

**CHAPTER - IV**  
**DATA ANALYSIS AND INTERPRETATIONS**

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### **DATA ANALYSIS AND INTERPRETATIONS**

#### **4.1 OVERVIEW**

In the previous chapter, the methodology, research design, pretesting of the questionnaire, and data collection were presented in details. This chapter focuses on the data analysis and interpretation of the results of an extensive study to find out the supply chain challenges in northeast India sports goods retailers and the impact on their firm's performance. The results of the data analysis and findings are provided in this chapter. The statistical package used for the analysis is IBM SPSS 26.0. The second part of the chapter reports on the validity and reliability of the constructs. The third part of the chapter includes the detail analysis of PLS-SEM.

The structural model has five independent variables, one mediation variable, and four dependent variables. The mediation analysis provides an understanding of how the independent variables influence the dependent variables through the mediation variable.

#### **4.2 DATA CLEANING**

For the study, a convenience sampling method was used and survey was conducted to collect the data through the printed questionnaire. The executives from the sports retail industry or the concerned individuals in the industry were given the printed questionnaires in person. Some respondents returned the questionnaire with the reason that they were no longer related to sports good retailing also, some said they were unable to respond due to the lack of data availability for such inquiries. Such incomplete data were removed

from the sample to enhance the data's quality, and also potential outliers were also deleted from the survey master data. Total of 670 samples was collected; however, only 513 were usable for the analysis. "Even with a high response rate, non-response biases are a threat to survey research" (Zsidisin and Ellram, 2003). The non-response bias was neglected in this study. Hair et al. (2014) stated "that for a significance level of 1%, a minimum sample size of 260 is required to detect minimum  $R^2$  values of 0.10 in any of the endogenous constructs in the structural model, assuming the commonly accepted level of statistical power of 80% and a specific complexity level of the PLS path model".

#### **4.3 DEMOGRAPHIC PROFILE OF THE RESPONDENTS**

The respondents who were selected to carry out the survey were sports goods retailers from Northeast India. The details information of the respondents (sports goods retailers) such as retailing of products, years of experience in sports goods retailing, annual sales, sourcing (procuring) sports products, place of order for sports goods supply, number of brands dealt by retailers, organized or unorganized retail firms, and the state where the retail stores are located.

#### 4.3.1. Frequency Distribution of Respondents based on Retailing Sports Products.

The frequency distribution of the respondents on the basis of retailing sports product is given in the Table 4.1.

**Table: 4.1**  
**Frequency Distribution on Retailing Sports Product**

<b>Retailing Sports Product</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Sporting Equipment	177	34.4
Consumer Sports Product	165	32.1
Sports Technology Product	119	23.2
All the above	52	10.2
<b>Total</b>	<b>513</b>	<b>100</b>

Based on the data presented in Table 4.1, it can be concluded that 34.4% of the sports goods retailers from Northeast India are retailing sporting equipment, 32.1% of the Northeast India sports goods retailers focus on selling consumer sports products, 23.2% of the sports good's retailers deal with sports technology products, and 10.4% of the Northeast India sports goods retailers engage in retailing with a combination of sporting equipment, consumer sports products. Figure 4.1 graphically represents the percentage distribution of the total number of respondents based on their involvement in retailing sports products in northeast India.

**Figure.4.1**

**Graphical Representation of Total number of Respondents based on Retailing Sports Product**



**4.3.2. Frequency Distribution of the Respondents Based on Years of Experience in Sports Goods Retailing**

The frequency distribution of the respondents based on their years of experience in the sports goods retail sector in Northeast India is presented in Table 4.2.

**Table: 4.2**

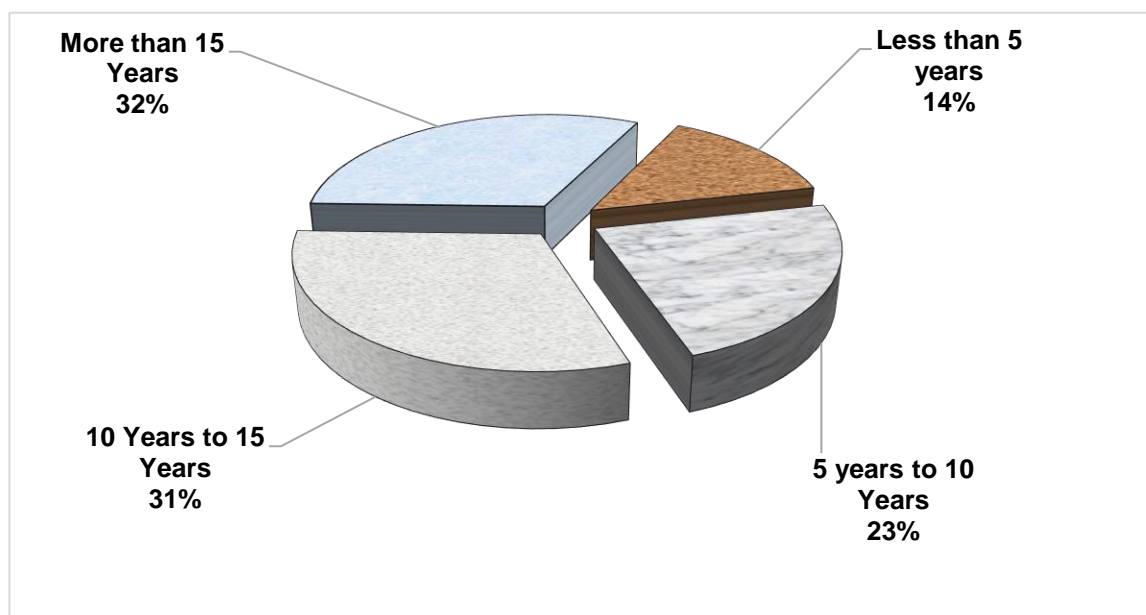
**Years of Experience in Sports Goods Retail**

Experience in Retail Sector	Frequency	Percentage (%)
Less than 5 years	74	14.3
5 years to 10 Years	119	23.2
10 Years to 15 Years	157	30.6
More than 15 Years	163	31.7
<b>Total</b>	<b>513</b>	<b>100</b>

Table 4.2 presents the survey respondents' levels of experience in sports goods retail. The above table indicates that 14.3% of sports goods retailers in Northeast India have less than 5 years of experience, 23.2% of sports goods retailers have experience ranging from 5 to 10 years, 30.6% of sports goods retailers responded that they have 10 to 15 years' experience, and 31.7% of sports goods retailers have more than 16 years of experience in retailing sports goods in northeast India.

Figure 4.2 visually represents the percentage distribution of the total number of respondents based on their years of experience in the sports goods retail sector.

**Figure.4.2.**  
**Graphical Representation of Years of Experience in Sports Retail Sector**



### 4.3.3. Frequency Distribution of the Respondents Based on Annual Sales of Sport Goods Retailers

The frequency distribution based on the yearly sales of Northeast India sports goods retailers is given in Table 4.3.

**Table 4.3**  
**Annual Sales of Sports Goods Retailers**

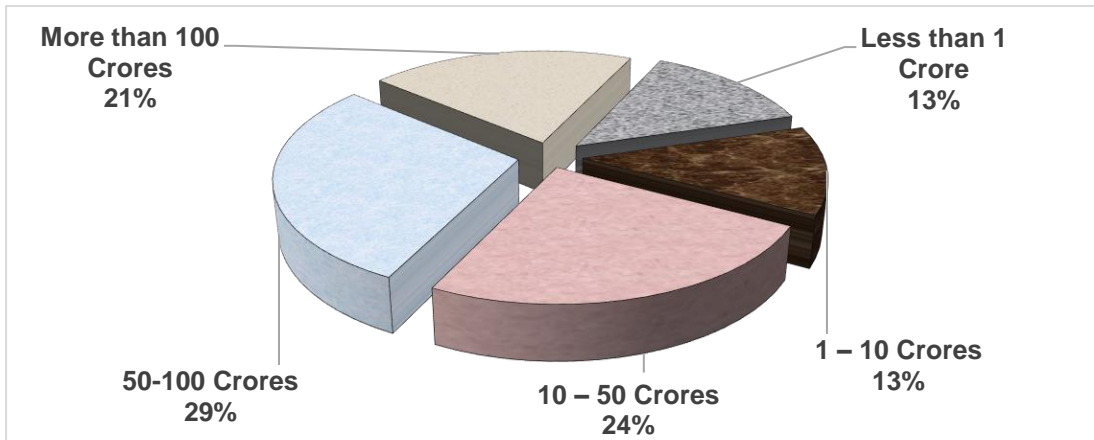
<b>Annual Sales</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Less than 1 Crore	69	13.4
1 – 10 Crores	64	12.5
10 – 50 Crores	125	24.4
50-100 Crores	148	28.9
More than 100 Crores	107	20.8
<b>Total</b>	<b>513</b>	<b>100</b>

In Table 4.3, it can be concluded that 13.4% of the sports goods' retailers have a yearly sale of less than one crore. 12.5% of the sports goods' retailers have annual sales of one crore to ten crores. The data further reveals that 24.4% of the sports retailers have annual sales of ten crores to fifty crores; sports goods retailers in northeast India, with 28.9%, have the highest annual sales of fifty crores to one hundred crores; and 20.8% of sports goods retailers have annual sales exceeding one hundred crores in northeast India.

Figure 4.3 provides a graphical representation of the percentage distribution based on the annual sales of sports goods retailers.

**Figure.4.3**

**Graphical Representation of Annual Sales of Sports Goods Retailers**



**4.3.4. Frequency Distribution of Respondents Based on Sourcing of Sports Products**

The frequency distribution of the respondents based on the sourcing of sports products is given in Table 4.4.

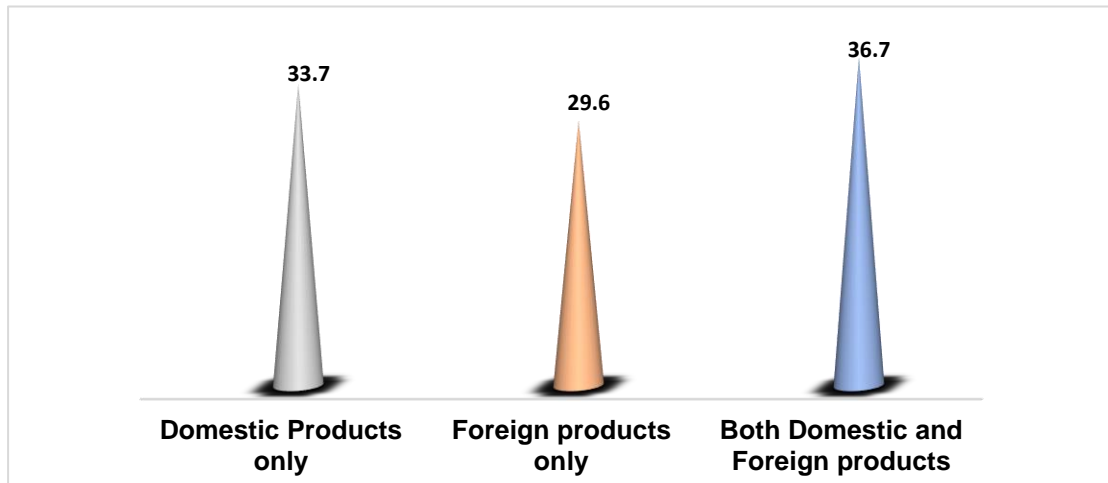
**Table 4.4**  
**Sourcing of Sports Product**

Sourcing Product	Frequency	Percentage %
Domestic Products only	173	33.7
Foreign products only	152	29.6
Both Domestic and Foreign products	188	36.7
<b>Total</b>	<b>513</b>	<b>100</b>

In Table 4.4, it can be concluded that 33.7% of the sports retailers exclusively source domestic products, while 29.6% exclusively source foreign products. Additionally, 36.7% of the sports goods' retailers' sources are both domestic and foreign products.

Figure 4.4 presents a graphical representation of the percentage distribution of sports goods retailers regarding the sourcing of sports products.

**Figure.4.4**  
**Graphical Representation of Sourcing Sports Products**



#### 4.4.5. Frequency Distribution of Retailers Placing an Order of Sports Goods

The frequency distribution of the sports good's retailers base on their placing order is given in the table 4.5.

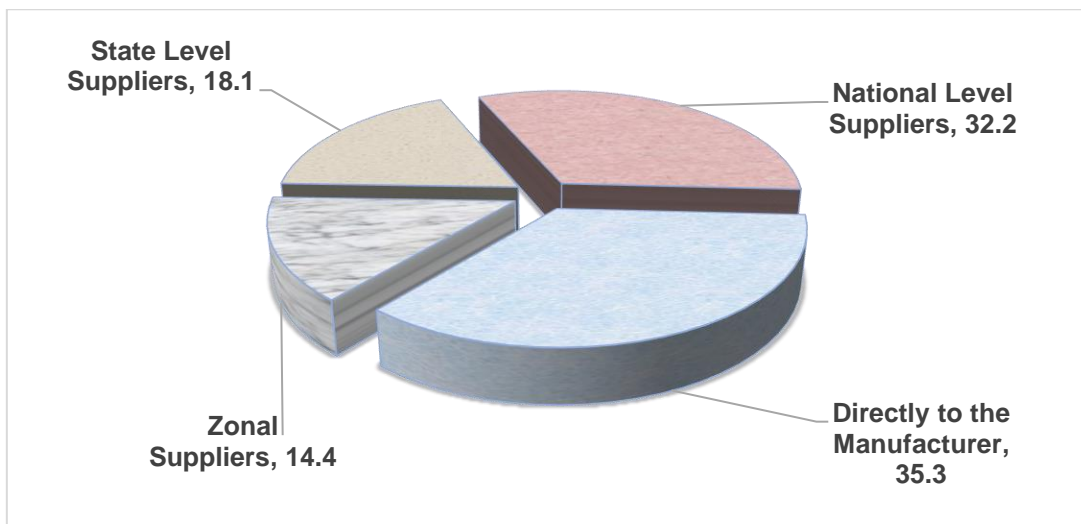
**Table 4.5**  
**Placing Order of Sports Goods by the Retailers**

Placing Order	Frequency	Percentage %
Directly to the Manufacturer	181	35.3
Zonal Suppliers	74	14.4
State Level Suppliers	93	18.1
National Level Suppliers	165	32.2
<b>Total</b>	<b>513</b>	<b>100</b>

Table 4.5 shows that 35.3% of the sports goods' retailers directly place the order with the manufacturer. 14.4% of sports goods retailers placed their orders with Zonal Suppliers. 18.1% of the sports goods' retailers placed their orders with state-level suppliers. 32.2% of the sports goods' retailers placed their orders with national-level suppliers.

Figure 4.5 presents a graphical representation of the percentage values depicting the placing order preferences for sports goods.

**Figure.4.5**  
**Graphical Representation of Placing and Order of Sports Goods**



#### **4.4.6. Frequency Distribution of Dealing Brands in Sports Goods Retailers**

The frequency distribution of the retailers dealing with the sports product brands is presented in the table 4.6.

