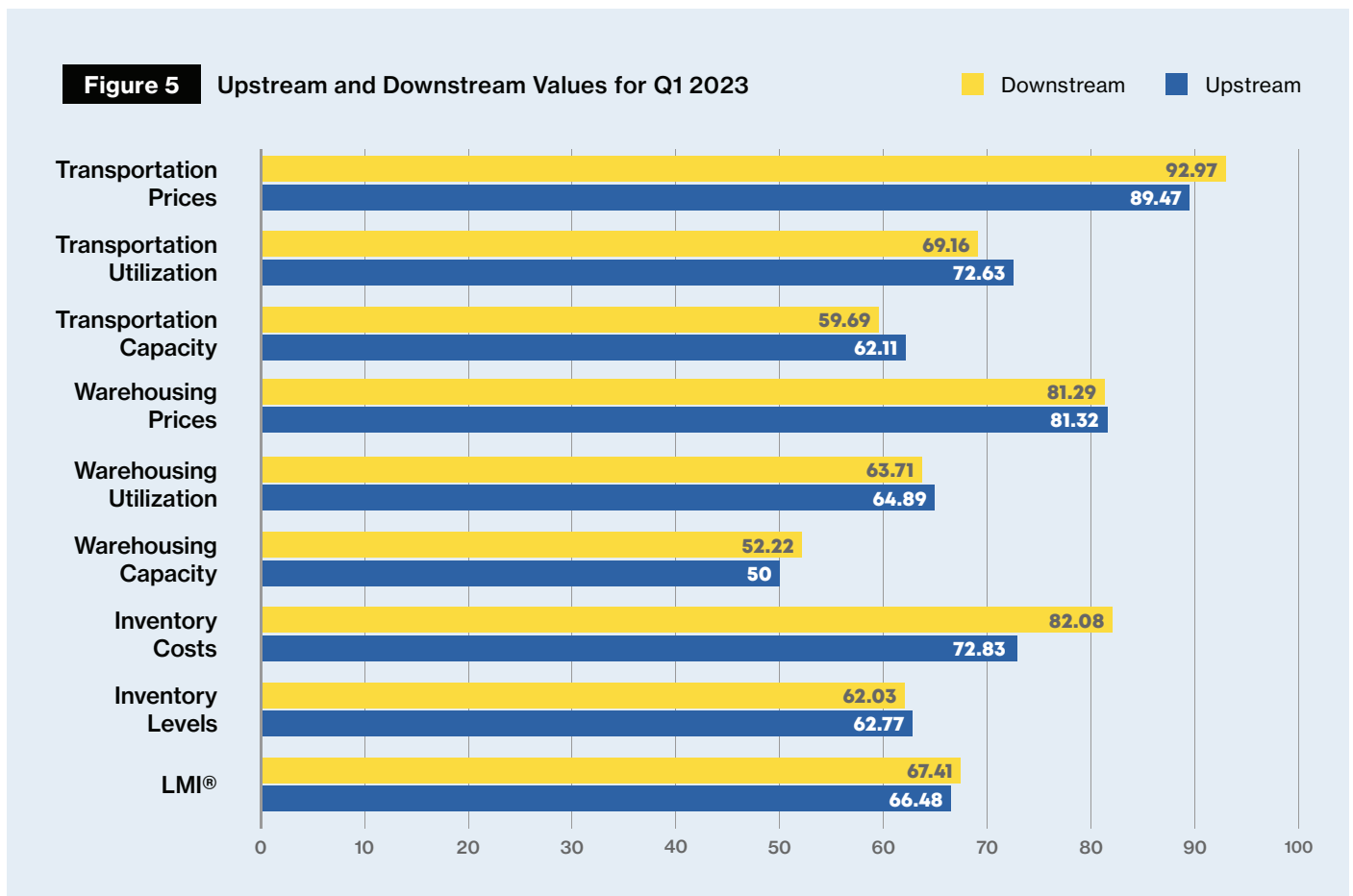
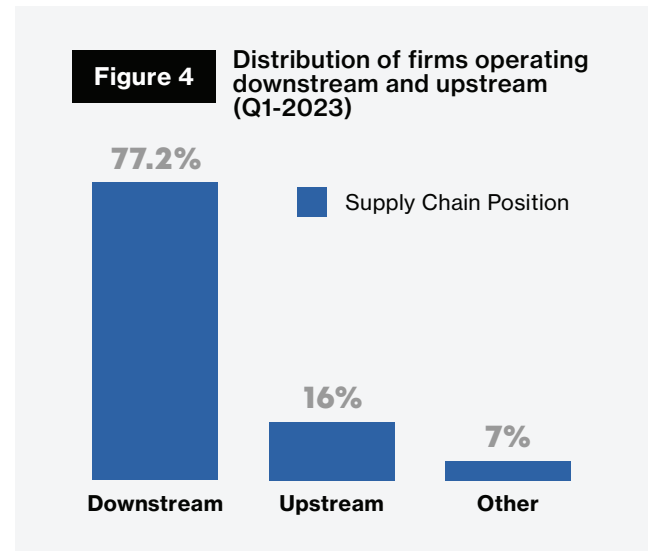
**Table 2: Historic Logistics Managers' Index Scores**

