

CARISCA

Centre for Applied Research and
Innovation in Supply Chain – Africa

GHANA LMI

LOGISTICS MANAGERS INDEX

SECOND QUARTER LOGISTICS MANAGERS INDEX REPORT

(April – June 2023)

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The LMI Value for Ghana for the second quarter of 2023 is 64.2

The LMI for the second quarter of 2023 decreased by 2.9 points to 64.2 from the previous quarter's 67.1.

Growth is INCREASING AT AN INCREASING RATE for Inventory Costs, Warehousing Capacity, and Transportation Capacity.

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

(Kumasi, Ghana) – The second quarter 2023 Logistics Managers Index registered a value of 64.2, which is 2.9 points lower than the 67.1 recorded in the first quarter

of 2023. This decline indicates a slight slowing down of the economy after a boisterous start in the first quarter. The drop is driven by increasing warehousing (57.26) and transportation (65.74) capacity as well as decreasing warehousing (80.58) and transportation prices (89.83).

On the other hand, inventory levels (58.45) have declined after gaining growth in the first quarter, while inventory cost has increased to 82.03. Both warehousing and transportation utilization have also fallen from last quarter's values and currently register at 59.90 and 65.82 respectively. Decreasing inventory levels have contributed to the slowing rates of growth, as well, for both warehousing and transportation utilization.

Researchers at the Centre for Applied Research and Innovation in Supply Chain – Africa (CARISCA) issued this report today.

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 second quarter was collected from April to June 2023.

REPORT HIGHLIGHTS

- ✓ **The overall Logistics Managers Index (LMI) for Ghana for the second quarter of 2023 stands at 64.2, down by 2.9 percentage points from first quarter's reading of 67.1.**

This decrease can be attributed to the slowed growth of inventory levels and the increased cost of inventory. Normally, a decrease in warehousing and transportation prices spurs inventory growth and leads to a reduction in inventory costs. This has not been the observation this quarter.

- ✓ **All the indicators for the second quarter are above the threshold of 50%.**

Findings from the Q2 survey indicate falling inventory levels in relation to the previous quarter. The rising cost of doing business characterized by growing inflation rates is one factor. Secondly, companies that stocked inventory in the first quarter are fulfilling customer orders from this inventory and are expecting new inventory in the third quarter. Nevertheless, inventory levels are at a higher level than a year ago during the same quarter.

- ✓ **Logistics cost indicators seem to be stable with a slight increase in inventory cost and subtle reductions in warehousing prices and transportation prices.**

Altogether, aggregate logistics cost shows a slight decline from the previous value.

- ✓ **For the second consecutive quarter, we see a continuous upward improvement in warehouse capacity, as it moved from the previous quarter's 52.0 to this quarter's 57.3.**

- ✓ **With the decline in inventory levels, we see a decrease in warehouse utilization this quarter, moving from 63.8 in the previous quarter to 59.9.**

A similar observation is recorded for transport utilization, which decreased from last quarter's 69.9 to 65.8.

- ✓ **The growth of logistics activities is expected to be steady in the next 12 months, with a forecast of 64.50 (almost the same as the current value for the quarter – 64.21).**

This forecast paints a picture of mixed optimism in the market due to the country's current macro-economic state. It is lower than projections from the first quarter (69.3). The hopes of a quick turnaround in the Ghanaian economy after the country secured the \$3 billion IMF credit facility early this year remains to be seen in the marketplace.

- ✓ **The Electronic Payment System Index (EPI) Index continues to see growth, with a current value of 72.9, an increase of 5.9 from the previous quarter's 67.0.**

Usage of electronic payments within the logistics sector is growing steadily. This growth is a positive outlook that will help facilitate the acceleration of fintech and provides evidence of an improvement in financial inclusivity in Ghana. This improvement may be attributed to the recent reduction in the e-levy rate and the government's efforts at financial inclusivity through its support and promotion of Mobile Money Interoperability service. According to respondents, the EPI is expected to continue its growth. They predict a score of 83.9 for the next twelve months.

RESULTS OVERVIEW

Once again, the predictive nature of the LMI is clearly seen in the second quarter results. Even though the LMI measures changes in logistics activities, it is highly reflective of the economy as a whole. In the second quarter, the LMI results indicate a drop in overall LMI value from 67.1 to 64.2 (-2.9). Results from the first quarter 2023 (with the highest recorded LMI value of 67.1) suggested a rebound of the Ghanaian economy from what could have been a recession in the latter part of 2022. However, this rebound seems to have slowed down in the second quarter. Logistics activities are growing (above the 50% threshold) but at a decreasing rate.

In general, growth of the Ghanaian economy has slowed down, with the World Bank consistently lowering GDP growth estimate values from 5.4% in 2021 to 3.2% in 2022 and 1.6% in 2023.¹ The World Bank attributes this decline in GDP growth rates to the high inflation rate (which reached 54.1% in December 2022 and 43.1% in July 2023 – see **figure 2**) and increased interest rates. Both factors have led to reduced private and public consumption. The cedi continues to depreciate against the dollar, with a dollar currently trading at 11.27 cedis.² Inflation, which was 54.1% in December 2022 and 41.2% in April 2023, rose to 43.1% in July (way above the central bank’s 6% to 10% target).

The nation’s major ports (Tema and Takoradi Ports) continue to experience a drop in volumes of cargo as a result of the high cost

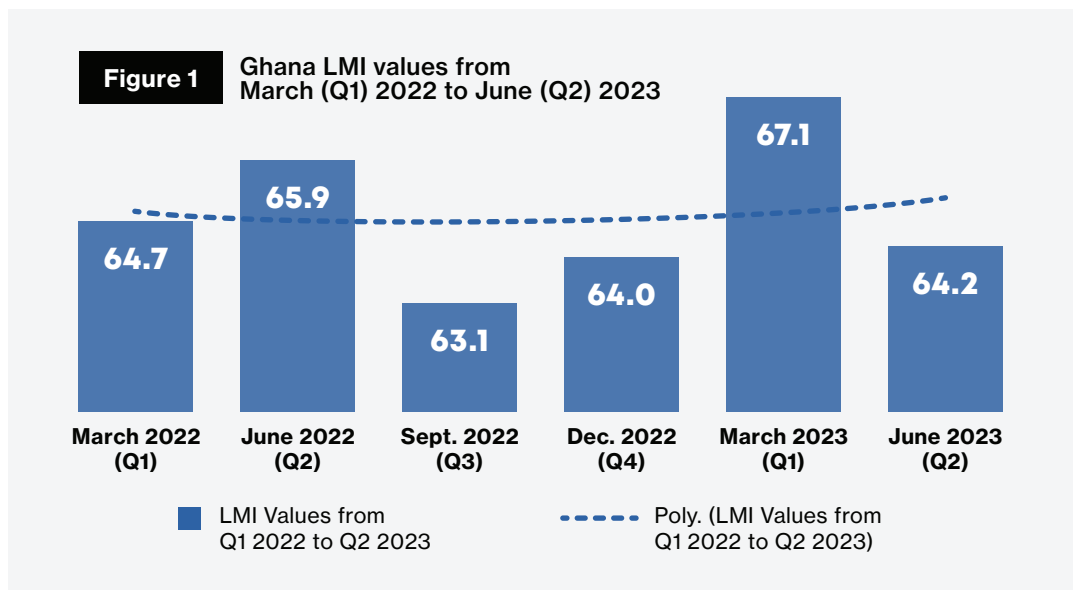
of doing business.³ This decline is also attributed to the reversal of the benchmark policy as well as increases in import duties and the introduction of new taxes. This decline in port activity adversely affects the availability of essential goods, since Ghana’s economy is largely import driven, as well as revenue mobilization at the ports.

The second quarter LMI results indicate that inventory levels have declined by 2.71 points and currently stand at 58.49, down from last quarter’s 61.2. This decline is quite significant, as it impacts utilization rates (warehousing and transportation) and is indicative of a slump in the retail and consumables sector. The continuous depreciation of the Ghanaian cedi against the United States dollar in the second quarter is also a contributing factor.

Inventory cost registered a value of 82.03 (an increase of 1.43 points from the previous quarter’s 80.6), meaning that goods have become more expensive in the second quarter compared to the first quarter, which registered the lowest value in the history of the Ghana LMI. Inventory levels

are often inversely related to inventory cost, and this is what is observed this quarter – as inventory costs increase we see a drop in inventory levels. Continued growth in inventory costs would adversely affect logistics activities. Respondents predict a lowering of logistics cost metric in the next quarter, but this remains to be actualized. At 82.03, inventory cost is above the 70 threshold for significant rates of growth.