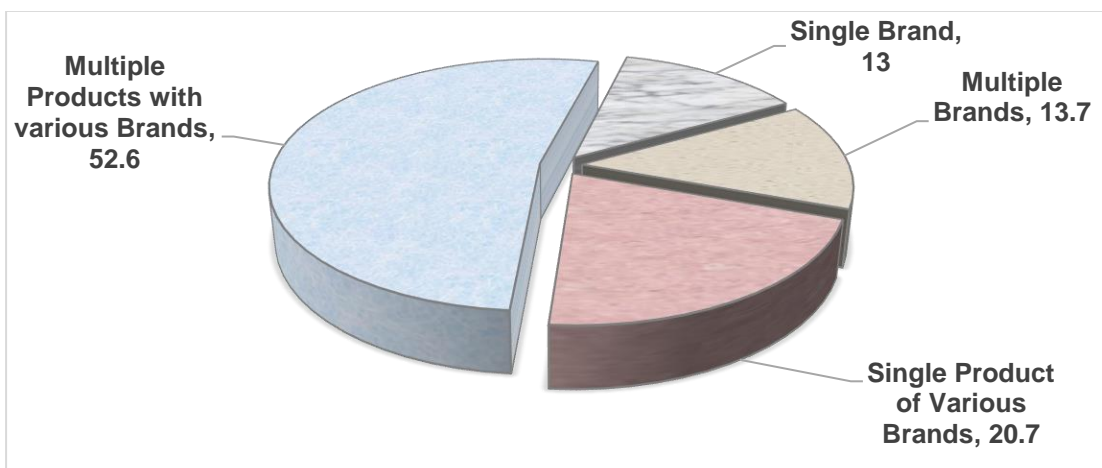
**Table 4.6**  
**Dealing Brands by the Sports Goods Retailers**

<b>Brands Dealt</b>	<b>Frequency</b>	<b>Percentage %</b>
Single Brand	67	13.0
Multiple Brands	70	13.7
Single Product of Various Brands	106	20.7
Multiple Products with various Brands	270	52.6
<b>Total</b>	<b>513</b>	<b>100</b>

Table 4.6 presents the brand dealings of sports goods retailers in North-East India. The data reveals that only 13.0% of the sports retailers are exclusively dealing with a single brand. 13.7% of the sports retailers are engaged in dealing with multiple brands. 20.7% of the sports retailers are dealing with a single product from various brands, while the majority, 52.6% of the sports retailers, are dealing with multiple products from various brands.

Figure 4.6 graphically presents the percentage distribution of the total number of sports retailers based on the brands dealt.

**Figure.4.6**  
**Graphical Representation of Brands Dealt by the Retailers**



#### 4.4.7. Frequency Distribution of Organized and Unorganized Sports Goods Retailers

The frequency distribution of the sports good's retailers based on the Retail Firm is given in below table 4.7.

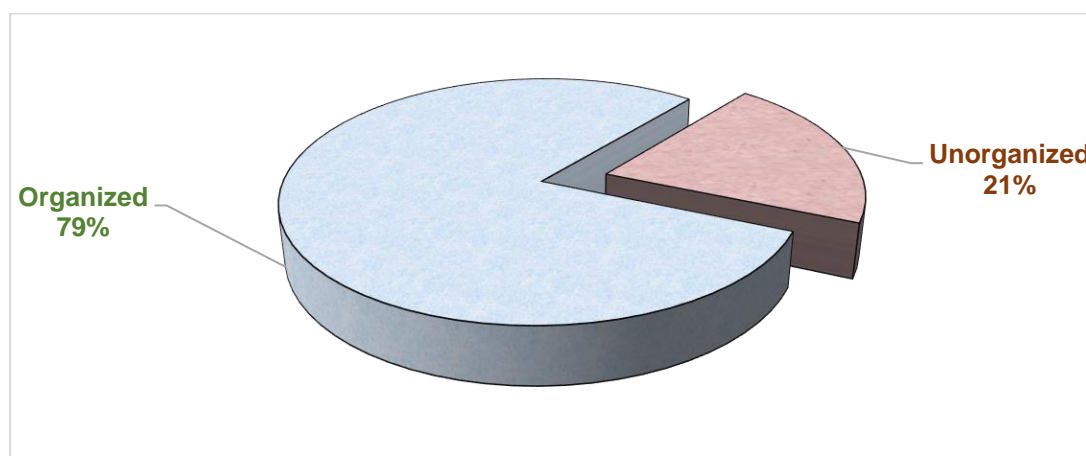
**Table 4.7**  
**Organized and Unorganized Sports Goods Retail Firm**

Retail Firm	Frequency	Percentage %
Organized	408	79.5
Unorganized	105	20.5
<b>Total</b>	<b>513</b>	<b>100</b>

In Table 4.7, it shows that 20.5% of sports goods retailers in Northeast India are unorganized firms, while 79.5% of sports goods retailers in Northeast India are organized firms.

Figure 4.7 Graphically represents the percentage distribution of sports goods retailers based on their retail firm.

**Figure. 4.7**  
**Graphical Representation of organized and unorganized Retail Firm**



#### 4.4.8. Frequency Distribution of Sports Goods Retailers based on State of Retail Store Location

The frequency distribution of the sports good's retailers based on the State of Retail Store Location is given in the table 4.8.

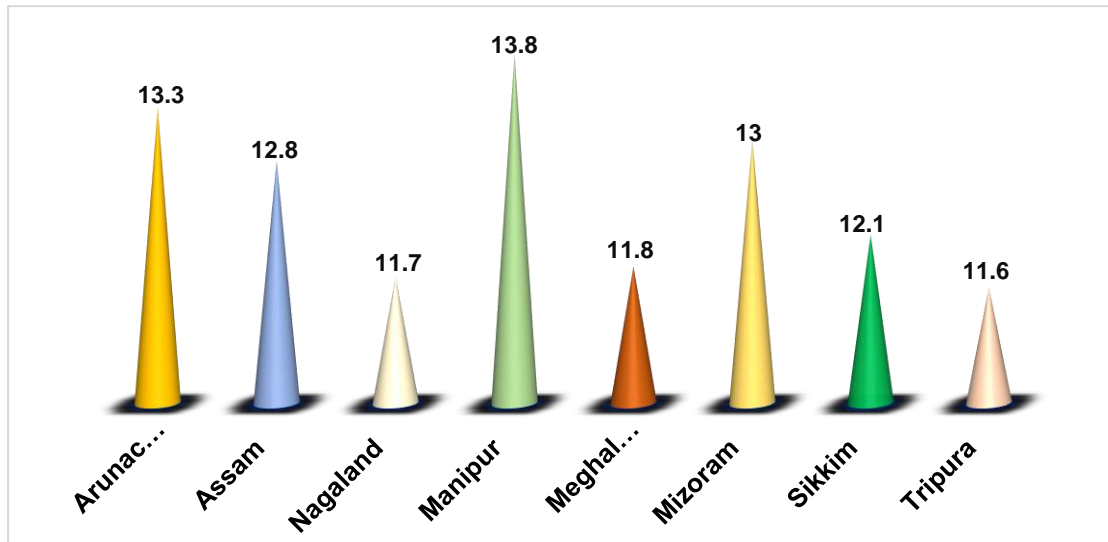
**Table 4.8**  
**State of Retail Store Located**

Location	Frequency	Percentage %
Arunachal Pradesh	68	13.3
Assam	65	12.8
Nagaland	60	11.7
Manipur	70	13.8
Meghalaya	61	11.8
Mizoram	67	13.0
Sikkim	62	12.1
Tripura	60	11.6
<b>Total</b>	<b>513</b>	<b>100</b>

In table 4.8, it shows the firm location of the respondents. The results of the frequency test indicate that 13.8% of the respondents reported that their sports retail store is located in Manipur. From the total sample size, 13.3% of the respondents responded that their retail store is located in Arunachal Pradesh, and 13.0% of the retailers indicate that their retail store is located in Mizoram. 12.8% of retailers responds that they are located in the state of Assam, and 12.1% of the retailers responds that their sports retail store is located in Sikkim. 11.8% of the retailers responds that their sports retail store is located in Meghalaya while, 11.7% of the sports retailer responded that their retail store is located in Nagaland and 11.6% of the retailer responds that their retail store is located in the state of Tripura.

The percentage values of the total number of respondents based on state of retail store location are presented in Figure 4.8.

**Figure.4.8**  
**Graphical representation of the Northeast State Sports Goods retailers**



#### **4.5. ANALYSIS RELATED TO OPINION OF SPORTS GOODS RETAILERS FROM NORTH EAST INDIA**

##### **4.5.1. Chi - Square test regarding the Association between the Years of Experience and Annual Sale of Sports Goods Retailers**

The researcher has developed the following hypothesis to investigate whether there exists a significant association between the years of experience and annual sale of sports goods retailers in northeast India.

**Hypothesis (H<sub>0</sub>):** There is no association between the years of experience in sports goods retailing and the annual sale.

**Hypothesis (H<sub>1</sub>):** There is an association between the years of experience in sports goods retailing and the annual sale.

The researcher has used chi - square for testing the above hypothesis.

**Table 4.9**

**Chi - Square test result regarding the association between the Years of Experience and the Annual Sale of Sports Goods Retailers**

Years of Experience	Annual Sale					
	Less than 1 Crore	1 – 10 Crores	10 – 50 Crores	50-100 Crores	More than 100 Crores	Total
<b>Less than 5 years</b>	13 (18.1) [20.6]	16 (21.6) [24.3]	15 (19.8) [11.5]	15 (19.8) [9.7]	15 (20.7) [14.0]	74 (100.0) [14.3]
<b>6 years to 10 Years</b>	18 (14.8) [27.5]	18 (14.8) [27.2]	29 (24.5) [25.9]	30 (24.9) [19.8]	24 (19.6) [21.6]	119 (100.0) [23.2]
<b>11 Years to 15 Years</b>	12 (8.0) [19.6]	14 (9.2) [22.3]	37 (22.9) [28.5]	56 (35.7) [37.6]	38 (24.3) [35.1]	157 (100.0) [30.6]
<b>More than 16 Years</b>	21 (12.8) [32.4]	17 (10.5) [26.2]	46 (27.5) [35.5]	49 (29.8) [32.5]	30 (19.4) [29.2]	163 (100.0) [31.7]
<b>Total</b>	64 (12.5) [100.0]	65 (12.7) [100.0]	127 (24.6) [100.0]	150 (29.2) [100.0]	107 (21.0) [100.0]	513 (100.0) [100.0]
<b>Chi-Square</b>	<b>33.77</b>					
<b>P value</b>	<b>P &lt; 0.001**</b>					
<b>Contingency Coefficient</b>	<b>0.200</b>					

Note: 1. Value within ( ) refers only Row  
 2. Value within [ ] refers only Column  
 3. \*\* Denotes significant at 1% level.

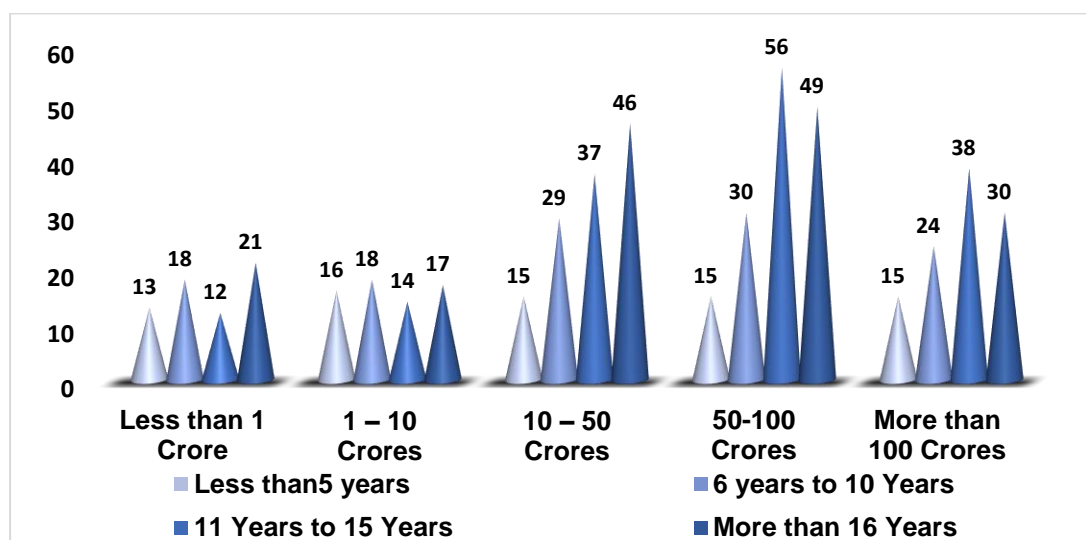
From the above table.4.9 depicts the years of experience and annual sales of sports goods retailers in northeast India. The sports goods retailers with less than 5 years of experience have the lowest annual sales of less than 1 crore and the highest annual sales is 1 to 10 crores. Sports goods retailers with 6 to 10 years of experience have the lowest annual sales of 1 to 10 crore

and the highest annual sales of 50 to 100 crores. Retailers with 11 to 15 years of experience have lowest annual sales of less than 1 crore and highest annual sale from 50 to 100 crores. The sports goods retailers with more than 16 years of experience have lowest annual sales of 1 to 10 crore and highest annual sale is 50 to 100 crores.

Table 4.9 shows that there is a significant association between the years of experience in sports goods retailing and annual sales. The calculated chi-square value of 33.77 is greater than the required value, indicating a substantial association between the two variables. Furthermore, the contingency coefficient value of 0.200 indicates a positive relationship between years of experience and annual sales in sports goods retailers. This shows that when the years of experience increase, there is a tendency for higher annual sales.

Figure 4.9 graphically represents the opinions of sports goods retailers of northeast India regarding the association between years of experience and annual sales.

**Figure 4.9**  
**Graphical representation of the retailers on Years of Experience and Annual Sale of Sports Goods Retailers of North East India**



#### **4.5.2. Chi - Square test regarding the Association between the Sourcing Product and Annual Sale of Sports Goods Retailers**

The researcher has developed the following hypothesis to investigate whether there is a significant association between the sourcing sports product and annual sale in northeast India sports goods retailers:

**Hypothesis (H<sub>0</sub>):** There is no association between the sourcing product and annual sale of sports retailers.

**Hypothesis (H<sub>1</sub>):** There is an association between the sourcing product and annual sale of sports retailers.

The researcher has opted the chi-square test to examine and evaluate the above hypothesis.

The test aims to determine whether there is a statistically significant relationship between the sourcing product and annual sale in northeast India sports goods retailers.

**Table 4.10**

**Chi - Square test result regarding the association between the Sourcing Sports Product and Annual Sale of Sports Goods Retailers**

Sourcing Product	Annual Sale					
	Less than 1 Crore	1 – 10 Crores	10 – 50 Crores	50-100 Crores	More than 100 Crores	Total
<b>Domestic Product only</b>	45 (25.9) [69.6]	48 (27.4) [72.8]	51 (29.6) [40.5]	16 (9.5) [11.0]	13 (7.7) [12.3]	173 (100.0) [33.7]
<b>Foreign product only</b>	8 (5.4) [12.7]	13 (9.1) [21.4]	59 (38.6) [46.5]	54 (35.3) [35.9]	18 (11.6) [16.4]	152 (100.0) [29.6]
<b>Both domestic and foreign product</b>	11 (6.0) [17.6]	4 (2.0) [5.8]	16 (8.7) [13.0]	80 (42.3) [53.2]	77 (40.9) [71.3]	188 (100.0) [36.7]
<b>Total</b>	64 (12.5) [100.0]	65 (12.7) [100.0]	126 (24.6) [100.0]	150 (29.2) [100.0]	108 (21.0) [100.0]	513 (100.0) [100.0]
<b>Chi-square</b>	<b>333.82</b>					
<b>Significance level</b>	<b>P &lt; 0.001**</b>					
<b>Contingency coefficient</b>	<b>0.54</b>					

*Note:* 1. Value within ( ) refers only Row  
 2. Value within [ ] refers only Column  
 3. \*\* Denotes significant at 1% level.