Quarter	LMI Values	
Q1 - 2023	67.1	All-time Average – 64.96 High – 67.1 Low – 63.1 Std Dev – 1.57
Q4 - 2022	64.0	
Q3 - 2022	63.1	
Q2 - 2022	65.9	
Q1 - 2022	64.7	







## Upstream vs Downstream Activities

In general, there is not much difference in the observations made for firms in the downstream (reflected by the yellow bars in **figure 5**) and those in the upstream (blue bars). Even though downstream firms reported slightly elevated levels of transport and inventory cost, warehousing price was at par. Upstream firms seemed to have slightly elevated levels of utilization (transportation and warehousing).

The implication is that B2B firms are more efficient with transport and warehouse utilization because they deal with large volumes. B2C firms are paying slightly more for transportation and inventory, due to their inability to negotiate lower rates because of the low volumes they carry.



**Table 3: Upstream and Downstream Values for Q1 2023**

Upstream vs. Downstream Values - Q1 2023				
Index	Upstream Values	Downstream Values	Delta	Significant?
LMI®	66.48	67.41	0.93	No
 Inventory Levels	62.77	62.03	0.74	No
 Inventory Costs	72.83	82.08	9.25	Marginal
 Warehousing Capacity	50	52.22	2.22	No
 Warehousing Utilization	64.89	63.71	1.18	No
 Warehousing Prices	81.32	81.29	0.03	No
 Transportation Capacity	62.11	59.69	2.42	No
 Transportation Utilization	72.63	69.16	3.47	No
 Transportation Prices	89.47	92.97	3.5	No

## PREDICTIONS

The predictions made in March (**figure 6**) are similar to what we saw in December but slightly more optimistic. The current growth boost is expected to continue over the next 12 months, resulting in an expansion of the LMI to 69.3, up by +4.5 from December’s prediction of 64.8.

Like last quarter, logistics managers expect that inventories will continue building up and expand to 75.6 in the next two or three quarters. They also anticipate that inventory cost will continue to experience a downward trend to 75.2 while warehousing capacity continues to open up. They predict warehousing prices to keep coming down as utilization improves.

Because Ghana’s economy is import oriented, all three cost metrics are influenced by foreign exchange rates (predominantly the US dollar). As a result, inventory costs correlate to a large extent with the appreciation and depreciation of the cedi against the dollar. The first quarter of 2023 has seen the cedi appreciate, making respondents optimistic about the falling prices of inventory.

Warehouse prices are more stable, even though priced in dollars, because of long-term contracts that fix rental rates. Nevertheless, warehousing prices are predicted to be in the 80s, which is not much relief to warehousing tenants and consumers. Transportation prices are predicted to continue contracting over the next 12 months, as respondents grow increasingly optimistic about a reduction in inflation and fuel prices and an increase in volumes.

**Table 4** also shows the current and predicted values for all eight metrics from this quarter’s survey (March 2023). To generate the predicted future LMI values for Ghana, we asked respondents to predict movements in the individual metrics for the next 12 months. Results show high optimism about the potential for increased logistics activities and reduced costs in the coming year.