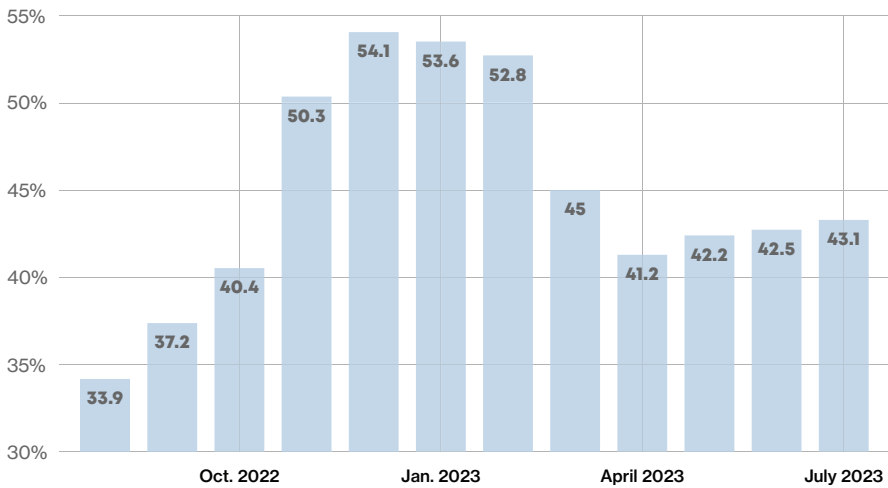
Warehousing capacity has risen to 57.3 from last quarter’s 52.0 (+5.26). Rental rates have been quite consistent. However, the prospects of improvement in the economy may be pushing demand for warehousing capacity. Warehouse prices have also decreased slightly and registered at 80.6 from last quarter’s 81.5 (-0.62). This metric has been in the 80s for the fifth consecutive time. The only time it was less than 80 was during the first quarter of 2022. The other warehousing metric (utilization) registered 59.9, a decline from the previous quarter’s 63.8 (-3.9). Falling inventory levels is a key factor in the decline of this metric.



1. [worldbank.org/en/country/ghana/overview](https://www.worldbank.org/en/country/ghana/overview)
 2. [xe.com/currencyconverter/convert/?Amount=1&From=USD&To=GHS](https://www.xe.com/currencyconverter/convert/?Amount=1&From=USD&To=GHS)
 3. myjoyonline.com/firms-at-ports-impacted-by-high-cost-of-doing-business-association-of-customs-house-agents-ghana/

Figure 2

Ghana inflation values from October 2022 to July 2023
(Source: Ghana Statistical Service)⁶



With excess warehousing capacity created by falling inventory levels, managers are having a difficult time improving utilization of warehousing space.

The transportation price metric also registered a lower metric of 89.8, 2.07 points lower than that of the last quarter's 91.9. Transportation prices reached their highest 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.⁴ Many Ghana transportation and logistics companies, such as DHL, UPS and TPL, began to see increased volumes due to the reduced fuel

prices. However, this demand has slowed down as prices pick up again. Currently, at a global level, petrol is selling at 1.186 USD per liter, an increase from last quarter's 1.090 USD per liter.⁵

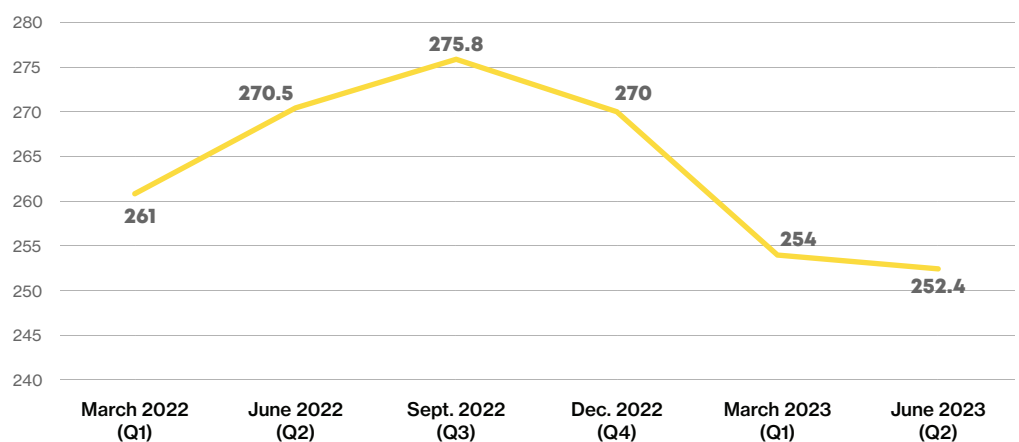
The transportation capacity index for the quarter increased from 60.3 (in the first quarter) to 65.74 in the current (second) quarter (+5.44). On the other hand, transportation utilization registered a value of 69.7, lower than last quarter's 65.82 (-3.88).

Aggregate Logistics Costs

Aggregate logistics costs present an overview of total logistics costs by aggregating the three cost metrics (i.e., inventory costs, warehousing and transportation prices). **Figure 3** shows the aggregate logistics costs for Ghana in the second quarter. The vertical axis of the chart ranges from 0 – 300 because the scores of the three metrics are aggregated, with 150 representing the midpoint.

The chart reveals that, in June 2023, the aggregate cost in Ghana is down to 252.4, from last quarter's 254. Though there has been a drop, the aggregate cost is still quite high and above the mean threshold of 150, implying that the cost of logistics in Ghana is on the high side. Nevertheless, this quarter's value is the lowest recorded since the inception of the Ghana LMI.

In previous quarters, the aggregate cost had crested at 275.8, in September 2022 (Q3). Inflation in Ghana was at its highest (54.1%) in December, before declining to 45% in early 2023. 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.

**Figure 3**

Aggregate logistics costs from March (Q1) 2022 to June (Q2) 2023

- [4. 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)
- [5. globalpetrolprices.com/Ghana/gasoline_prices/](http://globalpetrolprices.com/Ghana/gasoline_prices/)
- [6. tradingeconomics.com/ghana/inflation-cpi](http://tradingeconomics.com/ghana/inflation-cpi)

What LMI Survey Respondents Are Saying

SUPPLY AND DEMAND CHALLENGES

“ With such high exchange rates, coupled with high inflation, everything is expensive and this affects the cost of doing business. We spent double to stock the same amount of inventory compared to last year.

- Food Manufacturer

“ Our industry is experiencing high taxation and general cost of doing business and unfortunately a low demand. Currently, sales are extremely slow entering into the second quarter of 2023 and with the current economic state of the country, there may be no improvements until the latter part of the year.

- Retailer and Wholesaler

“ All our spare parts are imported and due to the high exchange rate we have not been able to repair a lot of our trucks and machinery.

- Transporter

“ The high cost of doing business has led to a low level of disposable income of customers.

- Retailer

“ Our products are relatively expensive because of high inflation, high cost of doing business and high cost of production. Because we import all our raw materials, the forex exchange rate and high import duties all influence the high cost of our products.

- Manufacturer

SECOND QUARTER 2023 OBSERVATIONS

Overall LMI

The overall LMI metric for Ghana in the second quarter of 2023 has decreased by 2.89 points, registering a value of 64.21. This represents a decline from the previous quarter's 67.1. This drop is largely due to a fall in inventory levels, growth in inventory costs and reduced levels of utilization (both warehousing and transportation).

This second quarter registered drops in inventory levels (-2.71), an increase in inventory cost (+1.43), a slight reduction in warehouse (-0.62) and transportation (-2.07) prices, an increase in transport (+5.44) and warehousing (+5.26) capacity and a decrease in both warehousing (-3.9) and transportation (-3.9) utilization. The drops in transportation and warehousing prices were not so significant but led to a slight reduction in aggregate logistics costs. These aggregate costs registered a value of 252.4 from last quarter's 254. All the LMI metrics for Ghana have registered values above the threshold of 50%.

The Ghana LMI is still in growth mode, registering a value that is above 50%. Nevertheless, growth is at a decreasing rate with the current economic situation in the country not stable enough to generate increasing growth and optimism among industry players. Inflation has begun an upward trend (41.2% in April 2023 and

43.1% in July⁷), and the appreciation of the cedi against the dollar in the first quarter has been lost, with the dollar gaining against the cedi (dollar currently trading at 11.27 cedis⁸).