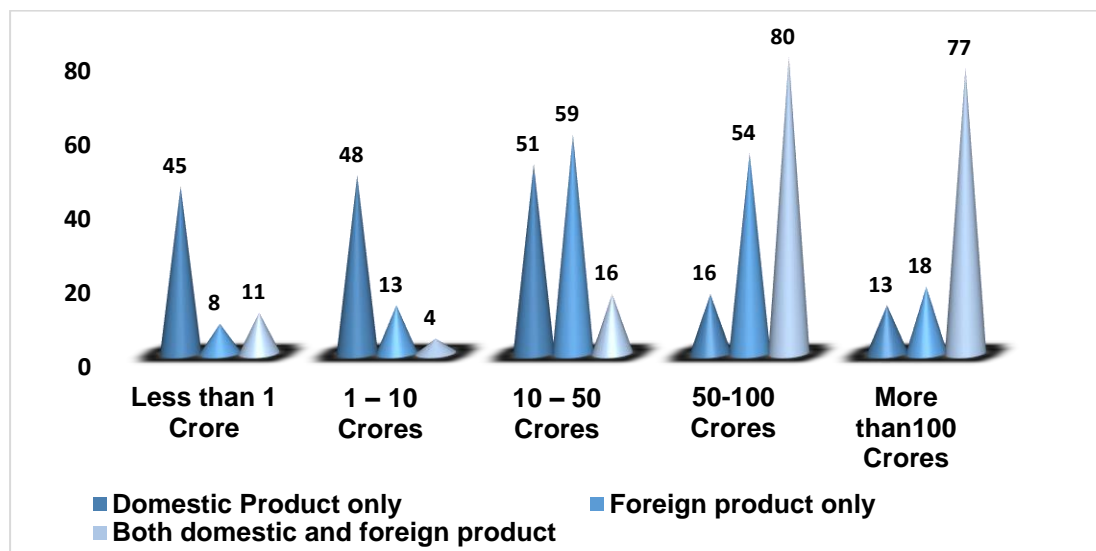
From the above table. 4.10 depict that the sourcing of sports products and the annual sales of sports goods retailers in northeast India. By sourcing only domestic products sports goods retailers have the lowest annual sales of more than 100 crores and the highest annual sales of 10 to 50 crores. Retailers sourcing only foreign products have the lowest annual sale of less than 1 crore and the highest annual sales of 10 to 50 crore. Sports retailers sourcing both

domestic and foreign products have the lowest annual sales of 1 to 10 crore and the highest annual sales of 50 to 100 crore.

Table 4.10 clearly shows that there is a significant association between the sourcing products and annual sale of sports goods retailers. The calculated chi-square value of 333.82 is greater than the required value, indicating a substantial difference between the two variables. Furthermore, the contingency coefficient value of 0.54 indicates a positive relationship between annual sales and sourcing products of sports goods retailers.

Figure 4.10 graphically represents the opinions of sports goods retailers from northeast India regarding the association between sourcing products and annual sale.

**Figure 4.10**  
**Graphical representation of the retailers on Sourcing Product and Annual Sale of Sports Goods Retailers in North East India**



#### **4.5.3. Chi - Square test regarding the Association between the Number of Brand Dealt and Annual Sale of Sports Goods Retailers**

The researcher has formulated the following hypothesis to investigate whether there is a significant association between the number of brands dealt and annual sale in northeast sports goods retailers:

**Hypothesis (H<sub>0</sub>):** There is no significant association between the number of brands dealt and annual sale in sports goods retailers.

**Hypothesis (H<sub>1</sub>):** There is a significant association between the number of brands dealt and annual sale in sports goods retailers.

The researcher has opted the chi-square test to examine and evaluate the above hypothesis. The test aims to determine whether there is a statistically significant association between the number of brands dealt and annual sale in northeast India sports goods retailers.

**Table 4.11**

**Chi - Square test result regarding the association between the Number of Brand Dealt and Annual Sale**

Number of Brand Dealt	Annual Sale					
	Less than 1 Crore	1 – 10 Crores	10 – 50 Crores	50-100 Crores	More than 100 Crores	Total
<b>Single Brand</b>	7 (10.4) [10.8]	6 (9.4) [9.7]	23 (34.9) [18.5]	17 (23.6) [10.5]	14 (21.7) [13.5]	67 (100.0) [13.0]
<b>Multiple Brands</b>	9 (13.5) [14.7]	11 (15.3) [16.5]	18 (26.1) [14.5]	16 (23.4) [11.0]	15 (21.6) [14.0]	70 (100.0) [13.7]
<b>Single Product of Various Brands</b>	15 (13.7) [22.5]	14 (13.1) [21.4]	26 (24.4) [20.5]	28 (26.8) [19.0]	24 (22.0) [21.6]	106 (100.0) [20.7]
<b>Multiple Products with various Brands</b>	33 (12.4) [52.0]	34 (12.6) [52.4]	59 (21.7) [46.5]	89 (32.9) [59.5]	55 (20.3) [50.9]	270 (100.0) [52.6]
<b>Total</b>	64 (12.5) [100.0]	65 (12.7) [100.0]	126 (24.6) [100.0]	150 (29.2) [100.0]	108 (21.0) [100.0]	513 (100.0) [100.0]
<b>Chi-square</b>	<b>13.32</b>					
<b>Significance level</b>	<b>P &lt; 0.001**</b>					
<b>Contingency coefficient</b>	<b>0.12</b>					

- Note:* 1. Value within ( ) refers only Row  
 2. Value within [ ] refers only Column  
 3. \*\* Denotes significant at 1% level.

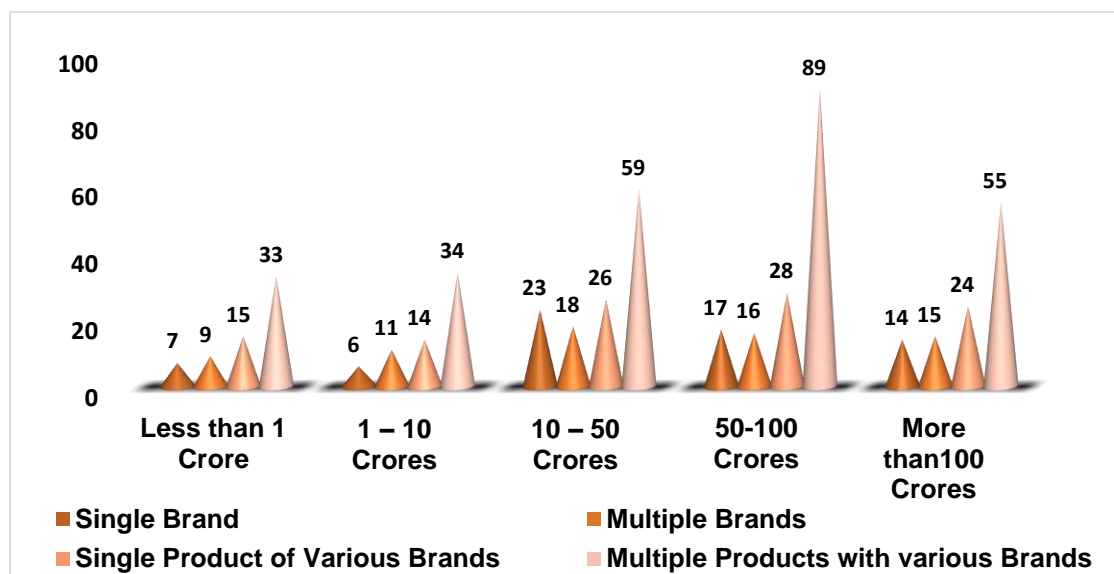
From the above table.4.11, depict that the brand dealing and the annual sale in northeast India sports goods retailers. Sports goods retailers dealing single sports brand only have the lowest annual sales of 1 to 10 crore and the highest annual sales of 10 to 50 crores; sports retailers dealing multi-brand

products have the lowest annual sales of less than 1 crore and the highest annual sales of 10 to 50 crores. Retailers dealing in single products of various brands have the lowest annual sales of 1 to 10 crore and the highest annual sale is 50 to 100 crores. Sports retailers dealing in multi-brand products have the lowest annual sales of less than 1 crore and the highest is 50 to 100 crores.

Table 4.11, provide the clear evident that the calculated chi-square value of 13.32 exceeded the required value. This indicates a significant association between the number of brands dealt and annual sale in northeast sports goods retailers. Furthermore, the contingency coefficient value of 0.12 suggests a positive relationship between the number of brands dealt and annual sale in northeast India sports goods retailers.

Figure 4.11 graphical represents the opinions of sports goods retailers from northeast India on the association between the number of brands dealt and annual sale.

**Figure 4.11**  
**Graphical representation of the retailers on Number of Brand Dealt and Annual Sale of Sports Goods Retailers in North East India**



#### 4.5.4. Chi - Square test regarding the Association between the Organized and Unorganized Sports Goods Retailers and Annual Sale

The researcher has proposed the following hypothesis to determine if there is a significant association between Organized and Unorganized Sports Retailers in terms of their Annual Sale.

**Hypothesis (Ho):** There is no significant association between Organized and Unorganized Sports Retailers and Annual Sale.

**Hypothesis (H<sub>1</sub>):** There is a significant association between Organized and Unorganized Sports Retailers and Annual Sale.

To test this hypothesis, the researcher has adopted the chi-square test.

**Table 4.12**  
**Chi - Square test result regarding the Association between the organized and Unorganized Sports Retailers and Annual Sale**

Retail Firms	Annual Sale					
	Less than 1 Crore	1 – 10 Crores	10 – 50 Crores	50-100 Crores	More than 100 Crores	Total
<b>Organized</b>	20 (4.8) [30.4]	31 (7.6) [47.6]	113 (27.7) [89.5]	144 (35.3) [96.2]	100 (24.6) [93.0]	408 (100.0) [79.5]
<b>Unorganized</b>	44 (42.5) [69.6]	34 (32.3) [52.4]	13 (12.6) [10.5]	6 (5.4) [3.8]	8 (7.2) [7.0]	105 (100.0) 20.5
<b>Total</b>	64 (12.5) [100.0]	65 (12.7) [100.0]	126 (24.6) [100.0]	150 (29.2) [100.0]	108 (21.0) [100.0]	513 (100.0) [100.0]
<b>Chi-square</b>	<b>286.83</b>					
<b>Significance level</b>	<b>P &lt; 0.001**</b>					
<b>Contingency coefficient</b>	<b>0.51</b>					

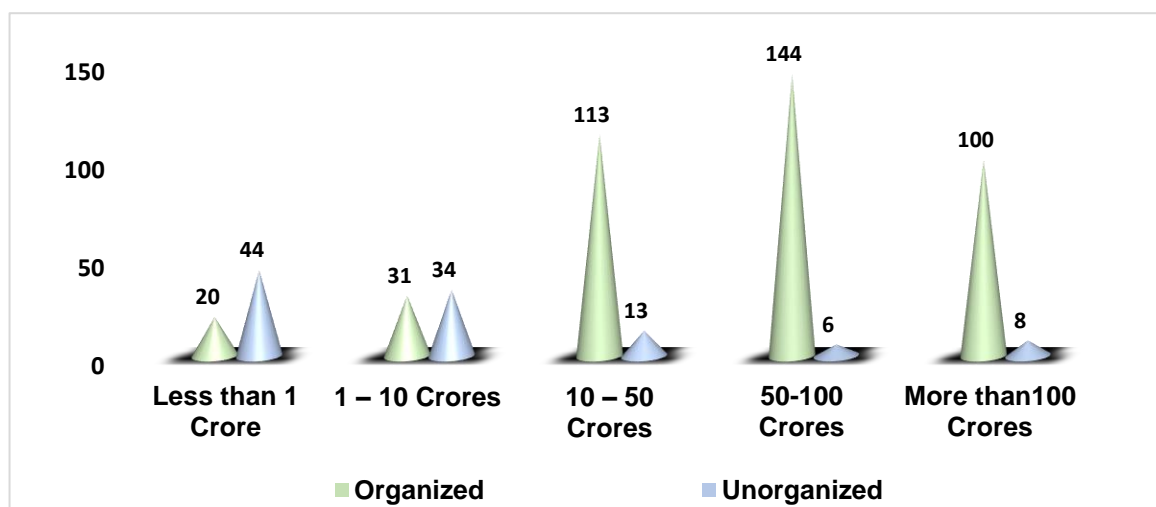
1. Value within ( ) refers only Row
2. Value within [ ] refers only Column
3. \*\* Denotes significant at 1% level.

From the above table.4.12 depict that the Organized and Unorganized Sports Retailers and the Annual Sale in Northeast India. Northeast India Organized Sports Goods Retailers have the lowest annual sales of less than 1 crore and the highest annual sales of 50 to 100 crores. Unorganized Sports Goods Retailers have the lowest annual sales of 50 to 100 crores and the highest annual sales of less than 1 crores.

Table 4.12 provide clear evident that the calculated chi-square value of 286.83 exceeded the required value. This indicates a significant association between Organized and Unorganized Sports Retailers and the Annual Sales of Sports Goods Retailers in Northeast India. The contingency coefficient value of 0.51 suggests a positive relationship between Organized and Unorganized Sports Retailers and the Annual Sales of Sports Goods Retailers.

Figure 4.12 graphical represents the opinions of sports goods retailers from northeast India on the association between the Organized and Unorganized Sports Retailers and the Annual Sale.

**Figure 4.12**  
**Graphical representation of Organized and Unorganized Sports Retailers and Annual Sale of North East India**



#### **4.5.5. Chi - Square test regarding the Association between the State of Retail Location with Annual Sale**

The researcher has developed the following hypothesis to examine whether there is a significant association between the State of Retail Location and Annual Sales.

**Hypothesis (H<sub>0</sub>):** There is no significant association between the State of Retail Location and Annual Sales.

**Hypothesis (H<sub>1</sub>):** There is a significant association between the State of Retail Location and Annual Sales.

The researcher has adopted the chi-square test to examine and evaluate the above hypothesis.

The test aims to determine whether there is a statistically significant association between the State of Retail Location and Annual Sales of northeast India sports goods retailers.