**Figure 6** shows the predicted values, while **figure 7** compares both current and predicted values.

Table 4: Predicted Future Values of the LMI – March 2023









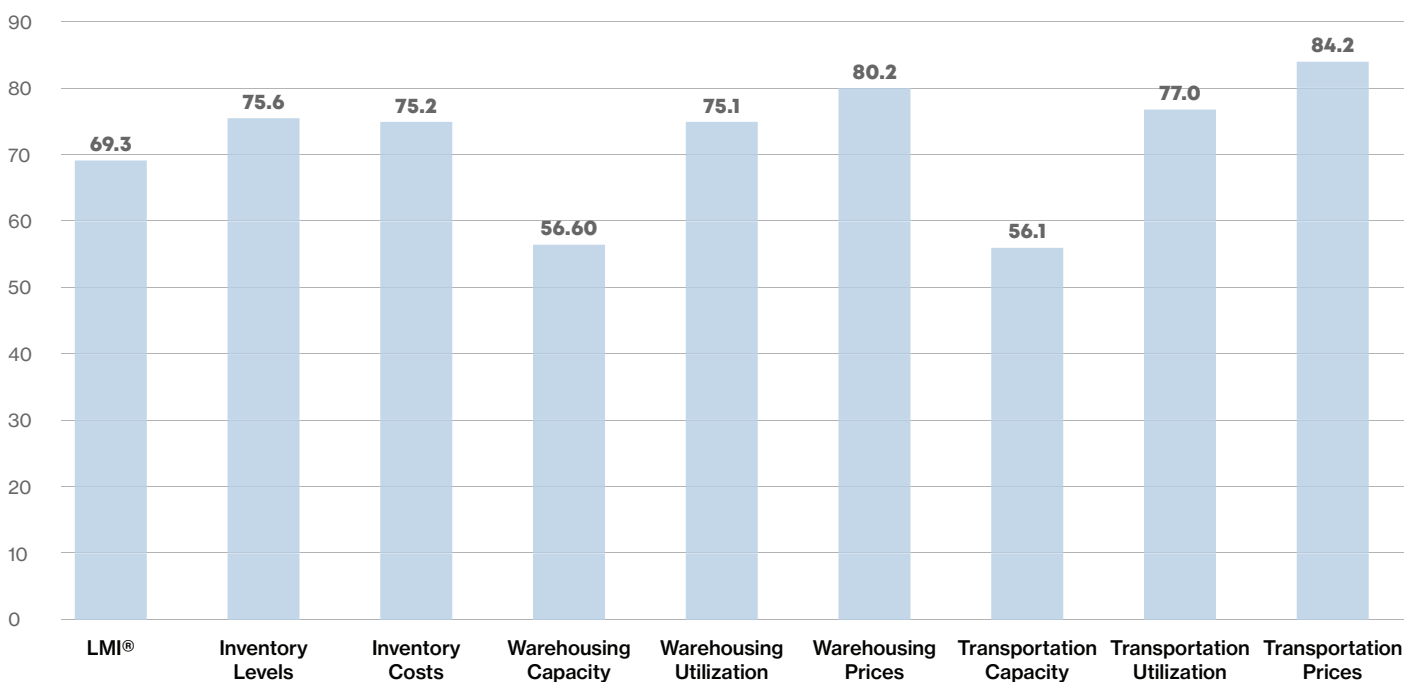
LOGISTICS AT A GLANCE – Current and Predicted Values (Q1 2023)		
Index	March 2023 - Current	March 2023 - Predicted
<b>LMI®</b>	<b>67.1</b>	<b>69.3</b>
 <b>Inventory Levels</b>	61.2	75.6
 <b>Inventory Costs</b>	80.6	75.2
 <b>Warehousing Capacity</b>	52.0	56.6
 <b>Warehousing Utilization</b>	63.8	75.1
 <b>Warehousing Prices</b>	81.5	80.2
 <b>Transportation Capacity</b>	60.3	56.1
 <b>Transportation Utilization</b>	69.9	77.0
 <b>Transportation Prices</b>	91.9	84.2