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** (page 6). For the sixth consecutive time, transportation price dominated the readings as the metric with the highest value, recording a score of 89.8. That metric was followed by inventory cost (82.0) and warehousing prices (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 90's with the exception of this quarter.

Respondents anticipate that the growth observed in the logistics sector will remain steady in the next twelve months and predict an LMI value of 64.50. This prediction is lower than last quarter's prediction of 69.3. Nevertheless, with the successful completion of the IMF bailout, there are still high hopes that the country's macroeconomic situation will improve toward the third and fourth quarters.

7. worldbank.org/en/country/ghana/overview

8. xe.com/currencyconverter/convert/?Amount=1&From=USD&To=GHS

Figure 4 Ghana LMI values from March (Q1) 2022 to June (Q2) 2023

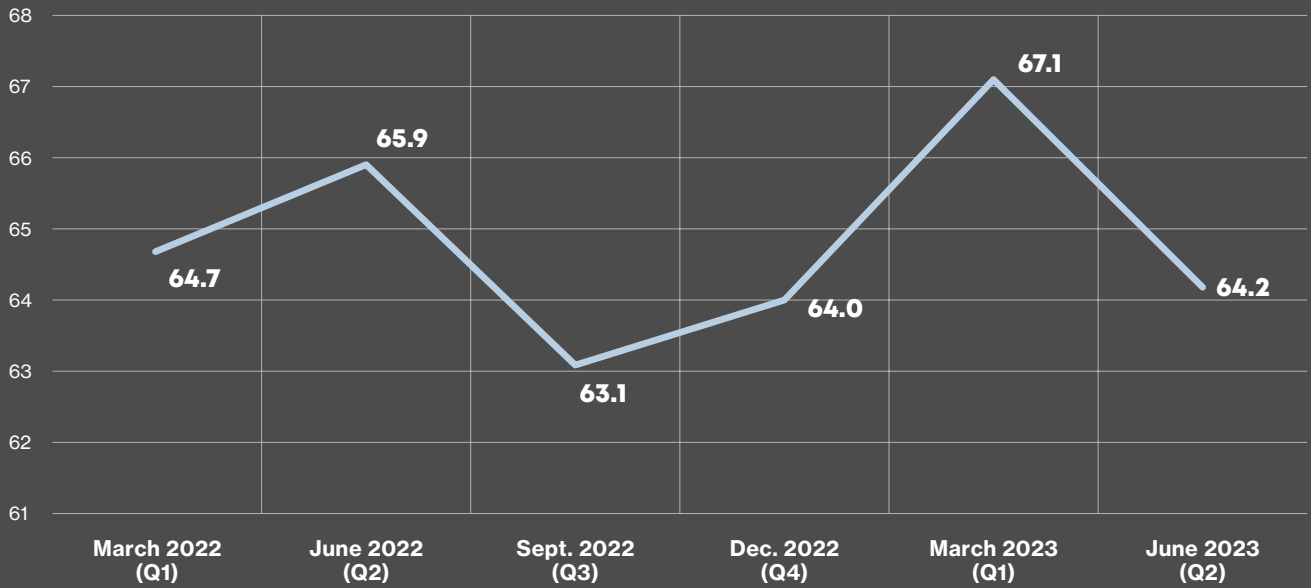










Table 1: LMI Values for Ghana for the Second and First Quarter 2023

LOGISTICS AT A GLANCE – Q2 2023					
Index	June 2023 Index	March 2023 Index	Quarter-Over-Quarter Change	Projected Direction	Rate of Change
LMI®	64.2	67.1	-2.89	Growing	Decreasing
 Inventory Levels	58.5	61.2	-2.71	Growing	Decreasing
 Inventory Costs	82.0	80.6	1.43	Growing	Increasing
 Warehousing Capacity	57.3	52.0	5.26	Growing	Increasing
 Warehousing Utilization	59.9	63.8	-3.9	Growing	Decreasing
 Warehousing Prices	80.6	81.2	-0.62	Growing	Decreasing
 Transportation Capacity	65.7	60.3	5.44	Growing	Increasing
 Transportation Utilization	65.8	69.7	-3.88	Growing	Decreasing
 Transportation Prices	89.8	91.9	-2.07	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	
Q2 2023	64.2	All-time Average – 64.83 High – 67.1 Low – 63.1 Std Dev – 1.44
Q1 2023	67.1	
Q4 2022	64.0	
Q3 2022	63.1	
Q2 2022	65.9	
Q1 2022	64.7	

Upstream vs Downstream Activities

The differences between observations made for firms downstream (reflected by the gold bars in **figure 6**) and those upstream are quite insignificant. In the past, upstream firms have had elevated levels for utilization, with consumer-facing firms paying slightly more for transportation and inventory. However, this has not been the case this quarter. Downstream firms reported slightly elevated levels of almost all the metrics except warehousing, which was the same for upstream firms.

Figure 5 Distribution of firms operating downstream and upstream (Q2 2023)