Table 4.13

Chi - Square test results regarding the Association between the State of Retail Location and Annual Sale

State Of Retail Location	Annual Sale					
	Less than 1 Crore	1 – 10 Crores	10 – 50 Crores	50-100 Crores	More than 100 Crores	Total
<b>Arunachal Pradesh</b>	7 (11.6) [10.1]	8 (13.7) [12.7]	15 (24.2) [11.6]	21 (35.8) [14.5]	9 (14.7) [8.3]	60 (100.0) [11.7]
<b>Assam</b>	8 (11.6) [11.9]	8 (10.7) [11.8]	23 (32.1) [18.2]	19 (26.8) [12.8]	13 (18.8) [12.8]	71 (100.0) [13.8]
<b>Nagaland</b>	7 (11.5) [10.1]	8 (13.5) [12.7]	14 (24.0) [11.6]	16 (26.0) [10.6]	15 (25.0) [14.2]	60 (100.0) [11.8]
<b>Manipur</b>	6 (8.3) [8.3]	10 (14.8) [15.7]	23 (34.3) [18.7]	17 (25.0) [11.5]	12 (17.6) [11.2]	68 (100.0) [13.3]
<b>Meghalaya</b>	10 (14.2) [13.8]	7 (11.3) [11.8]	14 (20.8) [11.1]	17 (25.5) [11.5]	19 (28.3) [17.8]	67 (100.0) [13.0]
<b>Mizoram</b>	13 (20.2) [19.3]	6 (8.7) [8.8]	10 (15.4) [8.1]	22 (33.7) [14.9]	15 (22.1) [13.6]	66 (100.0) [12.8]
<b>Sikkim</b>	9 (16.0) [13.8]	8 (12.8) [11.8]	13 (22.3) [10.6]	16 (26.6) [10.6]	13 (22.3) [12.4]	59 (100.0) [11.6]
<b>Tripura</b>	9 (14.3) [12.8]	9 (15.3) [14.7]	13 (20.4) [10.1]	20 (32.7) [13.6]	11 (17.3) [10.1]	62 (100.0) [12.1]
<b>Total</b>	69 (13.4) [100.0]	64 (12.5) [100.0]	125 (24.4) [100.0]	148 (28.9) [100.0]	107 (20.8) [100.0]	513 (100.0) [100.0]
<b>Chi-square</b>	<b>33.15</b>					
<b>Significance level</b>	<b>P &lt; 0.001**</b>					
<b>Contingency coefficient</b>	<b>0.19</b>					

Note: 1. Value within ( ) refers only Row

2. Value within [ ] refers only Column

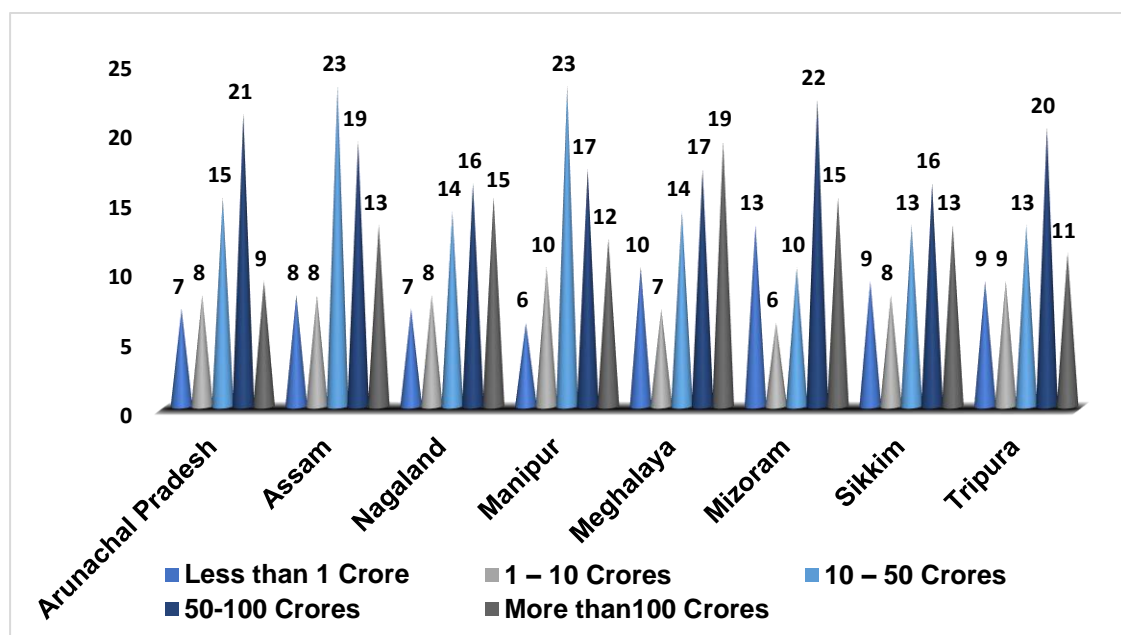
3. \*\* Denotes significant at 1% level.

From the above table.4.13 depict that the state of sports retail location and the annual sale of sports goods retailers. It can be observed that the majority of sports goods retailers from northeast states have the highest annual sale of 50 to 100 crores and lowest annual sale of 1 to 10 crores.

Table 4.13 provide clear evident that the calculated chi-square 'value of 33.15 exceeded the required value. This indicates a significant association between the State of Retail Location and Annual Sales of sports good's retailers. Further, it is observed that the contingency coefficient value is 0.19, which shows it has a positive relationship between the State of Retail Location and Annual Sales of sports good's retailers.

The opinion of sports goods retailers from Northeast India on association between the State of Retail Location and Annual Sales is graphically presented in Figure 4.13.

**Figure 4.13**  
**Graphical representation of Retail Location with Annual Sale**



#### **4.5.10. Chi - Square test regarding the Association between the Retailing Product and Annual Sale**

The researcher has developed the following hypothesis to determine whether there is a significant association between the Retailing Product and the Annual Sale.

**Hypothesis (H<sub>0</sub>):** There is no significant association between the Retailing Product and the Annual Sale.

**Hypothesis (H<sub>1</sub>):** There is a significant association between the Retailing Product and the Annual Sale.

The researcher has opted the chi-square test to examine and evaluate the above hypothesis.

The test aims to determine whether there is a statistically significant association between the Retailing Product and the Annual Sale of Northeast India sports goods retailers.

**Table 4.14**

**Chi - Square test results regarding the Association between the Retailing Product and Annual Sale**

Retailing Product	Annual Sale					
	Less than 1 Crore	1 – 10 Crores	10 – 50 Crores	50-100 Crores	More than 100 Crores	Total
<b>Sporting Equipment</b>	23 (12.0) [33.0]	32 (17.1) [50.0]	62 (33.1) [50.0]	52 (27.8) [35.3]	19 (10.0) [17.8]	188 (100.0) [36.8]
<b>Consumer Sports Product</b>	28 (17.0) [41.3]	23 (13.6) [35.3]	49 (29.5) [39.4]	50 (29.9) [33.6]	16 (9.8) [15.4]	167 (100.0) [32.5]
<b>Sports Technology Product</b>	13 (10.5) [18.3]	5 (4.7) [8.8]	8 (6.8) [6.6]	38 (31.6) [25.5]	55 (46.3) [52.1]	120 (100.0) [23.4]
<b>All the above</b>	5 (13.3) [7.3]	4 (10.0) [5.9]	5 (13.3) [4.0]	8 (21.7) [5.5]	16 (41.7) [14.8]	38 (100.0) [7.4]
<b>Total</b>	69 (13.4) [100.0]	64 (12.5) [100.0]	125 (24.4) [100.0]	148 (28.9) [100.0]	107 (20.8) [100.0]	513 (100.0) [100.0]
<b>Chi-square</b>	<b>163.86</b>					
<b>Significance level</b>	<b>P &lt; 0.001**</b>					
<b>Contingency coefficient</b>	<b>0.41</b>					

- Note:* 1. Value within ( ) refers only Row  
 2. Value within [ ] refers only Column  
 3. \*\* Denotes significant at 1% level.

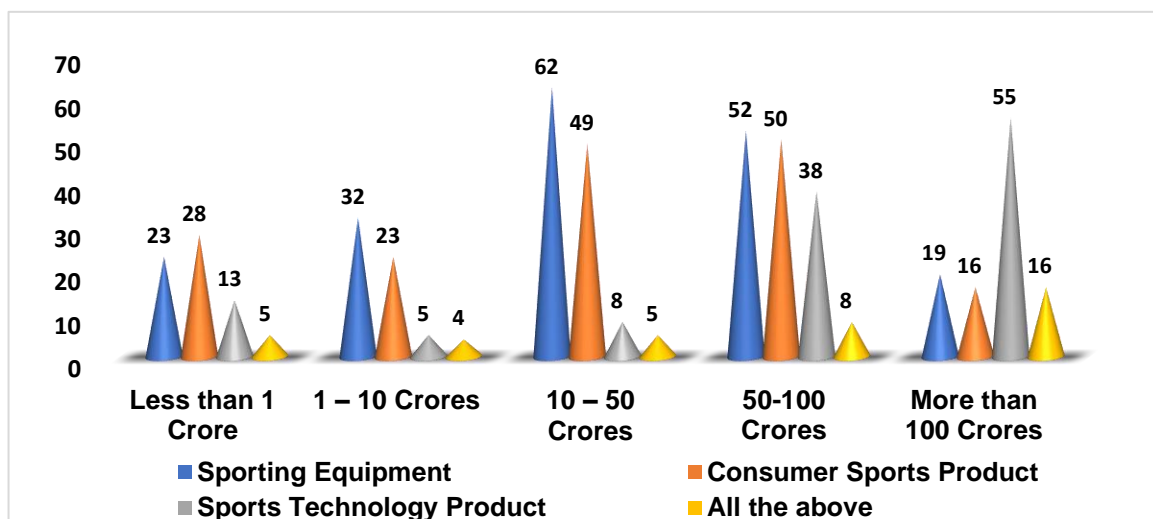
From the above table.4.14 depict that the retailing products and the annual sale in northeast India sports goods retailers. Retailing Sporting Equipment, the northeast India sports goods retailers have the highest annual sale of 10 to 50 crores and the lowest annual sale of more than 100 crores.

The majority of the sports retailers selling Consumer Sports Product, have the highest annual sale of 10 to 50 crores and the lowest annual sale of more than 100 crores. The retailers with Sports Technology Product, the majority are having the highest annual sale of more than 100 crores and the lowest annual sale of 1 to 10 crores and Retailing with Sporting Equipment, Consumer Sports Product, Sports Technology Product, they have the highest annual sale of more than 100 crores and the lowest annual sale of 1 to 10 crores.

Table 4.14 provide clear evident that the calculated chi-square value is 163.86, which is significantly higher than the required value. This indicates a significant association between the Retailing Products and Annual Sales in sports good’s retailers. Additionally, the contingency coefficient value of 0.41 indicates a positive relationship between retailing products and annual sales of sports goods retailers in northeast India.

Figure 4.14 graphically presents the opinions of sports goods retailers from Northeast India regarding the association between Retailing Products and Annual Sales.

**Figure 4.14**  
**Graphical representation of the retailers on Retailing Product and Annual Sale**



#### **4.5.6. Chi - Square test regarding the Association between the State of Retail Location and Placing Order**

The researcher has developed the following hypothesis to investigate whether there is a significant association between the State of the Retail Location and the Placing Order for Product Supply.

**Hypothesis (H<sub>0</sub>):** There is no significant association between the State of Retail Location and the Placing Order for Product Supply.

**Hypothesis (H<sub>1</sub>):** There is a significant association between the State of Retail Location and the Placing Order for Product Supply.

The researcher has adopted the chi-square test to examine and evaluate the above hypothesis. The test aims to determine whether there is a statistically significant association between the State of the Retail Location and the Placing Order for Sport Product Supply.

**Table 4.15**

**Chi - Square test results regarding the Association between the State of Retail Location and Placing Order for Product Supply**

State Of Retail Location	Placing Order				
	Directly to the Manufacturer	Zonal Suppliers	State Level Suppliers	National Level Suppliers	Total
<b>Arunachal Pradesh</b>	22 (36.8) [12.2]	7 (11.6) [9.4]	11 (18.9) [12.2]	20 (32.6) [11.8]	60 (100.0) [11.7]
<b>Assam</b>	29 (41.1) [16.0]	15 (20.5) [19.7]	11 (16.1) [12.2]	16 (22.3) [9.5]	71 (100.0) [13.8]
<b>Nagaland</b>	23 (38.5) [12.5]	7 (11.5) [9.4]	9 (13.5) [8.8]	21 (36.0) [13.7]	60 (100.0) [11.8]
<b>Manipur</b>	28 (40.7) [15.3]	9 (13.0) [12.0]	7 (11.1) [8.2]	24 (35.2) [14.5]	68 (100.0) [13.3]
<b>Meghalaya</b>	23 (34.9) [12.9]	8 (12.3) [11.1]	20 (28.9) [20.4]	16 (24.0) [9.9]	67 (100.0) [13.0]
<b>Mizoram</b>	17 (26.0) [9.4]	11 (16.3) [14.5]	18 (27.9) [19.7]	20 (29.8) [11.8]	66 (100.0) [12.8]
<b>Sikkim</b>	19 (31.9) [10.5]	9 (16.0) [12.8]	8 (13.8) [8.8]	23 (38.3) [13.7]	59 (100.0) [11.6]
<b>Tripura</b>	20 (32.7) [11.1]	8 (13.3) [11.1]	9 (14.3) [9.5]	25 (39.8) [14.9]	62 (100.0) [12.1]
<b>Total</b>	181 (35.3) [100.0]	74 (14.2) [100.0]	93 (18.2) [100.0]	165 (32.3) [100.0]	513 (100.0) [100.0]
<b>Chi-square</b>	<b>37.42</b>				
<b>Significance level</b>	<b>P &lt; 0.001**</b>				
<b>Contingency coefficient</b>	<b>0.21</b>				

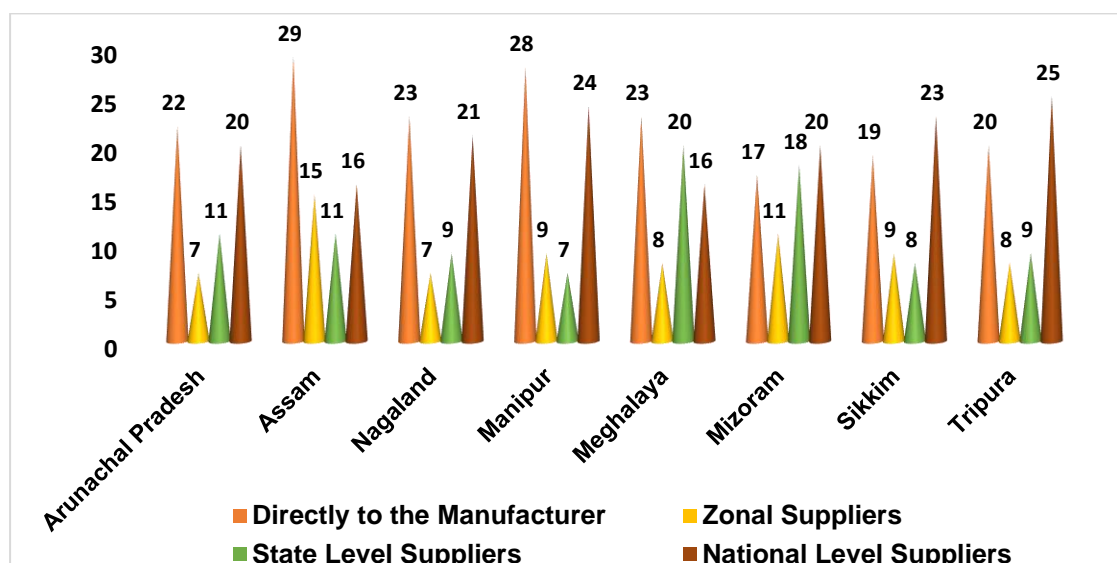
Note: 1. Value within ( ) refers only Row  
 2. Value within [ ] refers only Column  
 3. \*\* Denotes significant at 1% level.

From the above table.4.15 depict that the State of Retail Location and the Placing Order of sports product. It can be observed that the 35.3% of sports goods retailers from the northeast states are placing their order directly to the manufacturer, 32.2% of the sports good’s retailers place their order from the National Level Suppliers, 18.1% of the retailers place their order from the state level suppliers and 14.2% of the sports good’s retailers place their order from the zonal suppliers.

Table 4.15 provide clear evident that the calculated chi-square ‘value of 37.42 exceeded the required value, indicating a significant association between the State of Retail Location and the Placing of Order for Product Supply. The Contingency Coefficient value of 0.21 suggests a positive relationship between the State of Retail Location and the Placing of Order for Product Supply.

The opinions of sports goods retailers from north-east India regarding the State of Retail Location and the Placing of Order for Product Supply are graphically represented in Figure 4.15.

**Figure 4.15**  
**Graphical representation of the retailers on State of Retail Location and Order Place for Product Supply**



#### **4.5.7. Chi - Square test regarding the Association between the State of Retail Location and Number of Brand Dealt**

The researcher has formulated the following hypothesis to determine whether there is a significant association between the State of Retail Location and Number of Brand Dealt.

**Hypothesis (H<sub>0</sub>):** There is no significant difference between the State of Retail Location and Number of Brand Dealt.

**Hypothesis (H<sub>1</sub>):** There is a significant difference between the State of Retail Location and Number of Brand Dealt.

The researcher has opted the chi-square test to examine and evaluate the above hypothesis. The test aims to determine whether there is a statistically significant association between the State of Retail Location and Number of Sports Brand Dealt.