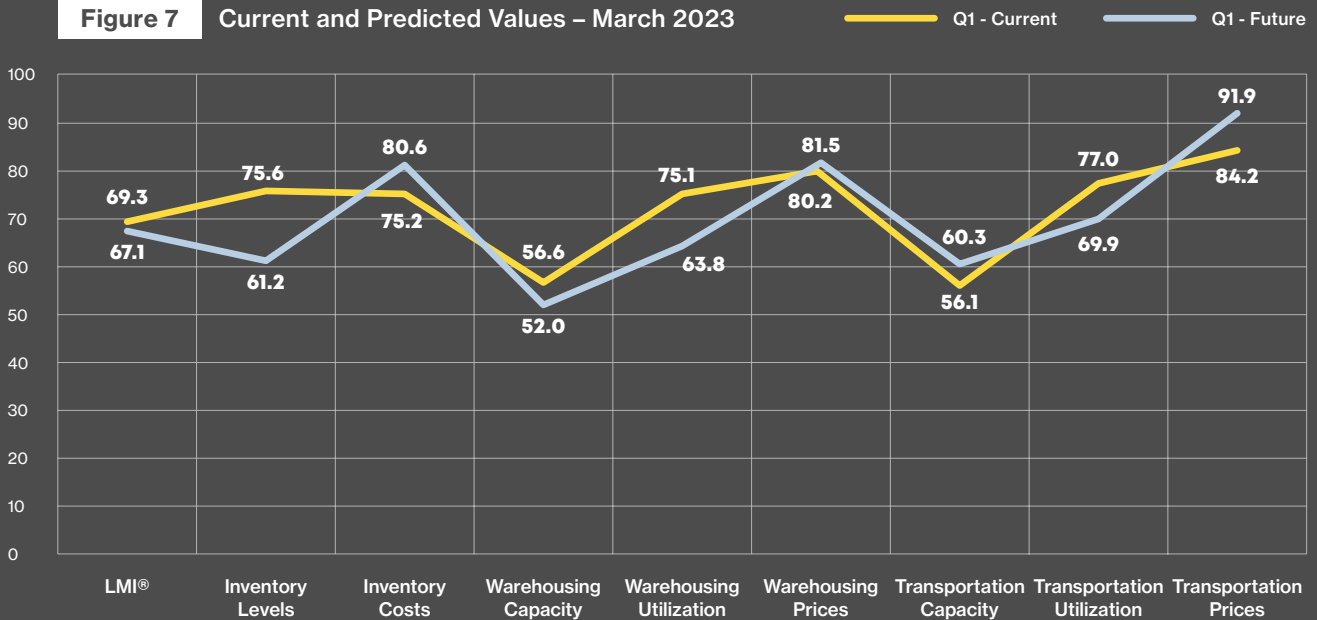
Figure 6 Future Predictions – March 2023

■ Predictions - March 2023 (Q1)





**Figure 7** Current and Predicted Values – March 2023



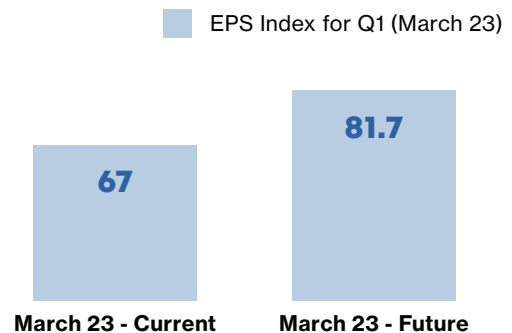
## ELECTRONIC PAYMENT SYSTEMS INDEX

The Electronic Payment Systems Index (EPI) was introduced in the second quarter of 2022 and has become a major feature of the LMI surveys. It gauges the views of respondents on the usage of electronic payment systems when transacting business with suppliers and customers. These electronic payment systems and methods make purchasing and procurement easier, more cost-effective and time saving. According to the recent World Bank Logistics Performance Indicator Report (2023), “end-to-end supply chain digitization, especially in emerging economies, is allowing developed countries to shorten port delays by up to 70% compared to those in developing countries.” E-payment systems support supply chain digitization and in Ghana Mobile Money Interoperability services has provided financial inclusion to businesses and consumers allowing for seamless electronic financial transactions. The logistics industry has benefited from this project, which has been championed by the vice president, Dr. Mahamadu Bawumia<sup>7</sup>.

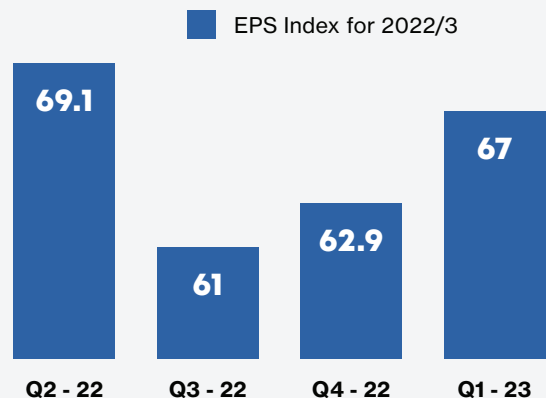
Like the LMI, the EPI has a threshold of 50% and is developed as a diffusion index. The EPI for the first quarter of 2023 registered a value of 67.0 (an increase of 4.1 from last quarter’s value of 62.9) as indicated in **figure 8** and **9**.