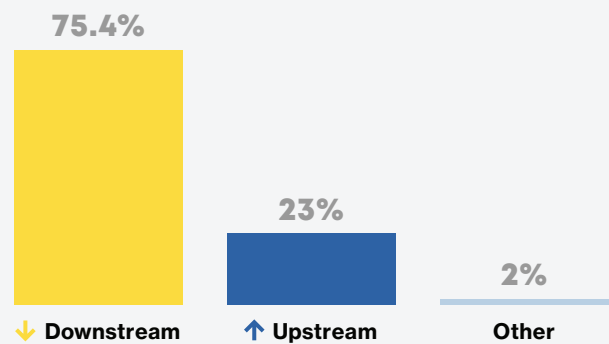


Figure 6 Upstream and Downstream values – Q2 2023

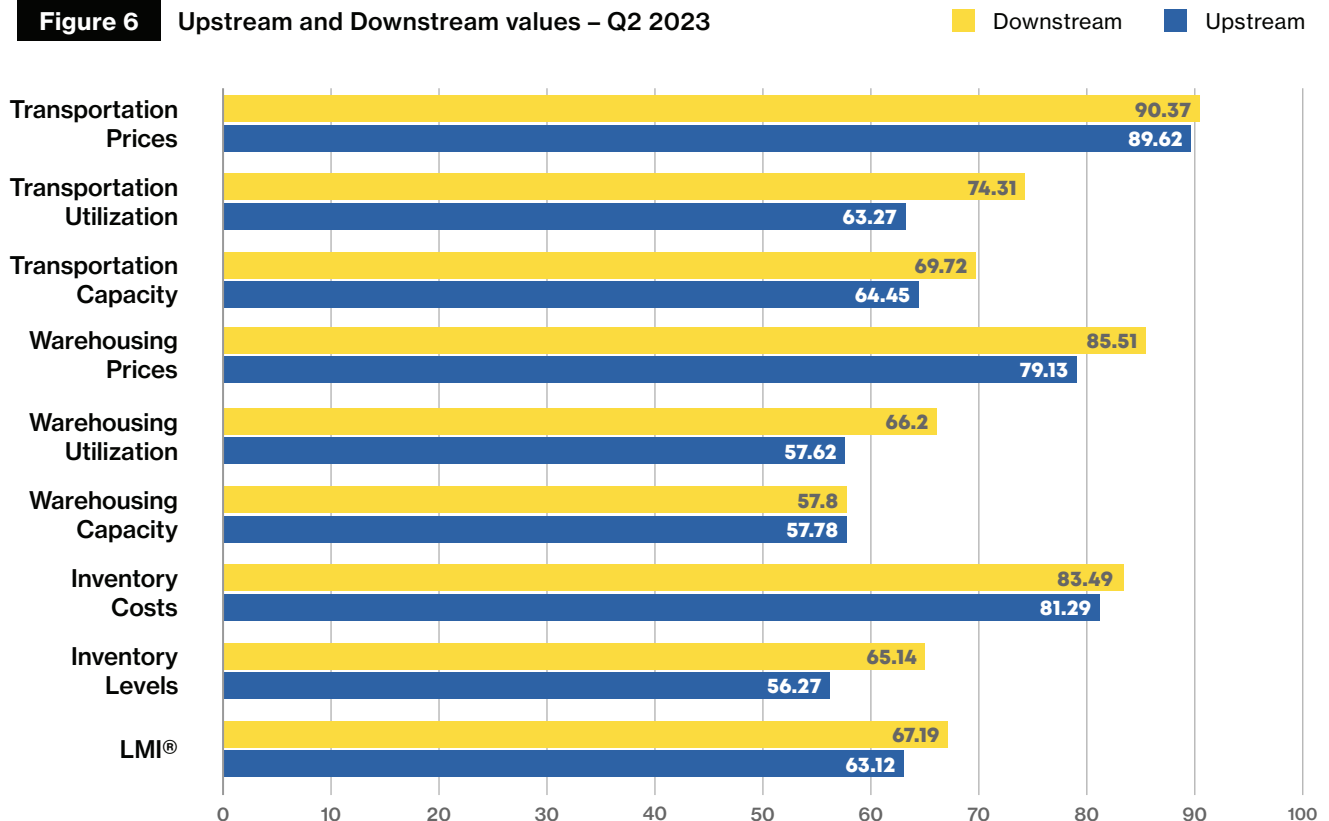










Table 3: Upstream and Downstream values – Q2 2023

Upstream vs. Downstream Values – Q2 2023				
Index	Upstream Values	Downstream Values	Delta	Significant?
LMI®	63.12	67.19	4.07	No
 Inventory Levels	56.27	65.14	8.87	Marginal
 Inventory Costs	81.29	83.49	2.2	No
 Warehousing Capacity	57.78	57.80	0.02	No
 Warehousing Utilization	57.62	66.20	8.58	Marginal
 Warehousing Prices	79.13	85.51	6.38	No
 Transportation Capacity	64.45	69.72	5.27	No
 Transportation Utilization	63.27	74.31	11.04	Marginal
 Transportation Prices	89.62	90.37	0.75	No

Manufacturing vs. Service Sector Activities

Observations were made for manufacturing and service sectors. Manufacturing firms registered higher levels of transportation prices, warehousing prices, warehousing utilization, inventory costs and inventory levels. The service sector registered higher values for transportation utilization, transportation capacity and warehousing capacity. In general, however, the LMI for the manufacturing sector (66.92) was higher than that for the service sector (63.45) as indicated in **figure 7**.

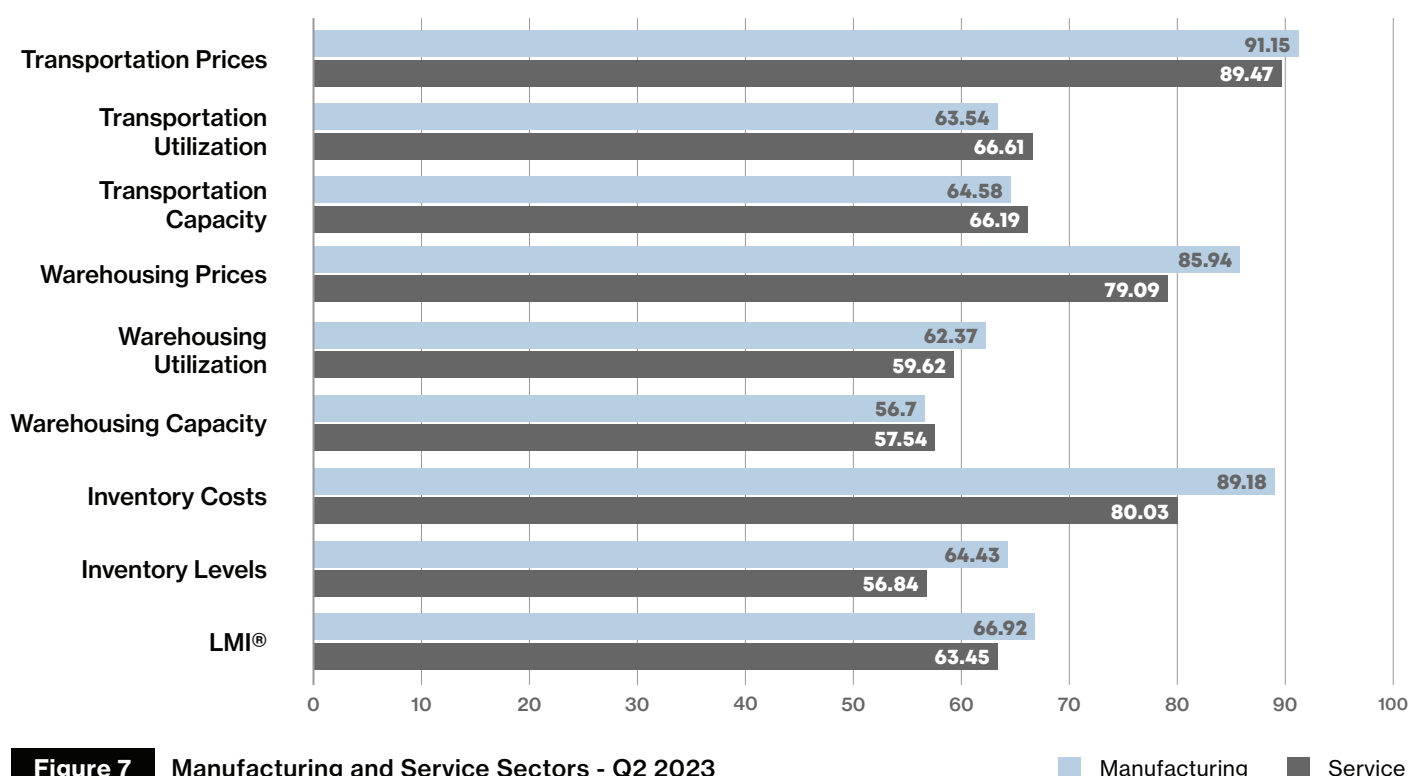


Figure 7 Manufacturing and Service Sectors - Q2 2023

■ Manufacturing ■ Service

Table 4: Values for Manufacturing and Service Sectors – Q2 2023

Values for Service and Manufacturing Sectors – Q2 2023				
Index	Service Values	Manufacturing Values	Delta	Significant?
LMI®	63.45	66.92	3.47	No
 Inventory Levels	56.84	64.43	7.59	No
 Inventory Costs	80.03	89.18	9.15	Marginal
 Warehousing Capacity	57.54	56.70	0.84	No
 Warehousing Utilization	59.26	62.37	3.11	No
 Warehousing Prices	79.09	85.94	6.85	No
 Transportation Capacity	66.19	64.58	1.61	No
 Transportation Utilization	66.61	63.54	3.07	No
 Transportation Prices	89.47	91.15	1.68	No

PREDICTIONS

Respondents were asked to predict movement in the overall LMI and individual metrics 12 months from now. The predictions made in June (**figure 8**) are similar to what we saw in March but slightly less optimistic. The current LMI value is expected to be steady at 64.50, down by 4.8 from March’s prediction of 69.3.

Similar to last quarter, respondents expect inventory levels to build up to 78.25. Respondents also anticipate that inventory cost will increase up to 73.05 (the first-time respondents have predicted a growth in inventory costs). Warehousing capacity is expected to be steady, while warehouse utilization grows to 75.72. Warehouse prices are predicted to drop to 69.34, while transport capacity increases to 70.17. Respondents also expect transport utilization to increase to 80.17, while transportation prices

are expected to drop to 76.67. The current cost of doing business and the depreciating cedi rate against the dollar could be a factor contributing to the predictions by respondents. This is the first-time respondents have predicted a future LMI that is almost the same as the current. Respondents are of the view that the growth of the cost metrics (inventory cost, transportation price and warehouse price) will slow down over the next 12 months, however. It should be noted that warehousing price is often based on long-term contracts that fix rental rates and may remain steady for some time.

Table 5 also shows the current and predicted values for all eight metrics from this quarter’s survey (June 2023). **Figure 8** shows the predicted values, while **figure 9** compares both current and predicted values.