**Table 4.16**

**Chi - Square test results regarding the Association between the State of Retail Location and Number of Brand Dealt**

State Of Retail Location	Brand Dealt				
	Single Brand	Multiple Brands	Single Product of Various Brands	Multiple Products with various Brands	Total
<b>Arunachal Pradesh</b>	7 (11.6) [10.4]	9 (14.7) [12.6]	10 (15.9) [8.9]	34 (57.5) [12.9]	60 (100.0) [11.7]
<b>Assam</b>	11 (15.2) [16.0]	10 (13.4) [13.5]	16 (23.2) [15.5]	34 (48.2) [12.6]	71 (100.0) [13.8]
<b>Nagaland</b>	9 (14.6) [13.2]	8 (13.5) [11.7]	20 (33.3) [19.0]	23 (38.5) [8.6]	60 (100.0) [11.8]
<b>Manipur</b>	9 (13.0) [13.2]	10 (14.8) [14.4]	13 (19.4) [12.5]	36 (52.8) [13.3]	68 (100.0) [13.3]
<b>Meghalaya</b>	8 (12.0) [12.3]	8 (11.9) [10.8]	14 (21.7) [13.7]	37 (54.7) [13.6]	67 (100.0) [13.0]
<b>Mizoram</b>	11 (16.3) [17.9]	11 (17.0) [16.2]	12 (18.9) [10.1]	32 (48.1) [11.7]	66 (100.0) [12.8]
<b>Sikkim</b>	6 (9.9) [8.5]	10 (17.0) [14.4]	6 (10.0) [6.0]	37 (62.8) [13.8]	59 (100.0) [11.6]
<b>Tripura</b>	6 (9.2) [8.5]	4 (7.1) [6.3]	15 (24.5) [14.3]	37 (59.2) [13.6]	62 (100.0) [12.1]
<b>Total</b>	67 (13.0) [100.0]	70 (13.7) [100.0]	106 (20.7) [100.0]	270 (52.6) [100.0]	513 (100.0) [100.0]
<b>Chi-square</b>	<b>33.30</b>				
<b>Significance level</b>	<b>P &lt; 0.001**</b>				
<b>Contingency coefficient</b>	<b>0.19</b>				

*Note:* 1. Value within ( ) refers only Row  
 2. Value within [ ] refers only Column  
 3. \*\* Denotes significant at 1% level.

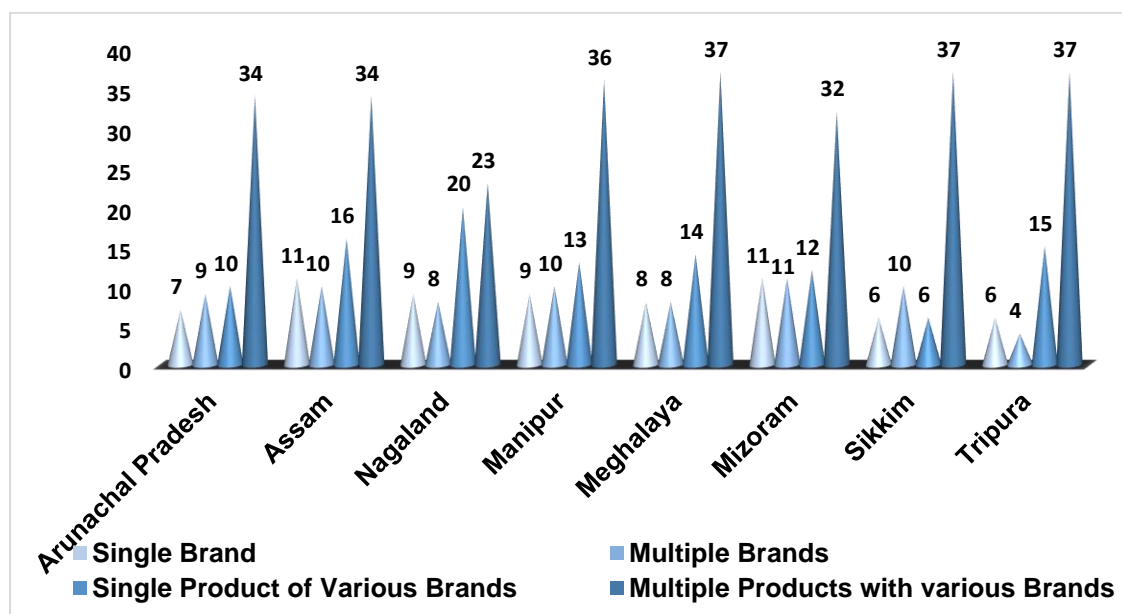
From the above table.4.16 depict that the State of Retail Location and the Brand Dealt of sports goods retailers. It can be observed that the 52.6% of

sports goods retailers from northeast states, Dealt with Multiple Products with various Brands, 20.7% of the sports good’s retailers deal with Single Product of Various Brands, while 13.7% of the northeast sports retailers deal with Multiple Brands and only 13.0% of the retailers Dealt with the Single Brand.

Table 4.16, clearly shows that the calculated chi-square value of 33.30 exceeded the required table value, indicating a significant association between the State of Retail Location and Number of Brands Dealt of sports good’s retailers in northeast India. Furthermore, the contingency coefficient value of 0.19 suggests a positive relationship between the State of Retail Location Number of Brands Dealt of sports good’s retailers.

The opinions of sports goods retailers from North East India regarding the State of Retail Location and Number of Brands Dealt are graphically presented in Figure 4.16.

**Figure 4.16**  
**Graphical representation of the retailers on State of Retail Location and Number of Brand Dealt**



#### **4.5.8. Chi - Square test regarding the Association between the State of Retail Location and Organized and Unorganized Sports Goods Retailers**

The researcher has developed the following hypotheses to investigate whether there is a significant association between the State Retail Location and Organized and Unorganized Retailers.

**Hypothesis (H<sub>0</sub>):** There is no significant association between State of Retail Location and Organized and Unorganized Sports Goods Retailers.

**Hypothesis (H<sub>1</sub>):** There is a significant association between State of Retail Location and Organized and Unorganized Sports Goods Retailers.

To test this hypothesis, the researcher has used the chi-square test.

**Table 4.17**

**Chi - Square test results regarding the Association between the State of Retail Location and Organized and Unorganized Retailers**

State Of Retail Location	Retail Firms		
	Organized Retailers	Unorganized Retailers	Total
<b>Arunachal Pradesh</b>	51 (84.2) [12.4]	9 (15.8) [9.0]	60 (100.0) [11.7]
<b>Assam</b>	53 (74.1) [12.8]	18 (25.9) [17.4]	71 (100.0) [13.8]
<b>Nagaland</b>	47 (78.1) [11.6]	13 (21.9) [12.6]	60 (100.0) [11.8]
<b>Manipur</b>	55 (80.6) [13.5]	13 (19.4) [12.6]	68 (100.0) [13.3]
<b>Meghalaya</b>	54 (80.2) [13.2]	13 (19.8) [12.6]	67 (100.0) [13.0]
<b>Mizoram</b>	51 (77.9) [12.5]	15 (22.1) [13.8]	66 (100.0) [12.8]
<b>Sikkim</b>	48 (80.9) [11.8]	11 (19.1) [10.8]	59 (100.0) [11.6]
<b>Tripura</b>	50 (80.6) [12.2]	12 (19.4) [11.4]	62 (100.0) [12.1]
<b>Total</b>	409 (79.8) [100.0]	104 (20.3) [100.0]	513 (100.0) [100.0]
<b>Chi-square</b>	<b>3.84</b>		
<b>Significance level</b>	<b>P &lt; 0.001**</b>		
<b>Contingency coefficient</b>	<b>0.06</b>		

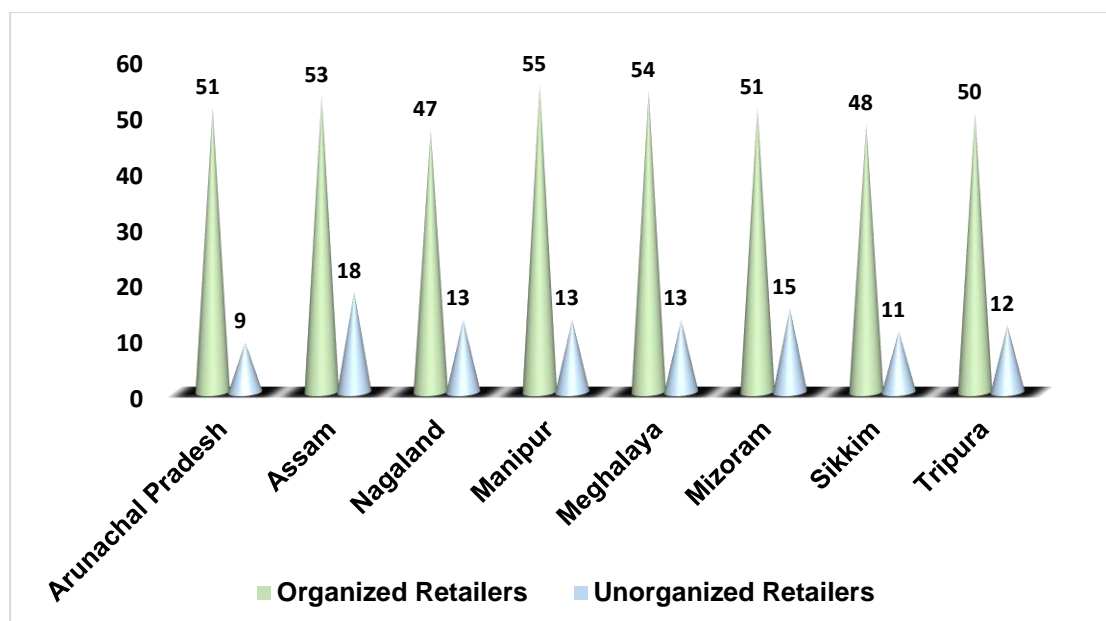
*Note:* 1. Value within ( ) refers only Row  
 2. Value within [ ] refers only Column  
 3. \*\* Denotes significant at 1% level.

From the above Table.4.17 depict that the State of Retail Location and Organized and Unorganized of sports goods retailers. It can be observed that the 79.8% of sports goods retailers from northeast states are Organized retailers and only 20.3% of the sports good's retailers are unorganized retailers.

Table 4.17, clearly shows that the calculated chi-square value of 3.84 exceeded the required value, indicating a significant association between the State of Retail Location and Organized and Unorganized sports good's retailers. The contingency coefficient value of 0.06 suggests a positive relationship between State of Retail Locations and Organized and Unorganized sports good's retailers.

Figure 4.17 graphical represents the opinions of sports goods retailers from northeast India on the association between the State of Retail Location and Organized and Unorganized sports good's retailers.

**Figure 4.17**  
**Graphical representation of the retailers on State of Retail Location and Organized and Unorganized Sports Goods Retailers**



#### **4.5.9. Chi - Square test regarding the Association between the State of Retail Location and Retailing Sports Product**

The researcher has devised the following hypothesis to determine whether there is any significant association between the State of Retail Location and Retailing Sports Product.

**Hypothesis (H<sub>0</sub>):** There is no significant association between the State of the retail Location and Retailing sports Product.

**Hypothesis (H<sub>1</sub>):** There is a significant association between the State of the retail Location and Retailing sports Product.

The researcher has opted the chi-square test to examine and evaluate the above hypothesis.

The test aims to determine whether there is a statistically significant association between the State of Retail Location and Retailing Sports Product.

**Table 4.18**

**Chi - Square test results regarding the Association between the State of Retail Location and Retailing Product**

State Of Retail Location	Retailing Product				
	Sporting Equipment	Consumer Sports Product	Sports Technology Product	All the above	Total
<b>Arunachal Pradesh</b>	20 (33.7) [11.4]	24 (40.0) [14.6]	10 (16.8) [8.5]	6 (9.5) [10.8]	60 (100.0) [11.7]
<b>Assam</b>	26 (36.6) [14.6]	27 (37.5) [16.1]	14 (19.6) [11.6]	4 (6.3) [8.4]	71 (100.0) [13.8]
<b>Nagaland</b>	23 (38.5) [13.2]	12 (19.8) [7.3]	16 (26.0) [13.2]	9 (15.6) [18.1]	60 (100.0) [11.8]
<b>Manipur</b>	23 (33.3) [12.9]	25 (37.0) [15.3]	12 (18.5) [10.6]	8 (11.1) [14.5]	68 (100.0) [13.3]
<b>Meghalaya</b>	23 (34.0) [12.9]	21 (31.1) [12.6]	17 (25.5) [14.3]	6 (9.4) [12.0]	67 (100.0) [13.0]
<b>Mizoram</b>	19 (28.8) [10.7]	23 (34.6) [13.8]	16 (24.0) [13.2]	8 (12.5) [15.7]	66 (100.0) [12.8]
<b>Sikkim</b>	18 (29.8) [10.0]	17 (28.7) [10.3]	20 (34.0) [16.9]	4 (7.4) [8.4]	59 (100.0) [11.6]
<b>Tripura</b>	25 (40.8) [14.3]	17 (26.5) [10.0]	14 (22.4) [11.6]	6 (10.2) [12.0]	62 (100.0) [12.1]
<b>Total</b>	177 (34.5) [100.0]	166 (32.3) [100.0]	119 (23.2) [100.0]	51 (10.1) [100.0]	513 (100.0) [100.0]
<b>Chi-square</b>	<b>27.67</b>				
<b>Significance level</b>	<b>P &lt; 0.001**</b>				
<b>Contingency coefficient</b>	<b>0.18</b>				

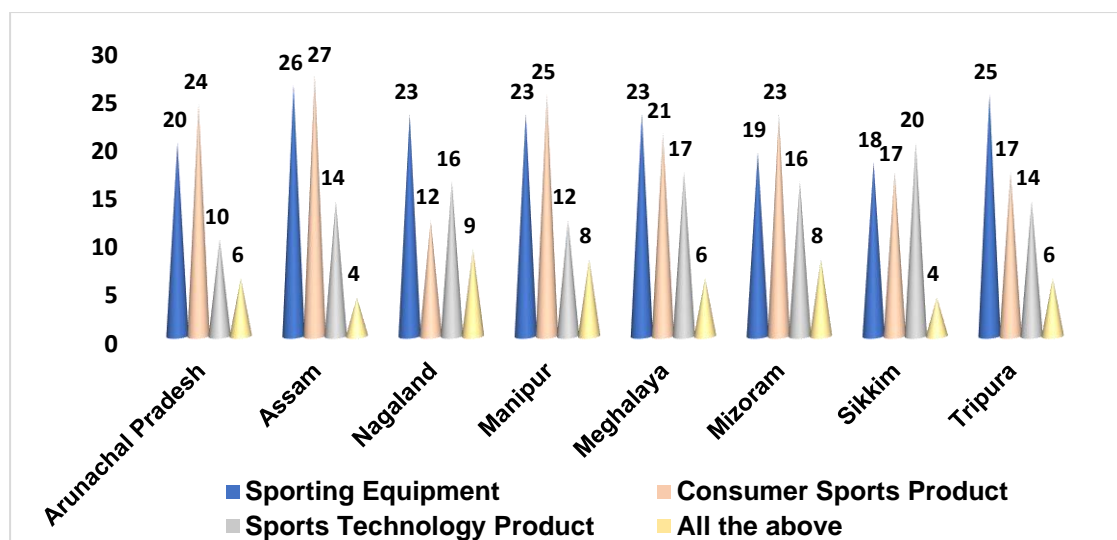
*Note:* 1. Value within ( ) refers only Row  
 2. Value within [ ] refers only Column  
 3. \*\* Denotes significant at 1% level.

From the above table.4.18 depict that the State of the retail Location and Retailing sports Product in northeast India. It is observed that 34.5% of the northeast sports good’s retailers are engaged in retailing Sporting Equipment, 32.3% of the retailer are retailing with the Consumer Sports Product, 23.2% of the retailers are retailing only Sports Technology Product and only 10.1% of the retailers are retailing with the Sporting Equipment, Consumer Sports Product, and the Sports Technology Product.

In the Table 4.18, it was clearly indicated that the calculated chi-square value of 27.67 exceeds the required value, indicating a significant association between the State of Retail Location and Retailing Product. The contingency coefficient value of 0.18 indicates a positive relationship between the State of the retail location and the retailing product.