Respondents predicted that usage of electronic payment systems will grow to a value of 81.7 over the next 12 months (an increase of 6.3 from last quarter’s prediction of 75.4). The prevailing economic situation with high inflation and poor exchange rates has affected these predictions in the past. Nevertheless, usage of electronic payment systems has grown steadily, albeit slowly, with a potential to pick up again as economic situations in the country improve.

**Figure 8** Current and predicted values of the Electronic Payment Systems Index



**Figure 9** EPI values for 2022 (Q2-Q4) and 2023 (Q1)



7. [ghanaweb.com/GhanaHomePage/business/Ghana-is-first-country-in-Africa-with-access-to-financial-inclusivity-Dr-Bawumia-1753961](https://ghanaweb.com/GhanaHomePage/business/Ghana-is-first-country-in-Africa-with-access-to-financial-inclusivity-Dr-Bawumia-1753961)

# ABOUT THIS REPORT

Researchers at the Centre for Applied Research and Innovation in Supply Chain – Africa (CARISCA) issued this report today. The Logistics Managers Index (LMI) is a new tool developed by CARISCA, based at Kwame Nkrumah University of Science and Technology, for Ghanaian businesses and policymakers. The LMI reports are based on quarterly surveys conducted with industry leaders in Ghana. The study is led by Emmanuel Kweku Quansah (Ph.D.), Nathaniel Boso (Ph.D.) and Abdul Samed Muntaka (Ph.D.) of KNUST.

The calculated LMI for Ghana, along with the accompanying analysis of its components, provides useful insights for the government of Ghana, business decision-makers, market analysts and investors, as it offers a predictive indication of overall economic activity in the country.

The LMI report is made available quarterly at [carisca.knust.edu.gh/LMI](https://carisca.knust.edu.gh/LMI). Senior supply chain (including operations) managers of businesses in Ghana are invited to participate in the quarterly LMI surveys by visiting: [surveymonkey.com/r/Q2-23-LMI](https://surveymonkey.com/r/Q2-23-LMI).

## Data and Methodology

Data for the Logistics Managers Index for Ghana are collected in quarterly surveys. Respondents for the study include senior logistics, supply chain and procurement executives and managers in the formal sector of the Ghanaian economy. Senior executives and managers are most likely to have macro-level information on inventory, warehousing and transportation trends in their organizations.

Data are also collected from professional members of the Chartered Institute of Logistics and Transport (CILT) and the Chartered Institute of Procurement and Supply (CIPS). Members of these professional bodies in Ghana tend to hold senior management positions in their organizations.

## The Diffusion Index

The LMI for Ghana is calculated using the diffusion index. The diffusion index is used to calculate other widely accepted indexes, such as the Purchasing Managers Index (PMI) and the USA LMI. This index gives an indication of whether the metric being evaluated is contracting or growing. Values below 50.0 suggest a contraction, while values above 50.0 suggest growth in an activity (Getz and Ulmer, 1990). Thus, LMI values below 50.0 would be suggestive of contraction whereas values above 50.0 would suggest expansion in logistics activities.

Diffusion indexes are used to measure how widely a variable is spread across a group. The Institute for Supply

The LMI measures the growth or decline of Ghana's logistics industry along three components: inventory, warehousing and transportation activities. The LMI for Ghana study utilizes eight metrics across the three components to capture Ghana's logistics activities. The index measures combinations of inventory, warehouse and transportation activities and tracks the relationship between these variables to make inferences about their effects on the broader Ghanaian economy.

An index score is calculated for each of the eight components, and an overall index score (i.e., an LMI value) is then evaluated as a composite of these components. This LMI value is expressed as a percentage with a mid-value/threshold of 50%. An LMI value above 50% indicates a growing logistics industry, while a value less than 50% indicates a contracting logistics industry.

This approach is an effective and a reliable way to identify prevailing trends in logistics activities. Due to its predictive nature, the LMI is also a useful tool for forecasting future trends in a modern economy (Rogers et al., 2018).

To ensure that the LMI value for Ghana is a true reflection of logistics activities in the Ghanaian economy, the respondents for this study were required to be working for organizations that operate in Ghana. Multiple industries were represented in the respondent pool: automobile and parts, telecommunications, shipping and transport, agriculture and agriculture business, manufacturing, mining, pharmaceuticals, industrial services, oil and gas/petroleum, and machinery and equipment.