Figure 8 Predictions – June (Q2) 2023

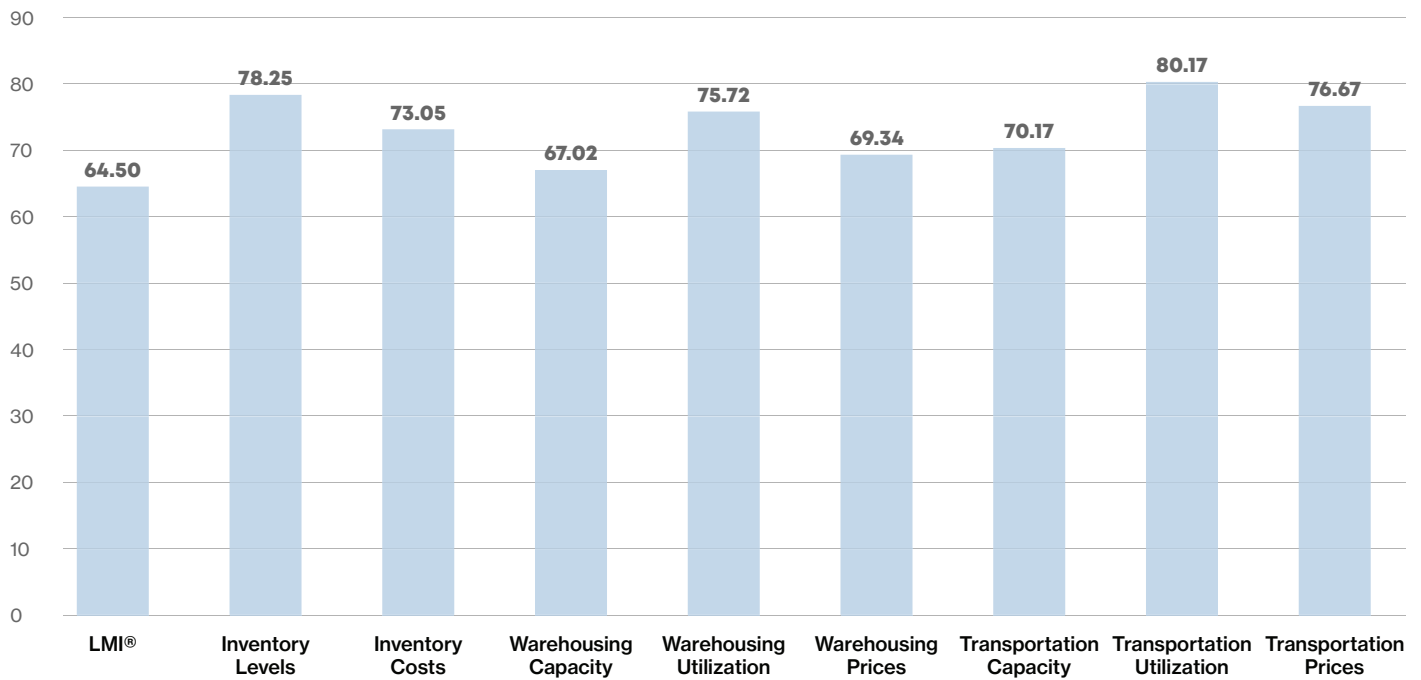


Table 5: Predicted Values of the LMI – June 2023









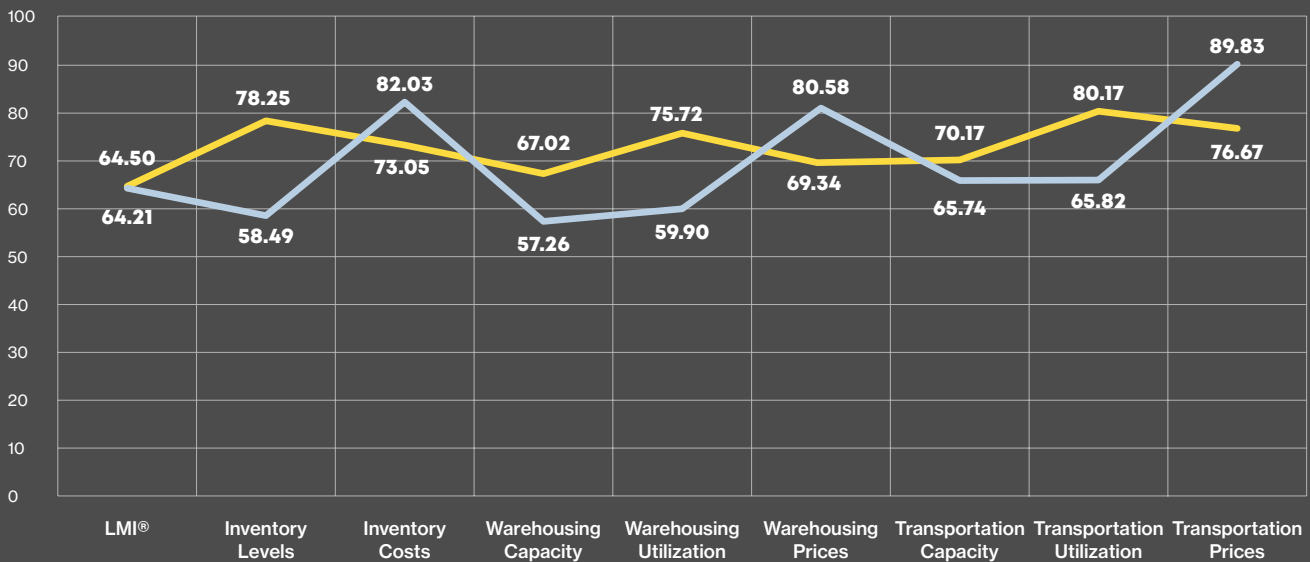
LOGISTICS AT A GLANCE – Predicted Values (Q1 and Q2 2023)		
Index	March 2023 – Predicted	June 2023 – Predicted
LMI®	69.3	64.5
 Inventory Levels	75.6	78.3
 Inventory Costs	75.2	73.1
 Warehousing Capacity	56.6	67.0
 Warehousing Utilization	75.1	75.7
 Warehousing Prices	80.2	69.3
 Transportation Capacity	56.1	70.2
 Transportation Utilization	77.0	80.2
 Transportation Prices	84.2	76.7

Figure 9 Current and Predicted Values – June 2023

Q2 - Current Q2 - Future



Upstream and Downstream (Predicted)

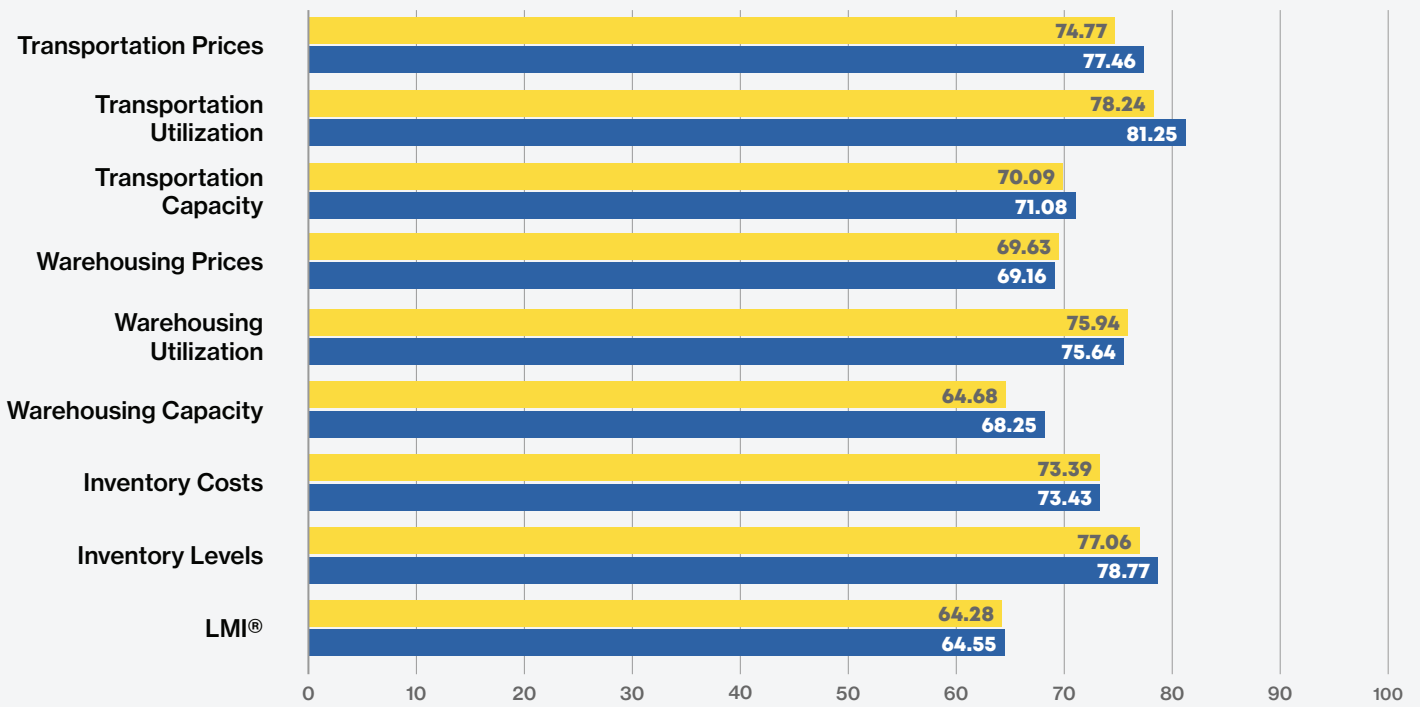
Similar to the main observations, there was no significant difference in the predictions between downstream (gold) and upstream (blue) respondents (**figure 10**). While it is not a significant difference, upstream firms expect to see inventory levels continue to build over the next 12 months, slightly more than downstream firms expect. The same goes for transport prices and transport utilization. Predictions by upstream and downstream respondents for inventory cost, warehousing prices, warehousing utilization, and transport capacity are almost the same.