Figure 4.18 graphically represents the opinions of sports goods retailers from Northeast India regarding the State of Retail Location and Retailing products.

**Figure 4.18**  
**Graphical representation of the retailers on State of Retail Location and Retailing Product**



#### 4.6. DESCRIPTIVE ANALYSIS OF MEASUREMENT SCALE

All the constructs were examined using the established scales and modified which is adopted from existing literature. Five-point Likert-Scale were used to collect the perceptions of the respondents. A descriptive analysis was performed using IBM SPSS Statistic 26.0 version to measure the level of the challenges contributing to retail SC among the northeast sports retailers and also provides the range, mean, and standard deviation of the dimension. In Table 4.19, the combined descriptive analysis findings for all the dimensions used in this study was shown below.

**Table 4.19.**  
**Descriptive Analysis Summary of all Measurement Scales**

Descriptive Statistics						
Dimension	N	Range	Minimum	Maximum	Mean	Std. Deviation
DeMC	513	11.00	8.00	19.00	12.29	2.51
DiMC	513	12.00	7.00	19.00	14.30	2.49
EUC	513	12.00	8.00	20.00	12.62	2.15
IMC	513	11.00	9.00	20.00	13.06	2.29
SC	513	12.00	8.00	20.00	12.52	2.24
SCP	513	8.00	8.00	16.00	10.37	1.83
DP	513	9.00	7.00	16.00	10.71	1.82
FP	513	8.00	8.00	16.00	10.92	1.90
IP	513	9.00	7.00	16.00	12.02	1.67
CSS	513	8.00	8.00	16.00	11.74	1.63

The above table 4.19 indicates that among the different dimension of sports retail SC challenges, such as DeMC, DiMC, EUC, IMC, and SC, DeMC has the lowest mean value of 12.29 with Standard Deviation of 2.51, it shows that the northeast sports retailers has biggest demand management

challenges, follow by the SC with the mean value of 12.52 and Standard Deviation of 2.24, EUC with the mean value of 12.62 and Standard deviation of 2.15, IMC with the mean value of 13.04 and the Standard Deviation of 2.29, and DiMC 14.30 and the Standard Deviation of 2.49.

The majority of the sports retailers agreed that all the study dimension are challenges factors contributing to SC challenges and agreed that these challenges significantly affect SCP and the firm's performance indicators.

#### 4.6.1. One-way Analysis of Different Dimensions of Sports Retail SC Challenges

**Hypothesis (H<sub>0</sub>):** There is no significant difference between the dimensions of sports retail SC challenges

**Hypothesis (H<sub>1</sub>):** There is a significant difference between the dimensions of sports retail SC challenges.

The opinion of sports retailers related to SC challenges are analyzed using One-way Analysis of Variance, to compare the mean of the dimension of supply chain challenges. The results are shown in the Table 4.20.

**Table 4.20**  
**One-way Analysis of variance of Different Dimension of Sports Retail SC Challenges**

Group	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	13777.06	4	3444.26	52.82	.000*
Within Groups	264721.78	2560	65.202		
Total	278498.84	2564			

From the table 4.20 it was concluded that there is a significant difference between the various dimensions of sports retail SC challenges. Since the significance value was less than 0.05. (i.e.  $P = 0.000$ ). Therefore,  $H_1$  is accepted.

Scheffe's Post Hoc test was further conducted to determine the mean difference between the dimensions of the sports retail SC challenges, as the "P" value was significant. The result was shown in Table 4.21.

**Table 4.21.**

**Scheffe's Post Hoc Tests of Significance and Difference between the Mean Opinion of the Sports Retailers in SC Challenges**

(I) Factors	(J) Factors	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
<b>DeMC</b>	DiMC	4.52*	0.40	0.00	-5.75	-3.28
	EUC	0.26	0.40	0.98	-.97	1.4
	IMC	4.92*	0.40	0.00	4.06	6.48
	SC	4.62*	0.40	0.00	3.39	5.74
<b>DiMC</b>	EUC	6.78*	0.40	0.00	5.84	6.92
	IMC	4.69*	0.40	0.00	3.45	5.92
	SC	4.35*	0.40	0.00	3.12	5.59
<b>EUC</b>	IMC	0.09	0.40	1.00	-1.32	1.14
	SC	4.42*	0.40	0.00	3.62	5.71
<b>IMC</b>	SC	6.33*	0.40	0.00	5.56	6.90

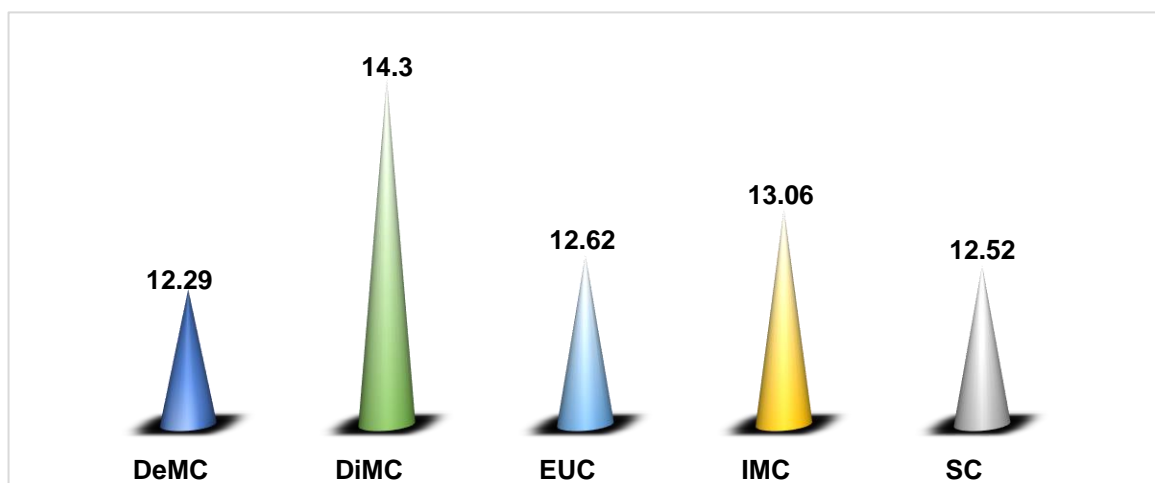
\*Significant level at the 0.05.

From the table 4.21, it is concluded that the mean difference values between the groups DeMC and DiMC of the sports retail Sourcing Challenges were 4.52, DeMC and IMC were 4.92, DeMC and Sourcing Challenges were

4.62, DiMC and EUC mean difference values were 6.78, the mean difference values of DiMC and IMC were 4.69, and DiMC and Sourcing Challenges mean difference values were 4.35, EUC and Sourcing Challenges were 4.42, IMC and Sourcing Challenges mean difference values were 6.33, which is less than the significance value of 0.05, which shows that northeast sports retailers have strong relationship between the dimension of retail SC challenges.

The mean value of the opinion of the sports retailers on various dimensions of SC challenges are graphically presented in figure.4.19.

**Figure. 4.19**  
**Graphical Representation of the Mean Opinion on Different Dimensions of Retail SC Challenges**



#### 4.6.2 One-way Analysis of Variance of the Firm's Performance Indicators

**Hypothesis (H<sub>0</sub>):** There is no significant difference between the various firm's performance indicators

**Hypothesis (H<sub>1</sub>):** There is a significant difference between the various firm's performance indicators

The opinion of sports retailers related to the firm's performance indicators are analyzed using One-way Analysis of Variance to find out the significant difference between each of the firm's performance indicators. The results are shown in table 4.22.

**Table. 4.22**

**One-way Analysis of Difference Variance of the Firm's Performance Indicators**

Group	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	35107.89	3	11702.63	250.28	.000*
Within Groups	151870.36	2048	46.75		
Total	186978.25	2051			

The table 4.22, shows that there is a significant difference between the various sport retail firm's performance indicators. The significance value is less than 0.05. (i.e. P = 0.000). Therefore, **H<sub>1</sub>** is accepted.

As the 'P' value was significant, Scheffe's Post Hoc test was conducted further to find the mean difference between the various sport retail firm's performance indicators. The result was shown in Table 4.23.

**Table 4.23**

**Scheffe's Post Hoc Tests of Significance and difference among the Mean Opinion of the Sports Goods Retailers in Firms Performance**

(I) Factors	(J) Factors	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
DP	FP	7.25*	0.33	0.00	8.20	6.31
	IP	0.60	0.33	0.36	1.55	0.34
	CSS	6.40*	0.33	0.00	7.35	5.45
FP	IP	6.65*	0.33	0.00	5.70	7.60
	CSS	0.85	0.33	0.09	0.09	1.80
IP	CSS	5.79*	0.33	0.00	6.74	4.85

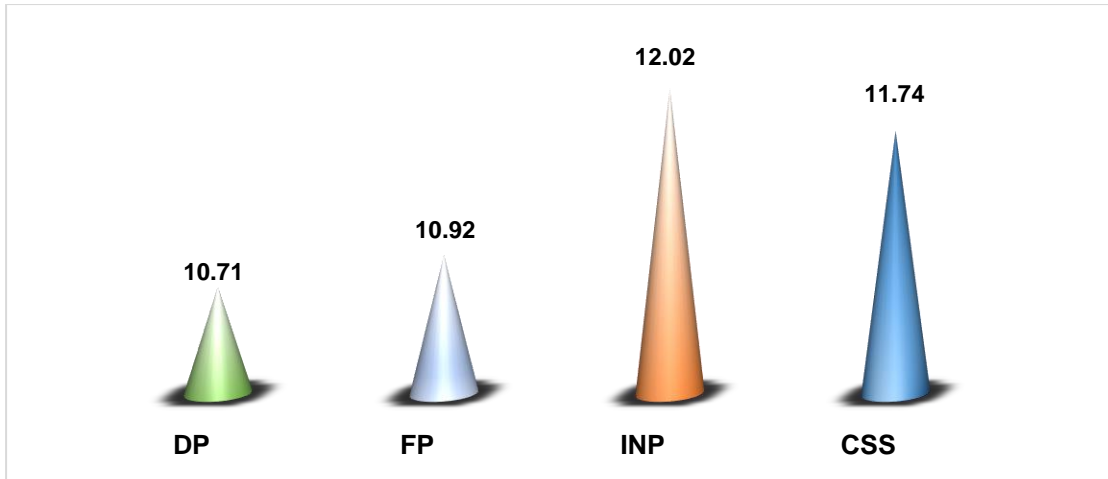
\*Significant level at the 0.05.

In table 4.23, it was shows that there is mean difference between the groups of Delivery Performance and Financial Performance of sports goods retailers were 7.25, Delivery Performance and Customer Service and Satisfaction were 6.40, Financial Performance and Inventory Performance were 6.65, and Inventory Performance and customer Service and Satisfaction were 5.79, which indicates that it is significance at the value 0.05, which stated that northeast sports retailers have a significant relationship among the firm performance indicators .

The mean value of the opinion of the sports retailers on various firms' performance indicators are graphically presented in figure.4.20.

**Figure.4.20**

**Graphical Representation of the Mean Opinion of the Sports Retailers in Firms Performance**



**4.7. MEASUREMENT SCALE OF SPORTS RETAIL SC CHALLENGES**

The descriptive analysis measuring the scale of sports retail SC challenges has five dimensions, such as DeMC, DiMC, EUC, IMC, and sourcing challenges (SC). The details of the measured scale using specific indicators for each dimension was shown below.

**4.7.2. Demand Management Challenges Measurement Scale**

Demand management serves as an independent variable, reflecting to challenges faced by sports retailers in their supply chain. Six measuring indicators were used to measure the DeMC of the northeast sports retail SC. The scale's reliability Cronbach's alpha value of 0.924 exceeds the required value of >0.7, indicating sufficient scale reliability. The average mean value of the item of the DeMC scale, which was below 3.0, showing that the majority of sports retailers from northeast India are facing high DeMC.

**Table 4.24**  
**Descriptive Analysis and Scale Reliability of DeMC**

Scale	Items	Mean	SD	Scale Reliability (Cronbach's Alpha)
<b>Demand Management Challenges</b>	<b>DeMC1</b>	2.1063	.78998	0.924
	<b>DeMC2</b>	1.9138	.79248	
	<b>DeMC3</b>	2.4223	.78279	
	<b>DeMC4</b>	1.6184	.74717	
	<b>DeMC5</b>	2.0170	.73415	
	<b>DeMC6</b>	2.2447	.77704	

**4.7.2. Distribution Management Challenges Measurement Scale**

The descriptive analysis of DiMC presented the detail mean value and standard deviation for each item (Table 4.25). six indicators were used to measure DiMC of northeast sports retailers. The Cronbach's alpha values for the constructs exceeded the required threshold of 0.70, demonstrating the sufficient scale's reliability. The average mean value of individual items of the DiMC scale was below 3.0 shows that a majority of the retailers agree that they have DiMC in their SC.

**Table.4.25**  
**Descriptive Analysis and Scale Reliability of DiMC**

Scale	Items	Mean	SD	Scale Reliability (Cronbach's Alpha)
<b>Distribution Management Challenges</b>	<b>DiMC1</b>	2.2964	.79682	0.892
	<b>DiMC2</b>	2.1768	.79773	
	<b>DiMC3</b>	2.3614	.78875	
	<b>DiMC4</b>	3.0361	.70919	
	<b>DiMC5</b>	2.4047	.73768	
	<b>DiMC6</b>	2.1264	.77616	

#### 4.7.3. Environment Uncertainty Challenges Measurement Scale

The descriptive analysis of EUC provides the detail mean value and standard deviation for each item (Table 4.26). six indicators were used to measure EUC of northeast sports retailers. The Cronbach's Alpha value of 0.916 indicates its measuring scale has reliability. The average mean value of individual items of the EUC scale was below 3.0, indicating that environmental uncertainty is highly a challenges factors to the sports retailers in their SC.

**Table.4.26**  
**Descriptive Analysis and Scale Reliability of EUC**

Scale	Items	Mean	SD	Scale Reliability (Cronbach's Alpha)
Environment Uncertainty Challenges	EUC1	2.0247	.79737	0.916
	EUC2	2.2014	.76336	
	EUC3	2.1427	.75289	
	EUC4	1.9047	.72963	
	EUC5	2.0813	.72922	
	EUC6	2.2872	.74358	

#### 4.7.4. Information Management Challenges Measurement Scale

To measure the IMC of northeast sports retailers, six indicators were used. The detail mean value and standard deviation for each item of the IMC are provided in (Table 4.27). The Cronbach's Alpha value of 0.914 indicates its measuring scale has reliability. Descriptive analysis reveals that the average mean values is below 3.0, shows that information management is a challenges factors for the northeast sports retail in their SC.

**Table.4.27**  
**Descriptive Analysis and Scale Reliability of IMC**

Scale	Items	Mean	SD	Scale Reliability (Cronbach's Alpha)
<b>Information Management Challenges</b>	<b>IMC1</b>	2.3841	.82103	0.914
	<b>IMC2</b>	2.0116	.79686	
	<b>IMC3</b>	2.1428	.79297	
	<b>IMC4</b>	2.4646	.75189	
	<b>IMC5</b>	1.8543	.73598	
	<b>IMC6</b>	2.2098	.75008	

#### **4.7.5. Sourcing Challenges Measurement Scale**

The descriptive analysis of the Sourcing Challenges provides the mean value and standard deviation for each item (Table 4.28). Six indicators were used to measure the sourcing challenges of northeast India sports goods retailers. The Cronbach's alpha values for all the constructs exceed the required threshold of 0.70, indicating the scale's reliability. The average mean values of individual items are less than 3.0, indicating that northeast sports retailers are facing high sourcing challenges in their SC.