A total of 433 valid responses were used for the Q1 2023 report.

Management (ISM) has been using the diffusion index to compute the Purchasing Managers Index since 1948. In keeping with the approach by Rogers, et al. (2018) and ISM, we computed the diffusion index as follows:

$$DI: 0.0 * PD + 0.5 * PU + 1.0 * PI$$

Where PD = % of respondents saying a category is declining, PU = % of respondents saying a category is unchanged, and PI = % of respondents saying a category is increasing.

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The Logistics Managers Index (LMI) for Ghana makes no representation other than that stated in this release regarding the individual company data-collection procedures. The data should be compared to all other economic data sources when used in decision-making.

To participate in the LMI survey, go to [surveymonkey.com/r/Q2-23-LMI](https://surveymonkey.com/r/Q2-23-LMI)

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# INTERVIEW

CARISCA spoke with two co-authors of the Logistics Managers Index, **Dr. Emmanuel Quansah** and **Dr. Abdul Muntaka**, both KNUST faculty working on the CARISCA project.



**DR. ABDUL SAMED MUNTAKA**

**Senior Technical Advisor and Component 3 Co-Lead, CARISCA**

**Former Department Chair, KNUST Supply Chain and Information Systems Department**



**DR. EMMANUEL QUANSAH**

**Research Faculty, CARISCA**

## *How did the Ghana LMI get started and how has it grown from its initial conception?*

**QUANSAH:** The LMI started as part of a project to develop data tools for businesses, stakeholders, entrepreneurs and the government of Ghana. Because we realized that decision making within the African context was more intuitive than evidence based. The initial project was called the African Business Managers Index (ABMI). We were hoping to develop a suite of data tools to support decision making for managers and government stakeholders. However, we realized that was quite a broad ambition and we decided to focus on the logistics industry, and we settled on the Logistics Managers Index which was created by Prof. Dale Rogers and his team and has been in use in the USA for over a decade.

The fact that Dr. Dale Rogers is part of CARISCA influenced this greatly and guided us in the development of the Ghana LMI.

**MUNTAKA:** The engagements we had with people in the industry at the beginning of CARISCA pointed to this gap in the industry, the fact that decision-making in logistics was based on intuition and not hardcore data. So, the question was: how do we get them the information they need? For example, if someone is going to rent a warehouse, how much is warehouse space going? Are prices on the rise? Are they lowering? What are the trends?

## *How have you seen the LMI grow and change and how is it benefiting the business community?*

**MUNTAKA:** It started small. Our first sample size in the first quarter of 2022 was 130 responses. Now, in the first quarter of 2023, we had 433 respondents. We've also learned that the business community is learning key concepts from the report. I've had a logistics manager tell me he did not know what transport utilization was until he started reading the reports, understanding that transport utilization is a ratio of transport capacity that is used. Participation is increasing, willingness to participate is increasing and the LMI is gradually influencing supply chain professionals' mindsets about key concepts, like warehouse utilization, transport utilization, ware-house capacity, transport capacity, etc. Many of these people learned these things in school, but they couldn't link these terms to their everyday work until these reports were published.

**QUANSAH:** The steady increase in our respondents clearly shows tremendous interest by the industry. They find the results are very relevant, and therefore they want to contribute to it. The LMI has been an eye-opener. Most companies use the LMI as a local intelligence tool. They rely on the LMI to provide them with data and forecasts on what is happening in the logistics industry. They use the LMI as an intelligence gathering tool. Instead of doing this intelligence gathering themselves, they rely on the LMI to provide them with data and forecasts on what is happening in the logistics industry. Oftentimes, they have an inward view of their own operations. But with the LMI, they have an aggregate view of the decisions being made by other companies within the industry and companies are able to compare their own levels of capacity or utilization with the metrics for the industry. It has been very relevant to the industry.

When we first started producing the LMI report, managers were skeptical that it would last. They were cautious in utilizing the LMI as an internal document, but as we've continued to produce reports, managers are beginning to see the LMI as a reliable tool, and several companies have mentioned they compare LMI data with their own data and are able to make better decisions based on the juxtaposition.