Table 6: Predicted Values of the LMI – June 2023

Future Upstream vs. Downstream Values – Q2 2023					
Index	Future Upstream Values	Future Downstream Values	Delta	Significant?	
LMI®	64.55	64.28	0.27	No	
Inventory Levels	78.77	77.06	1.71	No	
Inventory Costs	73.43	73.39	0.04	No	
Warehousing Capacity	68.25	64.68	3.57	No	
Warehousing Utilization	75.64	75.94	-0.3	No	
Warehousing Prices	69.16	69.63	-0.47	No	
Transportation Capacity	71.08	70.09	0.99	No	
Transportation Utilization	81.25	78.24	3.01	No	
Transportation Prices	77.46	74.77	2.69	No	

Figure 10 Predicted Upstream and Downstream Values – Q2 2023

Downstream Upstream



LMI COMPONENTS

INVENTORY

Inventory is a key component of supply chains and represents one of the three major flows along with information and funds. Inventory is one of the key components of the LMI and is made up of the metrics inventory levels and inventory costs.

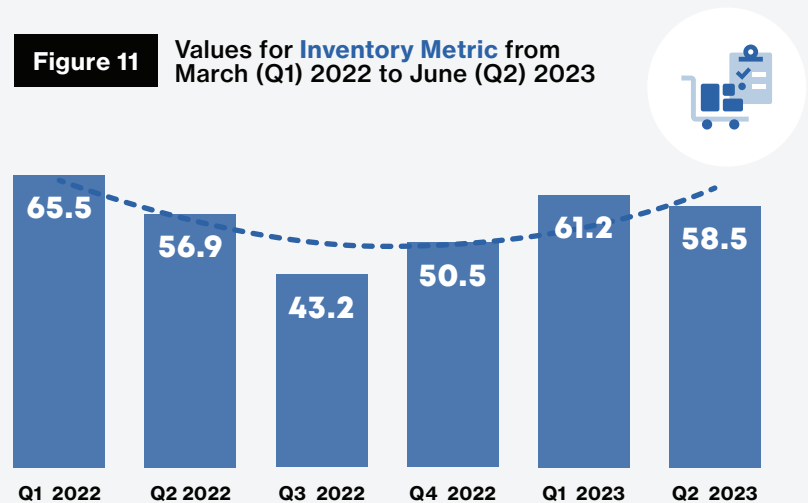
Inventory Levels

The inventory level for the second quarter of 2023 is 58.5, down -2.7 from the previous quarter. This reading is 1.6 points higher than the same time last year. The trend emerging is that inventory levels are high in the first quarter, often as a result of late arrivals from orders for December (of the previous year) and begin to decline in the second quarter of the next year.

Downstream respondents reported higher levels of inventory growth (67.19) compared to upstream respondents (63.12). Similarly, respondents from the manufacturing sector reported higher inventory levels (66.92) as compared to respondents from the service sector (63.45).

When asked to predict what conditions would be like 12 months from now, upstream respondents were more optimistic, predicting inventory levels of 78.77, while downstream respondents predicted inventory levels of 77.06.

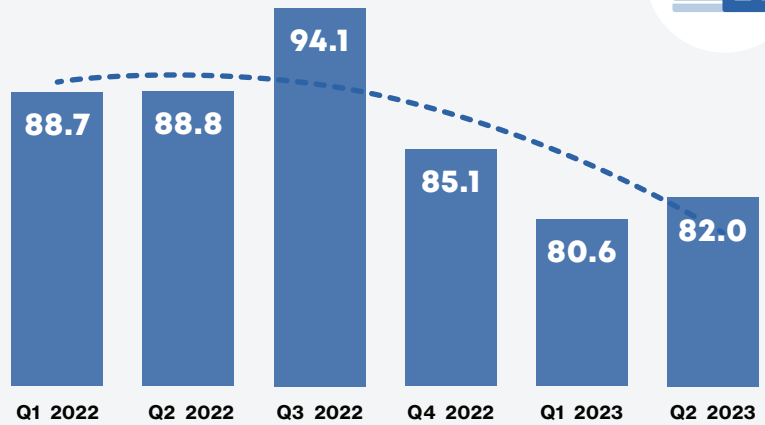
Figure 11 Values for **Inventory Metric** from March (Q1) 2022 to June (Q2) 2023



Inventory Costs

The current inventory costs index reads in at 82.03, up by 1.43 from the previous quarter's 80.6. The value is down 6.8 points from last year's value for the same quarter. The difference between the inventory cost metric for upstream and downstream firms was marginal, with upstream firms recording 81.29 and downstream firms recording 83.49. Manufacturing firms reported a higher inventory cost value of 89.18, while service firms reported a value of 80.03. Both downstream and upstream firms predict a lowering of inventory cost, at 73.39 and 73.43 respectively.

Figure 12 Values for **Inventory Cost** from March (Q1) 2022 to June (Q2) 2023



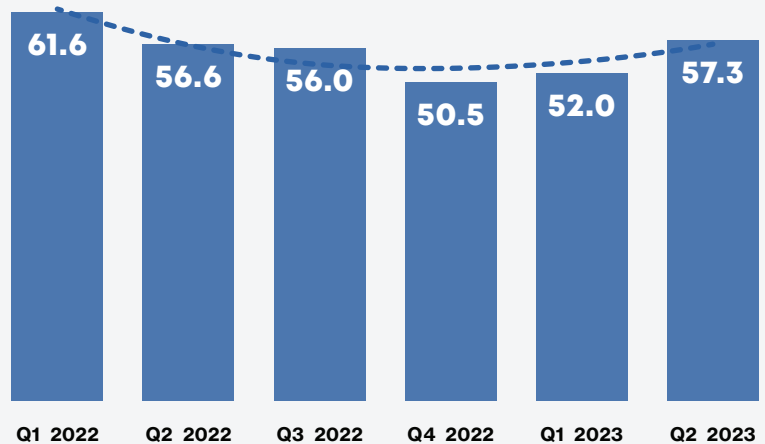
WAREHOUSING

The warehousing function serves an important role in Ghana's logistics setup, enabling for the long term and temporary storage of goods to facilitate customer fulfillment. Under warehousing, the LMI considers the metrics of capacity, utilization and prices.

Warehousing Capacity

The second quarter 2023 warehousing capacity index registered a value of 57.3, reflecting an increase of 5.3 from the previous quarter. This is a modest 0.7-point increase from last year's second quarter reading. There is no difference between upstream firms and downstream firms (both registered 57.8). It was interesting that there was almost no difference between warehousing capacity for manufacturing firms and service firms (difference of 0.8). Future predictions suggest that capacity will continue to come online over the next year, as respondents are expecting an expansion to 67.02. Both upstream and downstream firms are expecting growth, predicting expansion rates of 68.25 and 64.68 respectively.