**Table 4.28**  
**Descriptive Analysis and Scale Reliability of Sourcing Challenges**

Scale	Items	Mean	SD	Scale Reliability (Cronbach's Alpha)
<b>Sourcing Challenges</b>	<b>SC1</b>	2.3674	.77076	0.869
	<b>SC2</b>	2.0985	.81010	
	<b>SC3</b>	2.2189	.75514	
	<b>SC4</b>	1.6542	.81698	
	<b>SC5</b>	2.1829	.75015	
	<b>SC6</b>	2.0374	.74871	

#### **4.8. MEASUREMENT PERFORMANCE SCALE**

In this section, the performance measure is analyzed into two categories: SCP and the firm's performance. The SCP of sports retailers was analyzed using five indicators, and the firm's performance is measured with four dependent variables, such as delivery performance, financial performance, inventory performance, and customer service and satisfaction, consisting of five indicators of each variable to measure the firm's performance of northeast sports goods retailers. The measured scale for each dimension is detailed below.

#### 4.8.1. Supply Chain Performance Measurement Scale

The descriptive analysis of the SCP scale presents the mean value and standard deviation for each item (Table 4.29). Five indicators were used to measure the SCP of northeast sports retailers, and Likert's five-point scale was used. The Cronbach's alpha values for all the constructs surpass the required threshold of 0.70, indicating the scale's good reliability. The mean values of individual items of the SCP scale are below 3.0, shows that the majority of the northeast sports retailers have weak SCP.

**Table.4.29**

**Descriptive Analysis and Scale Reliability of Supply Chain Performance**

Scale	Items	Mean	SD	Scale Reliability (Cronbach's Alpha)
Supply Chain Performance	SCP1	2.3087	.73738	0.846
	SCP2	2.1469	.73292	
	SCP3	1.7068	.71163	
	SCP4	2.2530	.77815	
	SCP5	1.9830	.74542	

#### 4.8.2. Delivery Performance Measurement Scale

To measure the delivery performance of sports goods retailers in northeast India, there are five indicators (Table 4.30). The Cronbach's Alpha value of 0.908 indicates sufficient reliability of the scale. The overall mean value of individual items ( $10.7146/5 = 2.14$ ) indicates that the northeast sports retailers have very poor delivery performance.

**Table.4.30****Descriptive Analysis and Scale Reliability of Delivery Performance**

Scale	Items	Mean	SD	Scale Reliability (Cronbach's Alpha)
Delivery Performance	DP1	1.9172	.81949	0.908
	DP2	2.3542	.73777	
	DP3	2.2079	.75256	
	DP4	2.1796	.79699	
	DP5	2.0857	.75833	

**4.8.3. Financial Performance Measurement Scale**

Financial performance serves as a dependent construct, reflecting the performance of the sports goods retailers in northeast India. Five indicators were used to measure financial performance (FP) (Table 4.31). The Cronbach's alpha value of 0.896 meets the required threshold of  $>0.7$ , indicating satisfactory measuring scale reliability. Moreover, the mean values of individual items of financial performance are below 3.0 indicate that northeast sports retailers have very poor financial performance.

**Table.4.31****Descriptive Analysis and Scale Reliability of Financial Performance**

Scale	Items	Mean	SD	Scale Reliability (Cronbach's Alpha)
Financial Performance	FP1	2.2506	.72694	0.896
	FP2	2.1272	.69920	
	FP3	2.1108	.76788	
	FP4	2.4305	.75211	
	FP5	2.0178	.73360	

#### 4.8.4. Inventory Performance Measurement Scale

The inventory performance scale consists of five items to measure the firm's performance of northeast India sports goods retailer (Table 4.32). With a Cronbach's Alpha value exceeding 0.7, the scale indicates sufficient reliability. The consolidated mean value of the individual items, calculated as  $(12.0209/5) = 2.40$ , indicates that the sports goods retailer's firm has poor inventory performance.

**Table.4.32**  
**Descriptive Analysis and Scale Reliability of Inventory Performance**

Scale	Items	Mean	SD	Scale Reliability (Cronbach's Alpha)
Inventory Performance	IP1	2.3678	.70801	0.852
	IP2	2.4416	.69700	
	IP3	2.4034	.69452	
	IP4	2.4280	.71666	
	IP5	2.3801	.71882	

#### 4.8.5. Customers Service and Satisfaction Performance Measurement Scale

The descriptive analysis of the Customer Service and Satisfaction Performance presented the mean value and standard deviation of individual item (Table 4.32). Five items were used to measure customer service and satisfaction. The Cronbach's alpha values for all the constructs exceed the required threshold of 0.70, indicating the scale's good reliability. The mean value of individual items on the Customer Service and Satisfaction scale is

below 3.0 shows that northeast sports retailers have very poor performance of customer service and satisfaction.

**Table.4.33**  
**Descriptive Analysis and Scale Reliability of Customers Service and Satisfaction**

Scale	Items	Mean	SD	Scale Reliability (Cronbach's Alpha)
<b>Customers Service and Satisfaction</b>	<b>CSS1</b>	2.4084	.79129	0.820
	<b>CSS2</b>	2.2546	.79893	
	<b>CSS3</b>	2.3579	.73849	
	<b>CSS4</b>	2.3469	.69142	
	<b>CSS5</b>	2.3813	.72584	

#### 4.9. VALIDITY AND RELIABILITY

According to Ringle et al. (2012), "Researchers frequently use confirmatory factor analysis (CFA) prior to model evaluation; however, it is preferable to avoid this practice. The parameter estimates are dependent on the specific configuration of the analyzed model, it is preferable to evaluate these measurements using Partial Least Squares (PLS)-Structural Equation Modeling (SEM) statistics. Gefen et al. (2011) emphasized the importance of including factorial validity and the equivalent of confirmatory factor analysis in research reporting. The measurement of the model's reliability and validity includes an assessment of composite reliability (CR) to determine internal consistency, individual indicator reliability, and the AVE to determine convergent validity.

The key measure to evaluate internal consistency reliability is composite reliability (CR). According to Hair et al. (2014), "composite reliability values between 0.60 to 0.70 are acceptable, and between 0.70 and 0.90 are satisfactory, and values greater than 0.90 are not preferable as they indicate that all indicator variables measure the same underlying construct." The outer loading is the measurement of connection between the indicators and constructs. A higher outer loading indicates stronger relationships between indicators and constructs. To achieve an AVE value of 0.5, the outer loadings of a specific indicator of the construct should exceed 0.708. According to Hair et al. (2017), an outer loading value of 0.70 is considered acceptable. It should also be statistically significant for the outer loading, which can be determined by examining the T-statistics. A T-statistics value of 1.96 signifies significance at the 0.05 level.

Convergent validity is the degree at which a measurement aligns positively with other measurements of the same concept (Hair et al., 2014). In the context of the domain sampling model, indicators of a reflective construct are regarded as diverse methods for gauging the same concept. The commonly used approach for assessing the convergent validity of constructs is through the calculation of the AVE, which is essentially a measure of the shared variance among constructs. When the AVE reaches or exceeds a value of 0.50, it signifies convergent validity. Conversely, an AVE value below 0.50 suggests that there is more measurement error associated with the items within a specific construct. Overall, the study conceptual framework is valid and reliable. The CR ratings for all the study constructs are more than the required value of 0.70 and less than 0.90 (Hair et al., 2014), indicating the scale's reliability. The Outer

loadings of all indicators of the construct are greater than 0.708, and the t-stat is greater than 1.96, showing convergent validity at the indicator level. All of the constructs have AVE values larger than the necessary value of 0.5, suggesting convergent validity at the construct level.

#### 4.9.1 Demand Management Challenges (DeMC) Scale Validity and Reliability

Table 4.34 shows the reliability and convergent validity of the construct Demand Management Challenges (DeMC).

**Table 4.34**  
**Demand Management Challenges (DeMC)- Reliability and Convergent Validity**

Construct	Indicator	Item Loading	T-Stat	AVE	CR	Cronbach's Alpha
DeMC	DeMC1	0.821	38.232	0.585	0.8939	0.924
	DeMC2	0.715	41.677			
	DeMC3	0.721	45.707			
	DeMC4	0.803	42.680			
	DeMC5	0.815	42.715			
	DeMC6	0.724	41.957			

The result shows that CR for demand management challenges is greater than 0.7, indicating the reliability of the DeMC scale. The indicators' outer loading values, ranging from 0.715 to 0.821, are above the required value of 0.708 for a convergent value at the indicator level. The T-statistics value is greater than 1.96, which confirmed that the convergent validity of demand

management challenges scale is significant. The AVE value of 0.585 is greater than the required value of 0.5, indicating the convergent validity of the DeMC scale.

#### 4.9.2 Distribution Management Challenges (DiMC) Scale Validity and Reliability

Table 4.35 shows the reliability and convergent validity of the Distribution Management Challenges (DiMC) variable.

**Table 4.35**  
**Distribution Management Challenges (DiMC)- Reliability and Convergent Validity**

Construct	Indicator	Item Loading	T-Stat	AVE	CR	Cronbach's Alpha
DiMC	DiMC1	0.805	48.116	0.593	0.8970	0.892
	DiMC2	0.721	50.763			
	DiMC3	0.814	50.691			
	DiMC4	0.802	52.485			
	DiMC5	0.798	51.079			
	DiMC6	0.945	48.655			

The composite reliability for the distribution management challenges scale is 0.8970, which is greater than the required value of 0.70 and also indicates the sufficient internal consistency of the DiMC scale. The six indicators were used to measured, and the indicators' outer loading values range from 0.721 to 0.945, and all values are above the required value of 0.7. The T-statistics value of the respective indicators in the constructs is above 1.96, which confirmed that the convergent validity is statistically significant of

the items DiMC scale. The AVE value of 0.593 is above the required value of 0.5 and shows the convergent value at the construct level.

#### 4.9.3 Environmental Uncertainty Challenges (EUC) Scale Validity and Reliability

Table 4.36 shows the reliability and convergent validity of the environmental uncertainty challenges variable. The EUC scale consists of six items. The value of composite reliability of 0.897 above the required composite reliability value. The indicators' outer loading values range from 0.712 to 0.851, which is greater than the minimum required value of 0.708. The T-statistics values are greater than 1.96, indicating the convergent validity of the EUC scale at items level. AVE is calculated using the outer loading value for convergent validity at the construct level, and shows that the value of AVE is greater than the required value of 0.5. indicating convergent validity at the construct level.

**Table 4.36**  
**Environmental Uncertainty Challenges (EUC)- Reliability and**  
**Convergent Validity**

Construct	Indicator	Item Loading	T-Stat	AVE	CR	Cronbach's Alpha
EUC	EUC1	0.812	41.315	0.595	0.8979	0.916
	EUC2	0.731	42.059			
	EUC3	0.851	41.792			
	EUC4	0.804	42.082			
	EUC5	0.712	42.701			
	EUC6	0.721	41.395			

#### 4.9.4 Information Management Challenges (IMC) Scale Validity and Reliability

Table 4.37 shows the scale reliability and convergent validity of the construct information management challenges. The result shows the composite reliability for IMC is greater than 0.7, indicating the reliability of the information management challenges scale.

The outer loading values of the indicators, ranging from 0.730 to 0.832, are above the required value of 0.708 for a convergent value at the indicator level. The T-statistics value is greater than 1.96, which confirmed the significant of the convergent validity of the IMC scale at items level. The AVE value of 0.600 is greater than the required value of 0.5, indicating the convergent validity of IMC at construct level.

**Table 4.37**  
**Information Management Challenges (IMC)- Reliability and Convergent Validity**

Construct	Indicator	Item Loading	T-Stat	AVE	CR	Cronbach's Alpha
IM	IMC1	0.832	43.206	0.600	0.8998	0.914
	IMC2	0.731	41.651			
	IMC3	0.806	42.571			
	IMC4	0.741	41.551			
	IMC5	0.73	42.894			
	IMC6	0.804	42.650			

#### 4.9.5 Sourcing Challenges (SC) Scale Validity and Reliability

Table 4.38 shows the reliability and convergent validity of the construct Sourcing Challenges (SC).

**Table 4.38**  
**Sourcing Challenges (SC)- Reliability and Convergent Validity**

Construct	Indicator	Item Loading	T-Stat	AVE	CR	Cronbach's Alpha
SC	SC1	0.723	41.629	0.600	0.8998	0.869
	SC2	0.854	43.418			
	SC3	0.814	42.962			
	SC4	0.809	43.292			
	SC5	0.713	41.802			
	SC6	0.726	42.726			

There were six indicators used to measure sourcing management challenges. The internal consistency of the scale meets the standard requirement (CR >0.7), as the composite reliability is 0.899. The convergent validity of the item level is adequate, and the items loadings of the indicators are between 0.713 and 0.854, which is greater than 0.708. Also, T-statistics for the indicators are greater than 1.96, showing the statistically significant of the outer loadings. The AVE value for the sourcing challenges construct is 0.60, which indicates convergent validity at the construct level.

#### 4.9.6 Supply Chain Performance (SCP) Scale Validity and Reliability

Table 4.39 shows the reliability and convergent validity of the endogenous variable Supply Chain Performance (SCP).

**Table 4.39**  
**Supply Chain Performance (SCP) Scale Validity and Reliability**

Construct	Indicator	Item Loading	T-Stat	AVE	CR	Cronbach's Alpha
SCP	SCP1	0.821	45.008	0.658	0.8964	0.846
	SCP2	0.813	46.677			
	SCP3	0.816	43.999			
	SCP4	0.817	48.782			
	SCP5	0.783	44.075			

The composite reliability for the supply chain performance construct is 0.896 indicates the internal consistency of measurement scale. The indicators' outer loading values are above 0.7, and the T-statistics values are above 1.96, indicating the statistically significant of the item's loadings and convergence validity at the item level. The AVE value of 0.658 shows the convergent validity of the SCP at the construct level.

#### 4.9.6 Delivery Performance (DP) Scale Validity and Reliability

Table 4.40 shows the reliability and convergent validity of the endogenous variable Delivery Performance (DP).

**Table 4.40**  
**Delivery Performance (DP)- Reliability and Convergent Validity**

Construct	Indicator	Item Loading	T-Stat	AVE	CR	Cronbach's Alpha
DP	DP1	0.816	43.008	0.6409	0.8984	0.908
	DP2	0.721	44.677			
	DP3	0.912	42.999			
	DP4	0.824	43.782			
	DP5	0.713	44.075			

The composite reliability for the delivery performance construct is 0.898 indicates the internal consistency of the scale. The indicators' outer loading values are above 0.7, and the T-statistics values are above 1.96, indicating the statistically significant of the outer loadings and convergence validity at the item level. The AVE value of 0.640, shows the convergent validity of the DP at the construct level.

#### 4.9.7 Financial Performance (FP) Scale Validity and Reliability

Table 4.41 shows the reliability and convergent validity of the endogenous variable Financial Performance (FP).

**Table 4.41**  
**Financial Performance (FP)- Reliability and Convergent Validity**

Construct	Indicator	Item Loading	T-Stat	AVE	CR	Cronbach's Alpha
FP	FP1	0.802	68.232	0.653	0.8952	0.896
	FP2	0.921	67.640			
	FP3	0.864	69.188			
	FP4	0.811	68.132			
	FP5	0.724	67.901			

The FP was measured using five indicators, and the composite reliability value is 0.895, showing the internal consistency of the scale. The outer loadings of all five items are between 0.724 and 0.921, which is statistically significant at the level of 0.00. This shows the convergent validity at the item level. Further, the AVE value of 0.653 indicates convergent validity at the construct level.

#### 4.9.8 Inventory Performance (IP) Scale Validity and Reliability

Table 4.42 shows the reliability and convergent validity of the endogenous variable Inventory Performance (IP). The result shows the composite reliability for inventory performance is greater than 0.7, indicating the reliability of the IP scale. The outer loading values of the indicators, ranging from 0.729 to 0.902, are above the required value of 0.708 for a convergent validity at the items level. The T-statistics value is greater than 1.96, which

confirmed that the significant of the convergent validity of the IP scale. The AVE value of 0.645 is greater than the required value of 0.5, indicating the convergent validity at the construct level.