**How has the LMI involved the public sector and how has it been useful to government officials?**

**MUNTAKA:** It is difficult to tell how the LMI is influencing government officials because it is barely one year old. The good news, however, is that the respondents include people from the public sector, who are logistics managers and people in the supply chain. So as more and more people respond and use the LMI for their own units' decision making, it will eventually influence the policy making in the country, reaching the ministers and chief directors who are not supply chain professionals themselves.

**What challenges have you faced?**

**QUANSAH:** The initial challenge had to do with data collection. Online surveys have a low response rate in Africa, especially in Ghana, and we needed to build trust with these managers. Our data collection exercise has been face-to-face on the field. That takes time and is very costly. Beginning with the second quarter of 2022, we implemented parallel online surveys and the table below shows the respondent numbers for each quarter (both physically administered and online). It seems our efforts in building trust with respondents is beginning to pay off as the number of online responses have increased with each quarter. We want to be able to move to a fully online survey-based project, as that will reduce our survey administration costs significantly.

Quarter	Total Respondents	Face-to-Face	Online
Q1 - 2022	130	130	0 (0% of total)
Q2 - 2022	225	197	28 (12.4% of total)
Q3 - 2022	292	251	41 (14% of total)
Q4 - 2022	195	139	56 (28.7% of total)
Q1 - 2023	433	268	165 (38.1% of total)

**How do you expect the LMI to grow in the future?**

**MUNTAKA:** I see the LMI growing in terms of respondents, in terms of coverage and in terms of the countries it covers. The ultimate aim, if you look at the initial start, was to have an African Business Managers Index. Our hope is still that this will grow into other countries and then as it begins to pick up momentum, we will eventually transform it into the Africa Business Managers Index.

**QUANSAH:** When we started the LMI in Ghana, we had a conversation about branding it as the African LMI, but we decided that since we were starting in Ghana, we could not call it the African LMI. Our aim is to replicate the LMI in other African countries and we have begun reaching out to collaborators. We've had conversations with potential partners in Kenya and in Nigeria and hope to launch the surveys in these countries by the end of 2023. Within the next five years, we hope to have the African LMI focusing on major economies across the continent. We are actively looking for partners to expand the LMI across the continent.

We also hope to rollout an LMI portal that will enable us to not just publish the report, but that will enable us to create data dashboards, so that people can create their own charts for their own use.

**Are there any forecasts/teasing elements we can provide for the next LMI? Any new data points? Expectations?**









The Ghana LMI has captured the key movements of logistics activities for the past 15 months on quarterly basis and has been robust in its administration, producing timely and relevant insights for industry. The expectation is that the next LMI will enjoy widespread participation by top level logistics/supply chain professionals and there will be multiple evidence of corporate usage of the LMI reports.

The next LMI will include new data points that capture how the LMI provides unique value to logistics managers and provide more detailed sector perspectives.

Some forecasts for the Q2 2023 LMI include the following:

- All metrics are expected to be above the threshold of 50 percent.
- Barring any external economic shocks, logistics costs (inventory cost, warehouse prices and transportation prices) will continue a downward trend, leading to an increase in the purchasing power of companies to restock and grow inventory levels. Aggregate logistics cost might achieve a new all-time low value.
- Transportation and warehouse utilization will improve as businesses optimize inventory and adopt efficient turnaround options.
- Warehouse capacity is likely to remain steady.
- Transportation capacity may remain in a steady state or see a slight decline.
- The EPS index is expected to continue its growth as the government continues its efforts at financial inclusivity through mobile money interoperability services.

Table: LMI Values for Ghana for the First Quarter 2022 through First Quarter 2023

LOGISTICS AT A GLANCE					
Index	Q1 2023	Q4 2022	Q3 2022	Q2 2022	Q1 2022
LMI®	67.1	64	63.1	65.9	64.7
 <b>Inventory Levels</b>	61.2	50.5	43.2	56.9	65.5
 <b>Inventory Costs</b>	80.6	85.1	94.1	88.8	88.7
 <b>Warehousing Capacity</b>	52	50.5	56	56.6	61.6
 <b>Warehousing Utilization</b>	63.8	52.1	51.1	62.8	69.2
 <b>Warehousing Prices</b>	81.2	89.7	84.6	85.1	78.4
 <b>Transportation Capacity</b>	60.3	69.2	68.8	71.8	75.8
 <b>Transportation Utilization</b>	69.7	59	59.4	65.8	75.6
 <b>Transportation Prices</b>	91.9	95.2	97.1	96.6	93.9

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