Figure 13 Values for **Warehouse Capacity** from March (Q1) 2022 to June (Q2) 2023

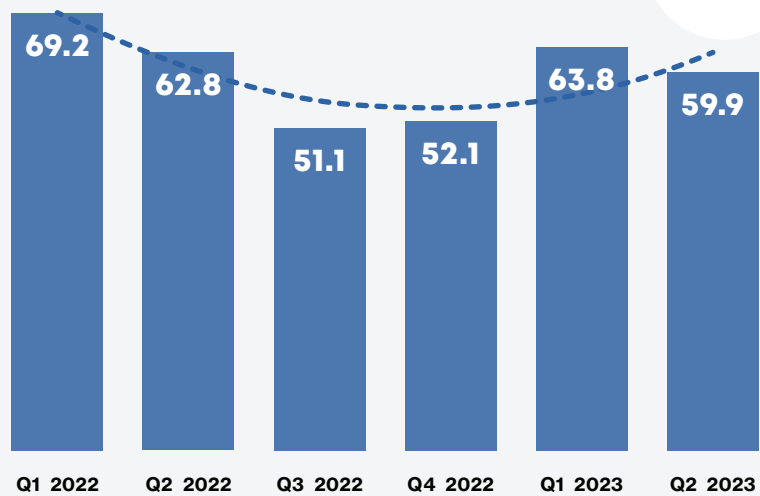


Warehousing Utilization

Warehouse utilization reads in at 59.9, which is down by 3.9 points from the first-quarter reading of 63.8. This reading is also down by 2.9 from last year's reading for the second quarter. Exploring the difference between upstream (57.62) and downstream (66.2) firms reveals a difference of 8.5. This difference indicates that for downstream entities (e.g., retailers) the utilization rates are growing, whereas for the upstream entities (manufacturers) growth is slower in this metric.

Manufacturing firms edged out service firms in this metric, with manufacturing registering 62.37 while service registered 59.26. Respondents predict an improvement in utilization in the next 12 months, with a predicted value of 75.72. Both upstream and downstream firms predict growth of 75.

Figure 14 Values for **Warehouse Utilization** from March (Q1) 2022 to June (Q2) 2023

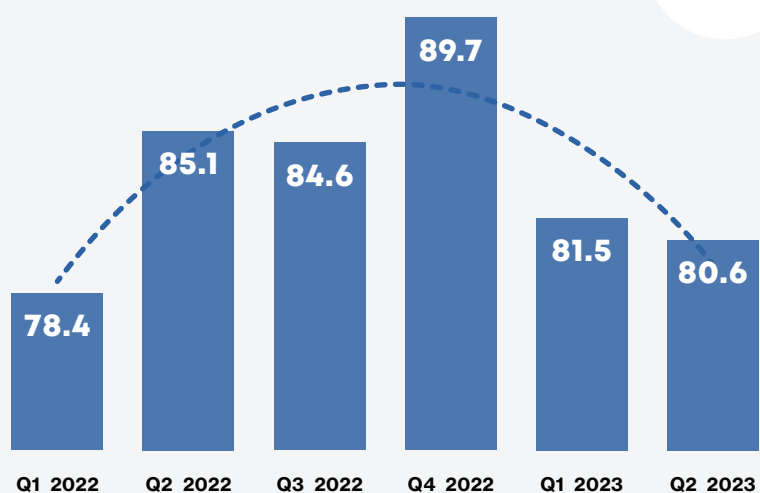


Warehousing Prices

Warehouse prices read in at 80.6 which is down 0.9 points from the first quarter reading of 81.5. This reading is also down by 4.5 from last year's reading for the same quarter. Exploring the difference between upstream (79.13) and downstream (85.51) firms reveals a difference of 6.38 points. Though marginal, this difference indicates that for downstream entities (e.g., retailers), the warehouse prices are higher than for upstream entities (manufacturers). These lower rates upstream are expected, as upstream firms are usually located in industrial areas with lower rental rates, coupled with the fact that upstream entities are able to negotiate based on economies of scale and long-term contracts.

This observation is confirmed by the results that compare manufacturing and service firms. Manufacturing firms edged out service firms in this metric, with manufacturing registering 85.94 while service registered 79.09. Respondents predict a reduction in this metric in the next 12 months, with a predicted value of 69.34. Both upstream and downstream firms predict growth of the same value.

Figure 15 Values for **Warehouse Prices** from March (Q1) 2022 to June (Q2) 2023



TRANSPORTATION

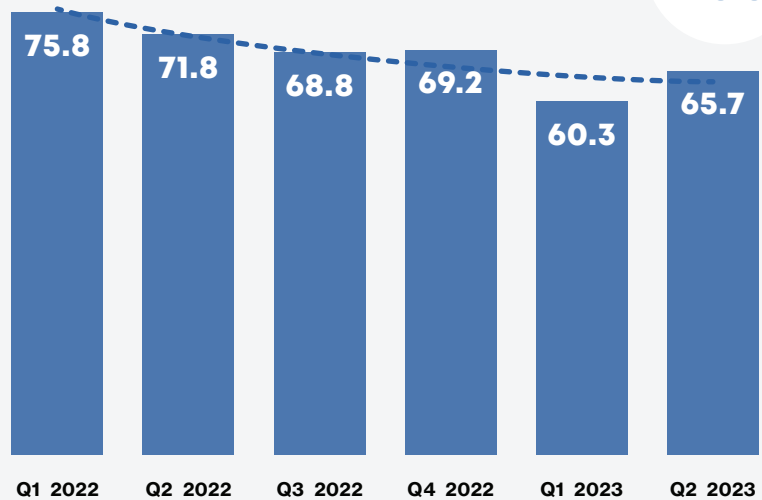
Transportation is the bedrock of every economy and one of the key components in the LMI. Transportation facilitates the movement of goods within the supply chain. From long-haul FTL and LTL transport shipments to intra-city courier transportation, transport links connect supply nodes to the final end consumer, helping complete customer-fulfillment requests. The LMI component on transportation includes the metrics transportation capacity, utilization and prices.

Transportation Capacity

The second quarter 2023 transportation capacity index registered a value of 65.7, reflecting an increase of 5.4 from the previous quarter. This value is a drop of 6.1 from last year's second-quarter reading. Upstream firms registered a lower capacity (64.45) than downstream firms (69.72). The difference between manufacturing firms and service firms was marginal (manufacturing at 64.58 and service at 66.19). Future predictions suggest that transport capacity will continue to increase over the next year, as respondents are expecting an expansion to 70.17. Both upstream and downstream firms are expecting growth, predicting expansion rates of 70.09 and 71.08 respectively.

Figure 16

Values for **Transportation Capacity** from March (Q1) 2022 to June (Q2) 2023



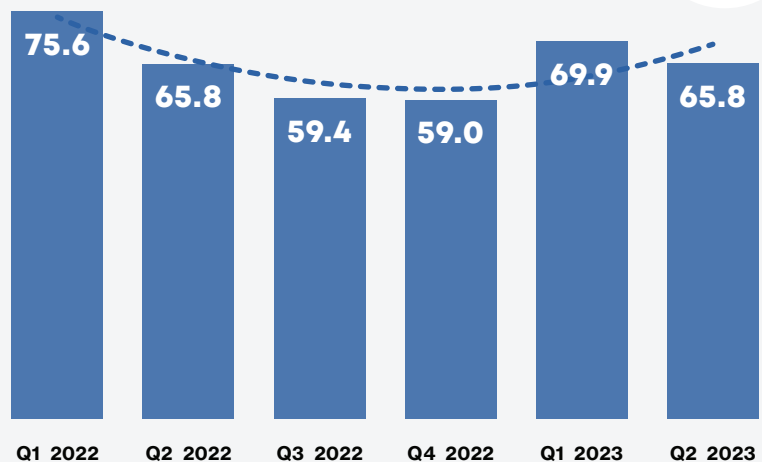
Transportation Utilization

The transportation utilization index registered a value of 65.8, reflecting a decrease of 4.5 from the previous quarter. It is interesting to note that the value for this year's second quarter is the same as that for last year (second quarter). Upstream firms registered a lower capacity (63.27) than downstream firms (74.31). It seems consumer-facing firms are finding ways to improve transportation utilization.

The difference between manufacturing firms and service firms was just marginal (manufacturing at 63.54 and service at 66.61), with service firms reporting slightly higher levels of transportation utilization. Future predictions suggest that transport utilization will continue to increase over the next year, as respondents are expecting an expansion to 80.17. Both upstream and downstream firms are expecting growth, predicting expansion rates of 81.25 and 78.24 respectively.

Figure 17

Values for **Transport Utilization** metric from March (Q1) 2022 to June (Q2) 2023



Transportation Prices

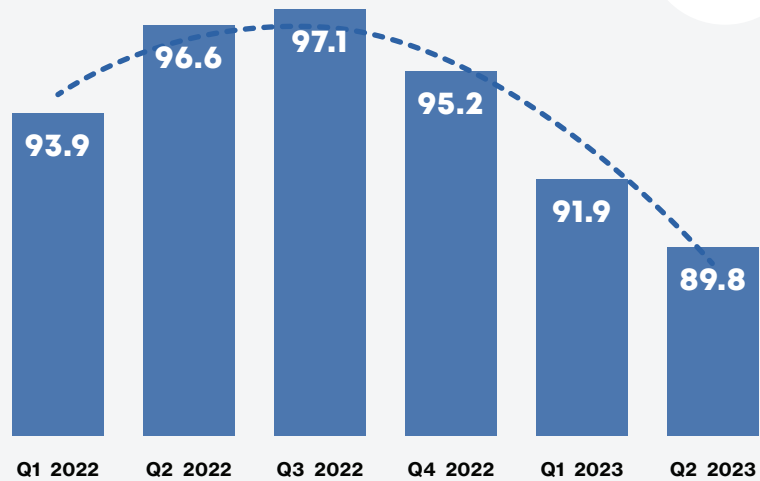
The transportation prices index registered a value of 89.8, reflecting a decrease of 2.1 points from the previous quarter's value of 91.9. It is interesting to note that this is the first time the transportation price metric has recorded a value below 90. The value for last year in the second quarter was 96.6. This metric continues to move away from the all-time high of 97.1 registered in September (Q3) 2022.

Downstream firms recorded a value of 90.37 slightly higher than that of upstream firms (89.62). The difference between manufacturing firms and service firms was marginal (manufacturing at 91.15 and service at 89.47), with service firms reporting slightly lower transportation prices.

Future predictions suggest that transport prices will continue to decrease over the next year to a value of 76.67. Both downstream and upstream firms are optimistic about this metric, with downstream firms predicting a value of 74.77 while upstream firms recorded 77.46.

Figure 18

Values for **Transportation Prices** from March (Q1) 2022 to June (Q2) 2023



ELECTRONIC PAYMENT SYSTEMS INDEX

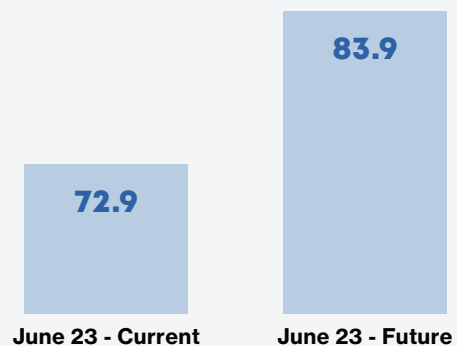
Since the second quarter of 2022, the **Electronic Payment Systems Index (EPI)** has been a key feature of the LMI reports. The EPI gauges the views of respondents on the usage of electronic payment systems when transacting business with suppliers and customers. E-payment systems support supply chain digitization and in Ghana Mobile Money Interoperability services has provided financial inclusion to businesses and consumers allowing for seamless electronic financial transactions.

These electronic payment systems and methods make purchasing and procurement easier, more cost-effective and time saving. Digitizing supply chain payments can have profound effects on supply chains and the Ghanaian economy. According to the 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.”

Several governments in developing countries including the Ghana government have in the last decade made important strides in supporting and partnering in the development of technology that fosters electronic payments. Several companies realizing the benefits of electronic payments have digitized supply chain payment to extend financial inclusivity and provide more options for payment, especially in cases where SME supply partners and individual consumers are involved.

Figure 19

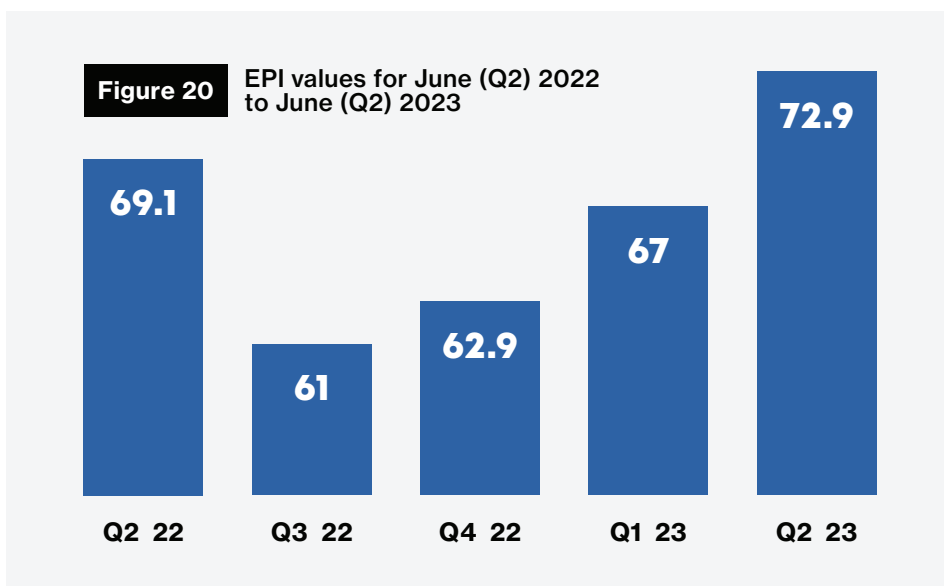
Current and predicted values for the EPI for June (Q2) 2023



Using electronic payment systems has been identified to reduce processing times and errors and improve convenience, tracking, transparency, efficiency, and security (Chaintreau et. al., 2018). Several companies have reported an improved customer experience and better response to market as a result of implementing electronically facilitated payments. Companies that support and enable electronic payments in addition to improving their business processes are also promoting and helping to attain the 2030 United Nations (UN) Sustainable Development Goals (World Bank, 2021).

Like the LMI, the EPI has a threshold of 50% and is developed as a diffusion index. Respondents were asked about their company's use of mobile money and e-payment platforms in terms of their decline, steady state or increase. Respondents were also asked about the extent to which their organizations utilize mobile money transactions and e-payment systems when dealing with customers and/or suppliers.

The EPI for the second quarter of 2023 registered a value of 72.9 (an increase of 5.9 from last quarter's value of 67.0), as indicated in **figures 19** and **20**.



The general improvement in the Ghanaian economy compared to the latter part of 2022 seems to be an underlying factor that has led to the rise in the EPI. General market sensitization by the technology companies that provide the electronic infrastructure to facilitate such transactions as well as government efforts have contributed to boosting this quarter's EPI value. Respondents predict that the usage of electronic payment systems will grow to a value of 83.9 over the next 12 months (an increase of 2.2 from last quarter's prediction of 81.7).

The data available shows that the EPI has increased steadily from the third quarter of 2022 when it registered a value of 61.0 (the lowest in the history of the index). This growth aligns with projections made by respondents in previous surveys. This is a good outlook as it indicates that improving payments processes as part of a larger supply chain digitization effort is gaining widespread support and participation. Improving Fintech will be key in preparing for Industry 4.0, and the EPI helps provide an industry snapshot of e-payment usage.

What LMI Survey Respondents Are Saying

IMPACT OF THE LMI

“ We find the report to be very educational and helpful and serves as a tool that helps us make informed decisions and also aids in our forecasting.

- Manufacturer

“ The Ghana LMI helps us with our current strategy to achieve our KPIs. The trends and projections from the LMI guide the alignment of our logistics plans.

- International Organization

“ The reports inform us of the happenings in the sector and help us make informed decisions.

- Third Party Logistics firm

“ The LMI reports help us make informed decisions on logistics and supply chain activities in our organization.

- Utility Entity

“ In the future we will rely on the LMI as a guiding report in the preparation of our logistics plans.

- Transportation firm



ABOUT THIS REPORT

The Logistics Managers Index (LMI) is a new tool developed by researchers at the Centre for Applied Research and Innovation in Supply Chain – Africa (CARISCA), based at Kwame Nkrumah University of Science and Technology (KNUST) 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.

CARISCA wishes to acknowledge the support of the Chartered Institute of Logistics and Transport (CILT) and the Chartered Institute of Procurement and Supply (CIPS) in disseminating the report.

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.



Senior supply chain (including operations) managers of businesses in Ghana are invited to participate in the quarterly LMI surveys by visiting: surveymonkey.com/r/Q3-23-LMI.

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).

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

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 424 valid responses were used for the Q2 2023 report.

Supply 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/Q3-23-LMI

CARISCA Centre for Applied Research and Innovation in Supply Chain – Africa

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