**Table 4.42**  
**Inventory Performance (IP)- Reliability and Convergent Validity**

Construct	Indicator	Item Loading	T-Stat	AVE	CR	Cronbach's Alpha
IP	IP1	0.729	43.262	0.645	0.8964	0.852
	IP2	0.809	44.093			
	IP3	0.823	45.408			
	IP4	0.816	45.128			
	IP5	0.902	42.987			

#### **4.9.9 Customers Service and Satisfaction (CSS) Scale Validity and Reliability**

Table 4.43 shows the reliability and convergent validity of the endogenous variable customer service and satisfaction.

The result shows the composite reliability for Customer CSS is greater than 0.7, indicating that CSS scale has reliability. The outer loading values of the items, ranging from 0.712 to 0.904, are above the required value of 0.708 for a convergent validity at the items level. The T-statistics value is greater than 1.96, which confirmed the statistically significant the convergent validity of the CSS scale. The AVE value of 0.642 exceeds the required value of 0.5, indicating the convergent validity of CSS at the construct level.

**Table 4.43**  
**Customers Service and Satisfaction (CSS)- Reliability and Convergent**  
**Validity**

Construct	Indicator	Item Loading	T-Stat	AVE	CR	Cronbach's Alpha
CSS	CSS1	0.819	64.078	0.642	0.8983	0.820
	CSS2	0.712	64.310			
	CSS3	0.904	63.998			
	CSS4	0.746	64.651			
	CSS5	0.817	65.013			

#### 4.9.10 Discriminant Validity

Hair et al. (2017) emphasized the significance of discriminant validity, defining it as the degree to which a concept stands apart from others in empirical terms, indicating its uniqueness and its ability to capture phenomena distinct from those represented by other constructs in the model.

To assess discriminant validity, both cross-loadings and the Fornell-Larcker criterion were used. The Fornell-Larcker criterion, Hair et al., (2014) described "it as a conservative method for assessing the discriminant validity". The conceptual framework encompassed of ten constructs. Correlations among latent variables were computed (Table 4.44), and the square root of AVE values was also determined. In the correlation matrix (Table 4.44), correlation values within the same construct were substituted with the square root of AVE values.

The Fornell-Larcker criterion results (Table 4.44) demonstrated that the square root of AVE exceeded the correlation between each construct and all others in the model, indicating that each construct shared more variance with its respective indicators than with other constructs. This outcome confirmed the discriminant validity of the conceptual model.

**Table 4.44: Discriminant Validity (Fornell-Larcker Criterion)**

	CSS	DP	DeMC	DiMC	EUC	FP	IMC	INP	SC	SCP
CSS	<b>0.801</b>									
DP	0.462	<b>0.800</b>								
DeMC	0.524	0.428	<b>0.764</b>							
DiMC	0.592	0.684	0.230	<b>0.770</b>						
EUC	0.536	0.692	0.489	0.545	<b>0.771</b>					
FP	0.306	0.425	0.741	0.624	0.694	<b>0.808</b>				
IMC	0.647	0.716	0.406	0.374	0.483	0.758	<b>0.774</b>			
INP	0.323	0.411	0.518	0.716	0.748	0.444	0.581	<b>0.803</b>		
SC	0.686	0.657	0.698	0.488	0.399	0.673	0.621	0.716	<b>0.775</b>	
SCP	0.461	0.721	0.485	0.648	0.726	0.741	0.687	0.781	0.648	<b>0.811</b>

Square root of AVE on diagonal is highlighted

Table 4.45 shows how items are cross-loaded with their specified construct and the other constructs provided in the conceptual model. Each indicator shows higher outer loadings on the corresponding construct compared to other constructs loadings, confirming the constructs' discriminant validity (Hair, Ringle, & Sarstedt, 2011).

**Table 4.45 Cross Loading**

	CSS	DP	DeMC	DiMC	EUC	FP	IMC	INP	SC	SCP
CSS1	<b>0.819</b>	0.411	0.517	0.317	0.331	0.406	0.324	0.622	0.305	0.551
CSS2	<b>0.712</b>	0.412	0.412	0.432	0.624	0.593	0.416	0.521	0.402	0.248
CSS3	<b>0.904</b>	0.519	0.608	0.505	0.331	0.304	0.609	0.465	0.614	0.412
CSS4	<b>0.746</b>	0.496	0.305	0.324	0.417	0.684	0.547	0.605	0.623	0.653
CSS5	<b>0.817</b>	0.509	0.509	0.604	0.213	0.305	0.501	0.315	0.414	0.218
DP1	0.431	<b>0.816</b>	0.291	0.632	0.355	0.502	0.462	0.236	0.447	0.468
DP2	0.346	<b>0.721</b>	0.579	0.468	0.473	0.645	0.431	0.597	0.383	0.338
DP3	0.514	<b>0.912</b>	0.290	0.318	0.502	0.528	0.459	0.651	0.482	0.507
DP4	0.616	<b>0.824</b>	0.482	0.470	0.479	0.401	0.438	0.634	0.282	0.463
DP5	0.325	<b>0.713</b>	0.586	0.597	0.595	0.437	0.554	0.391	0.583	0.410
DeM1	0.422	0.316	<b>0.821</b>	0.485	0.369	0.524	0.490	0.590	0.386	0.375
DeM2	0.545	0.489	<b>0.715</b>	0.581	0.481	0.308	0.431	0.553	0.576	0.267
DeM3	0.305	0.321	<b>0.721</b>	0.362	0.396	0.501	0.272	0.514	0.587	0.587
DeM4	0.295	0.484	<b>0.803</b>	0.473	0.566	0.306	0.324	0.559	0.632	0.651
DeM5	0.603	0.584	<b>0.815</b>	0.298	0.478	0.402	0.641	0.568	0.345	0.474
DeM6	0.519	0.641	<b>0.724</b>	0.594	0.295	0.352	0.435	0.583	0.554	0.427
DiM1	0.403	0.472	0.318	<b>0.805</b>	0.322	0.402	0.448	0.335	0.572	0.501
DiM2	0.416	0.405	0.596	<b>0.721</b>	0.426	0.455	0.275	0.579	0.392	0.619
DiM3	0.297	0.302	0.497	<b>0.814</b>	0.321	0.581	0.372	0.562	0.482	0.408
DiM4	0.314	0.667	0.477	<b>0.802</b>	0.559	0.621	0.255	0.453	0.563	0.426
DiM5	0.410	0.584	0.371	<b>0.798</b>	0.546	0.605	0.558	0.345	0.659	0.322
DiM6	0.604	0.288	0.589	<b>0.945</b>	0.442	0.203	0.560	0.456	0.579	0.501
EUC1	0.433	0.478	0.385	0.415	<b>0.812</b>	0.327	0.372	0.341	0.492	0.359
EUC2	0.539	0.286	0.572	0.515	<b>0.731</b>	0.321	0.464	0.357	0.469	0.456
EUC3	0.405	0.396	0.491	0.463	<b>0.851</b>	0.401	0.539	0.491	0.594	0.338
EUC4	0.321	0.574	0.428	0.442	<b>0.804</b>	0.512	0.387	0.441	0.610	0.442
EUC5	0.425	0.485	0.681	0.321	<b>0.712</b>	0.508	0.376	0.676	0.487	0.465
EUC6	0.415	0.541	0.541	0.333	<b>0.721</b>	0.606	0.541	0.516	0.363	0.520
FP1	0.684	0.318	0.502	0.533	0.402	<b>0.802</b>	0.411	0.615	0.421	0.309
FP2	0.615	0.323	0.607	0.516	0.327	<b>0.921</b>	0.403	0.457	0.313	0.672
FP3	0.425	0.425	0.507	0.408	0.407	<b>0.864</b>	0.503	0.337	0.411	0.387
FP4	0.312	0.422	0.310	0.431	0.523	<b>0.811</b>	0.407	0.404	0.505	0.602
FP5	0.517	0.523	0.408	0.324	0.306	<b>0.724</b>	0.303	0.605	0.412	0.524
IMC1	0.404	0.546	0.439	0.481	0.358	0.308	<b>0.832</b>	0.540	0.601	0.594
IMC2	0.327	0.661	0.429	0.575	0.553	0.316	<b>0.731</b>	0.556	0.327	0.686
IMC3	0.409	0.584	0.628	0.673	0.478	0.512	<b>0.806</b>	0.547	0.515	0.552
IMC4	0.411	0.543	0.521	0.331	0.583	0.308	<b>0.741</b>	0.549	0.215	0.487
IMC5	0.542	0.615	0.595	0.348	0.369	0.432	<b>0.73</b>	0.519	0.485	0.301
IMC6	0.307	0.531	0.607	0.455	0.582	0.611	<b>0.804</b>	0.537	0.609	0.478
INP1	0.506	0.652	0.575	0.551	0.362	0.513	0.560	<b>0.729</b>	0.558	0.435
INP2	0.504	0.231	0.550	0.529	0.563	0.527	0.543	<b>0.809</b>	0.545	0.526
INP3	0.355	0.632	0.565	0.432	0.458	0.378	0.549	<b>0.823</b>	0.556	0.371
INP4	0.613	0.445	0.538	0.627	0.549	0.344	0.523	<b>0.816</b>	0.529	0.464
INP5	0.327	0.541	0.560	0.326	0.672	0.542	0.542	<b>0.902</b>	0.545	0.449
SC1	0.509	0.695	0.478	0.466	0.595	0.510	0.135	0.561	<b>0.723</b>	0.659
SC2	0.413	0.582	0.243	0.545	0.505	0.619	0.324	0.544	<b>0.854</b>	0.447
SC3	0.406	0.202	0.348	0.360	0.491	0.514	0.605	0.557	<b>0.814</b>	0.553
SC4	0.558	0.557	0.634	0.563	0.485	0.317	0.415	0.530	<b>0.809</b>	0.346
SC5	0.562	0.390	0.641	0.375	0.578	0.426	0.606	0.538	<b>0.713</b>	0.434
SC6	0.558	0.584	0.421	0.573	0.385	0.325	0.596	0.559	<b>0.726</b>	0.365
SCP1	0.674	0.422	0.481	0.436	0.466	0.546	0.399	0.464	0.367	<b>0.821</b>
SCP2	0.639	0.375	0.672	0.411	0.352	0.593	0.486	0.222	0.352	<b>0.813</b>
SCP3	0.608	0.364	0.555	0.511	0.455	0.458	0.365	0.427	0.238	<b>0.816</b>
SCP4	0.628	0.489	0.561	0.609	0.341	0.692	0.481	0.346	0.439	<b>0.817</b>
SCP5	0.604	0.523	0.486	0.531	0.439	0.664	0.490	0.275	0.506	<b>0.783</b>

#### **4.10 Structural Equation Model – PLS Approach**

To analyzed the model, a structural equation model with partial least squares (PLS-SEM) used. SmartPLS 4.0 software is used for performing PLS tests. Hair, Ringle, and Sarstedt (2011) defined the "covariance-based structural equation model (CB-SEM) as a confirmatory approach that focuses on the model's theoretically established relationships and aims to minimize the difference between the model's implied covariance matrix and the sample covariance matrix. whereas PLS-SEM is a prediction-oriented variance-based technique that focuses on endogenous target components in the model and aims to optimize their explained variance".

Peng and Lai (2012) argue that "the PLS application is ideal for operations management research because it takes a component-based approach to structural modelling". As this study investigates the issues at the firm or supply chain level, large samples are difficult to gather (Peng and Lai, 2012). PLS requires less sample size than classic covariance-based approaches and is not require normally distributed data (Rexhausen et al, 2012; Kern et al, 2012; Hair Jr. et al, 2014).

The ten constructs explored in the section on conceptual model development are latent variables necessitating indirect measurement. This study focuses on retailer's supply chain practices challenges and performance constructs that are inherently reflective as they embody their indicators.

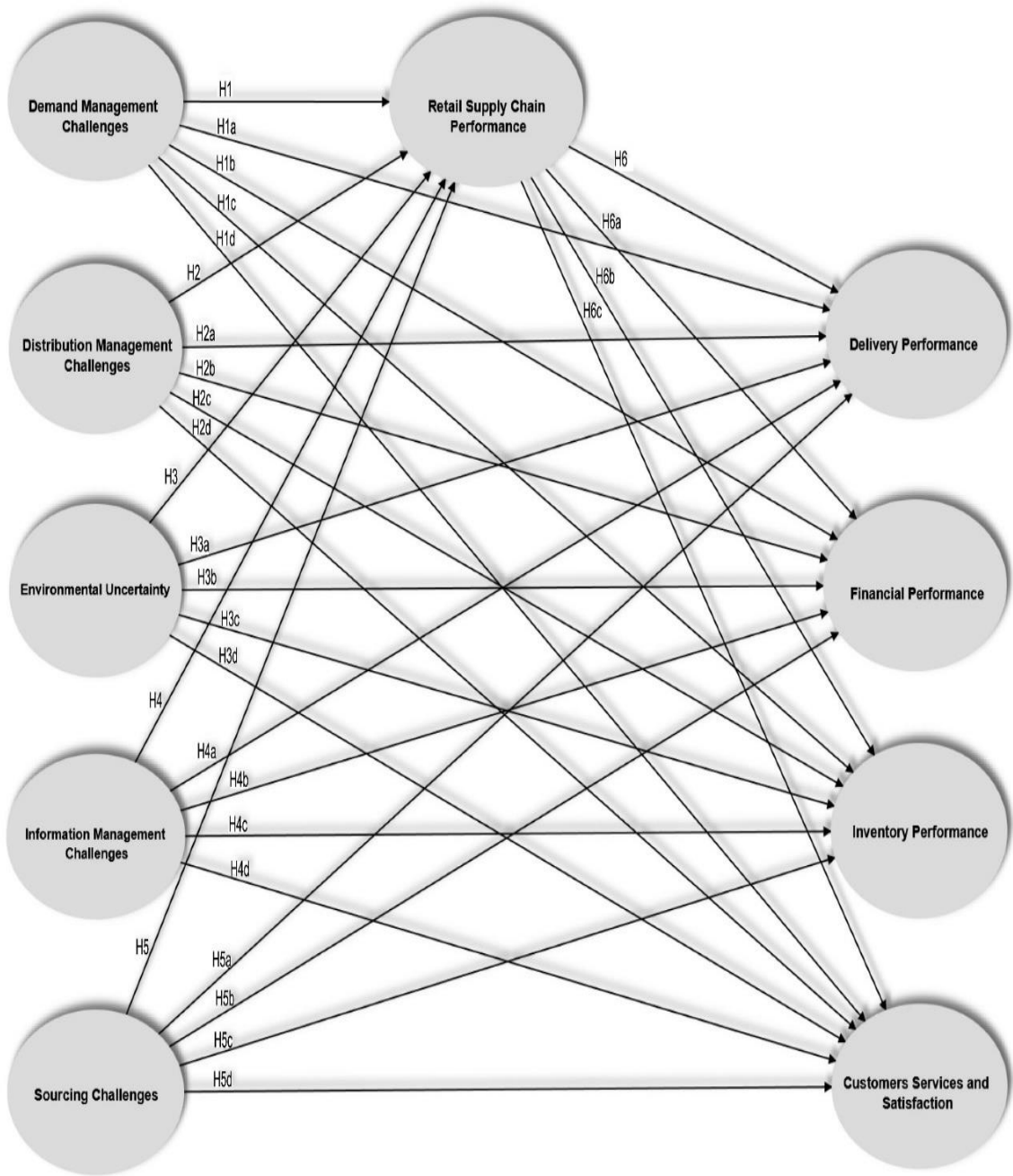
As discussed in the previous chapter, the conceptual model was tested using 513 cases gathered from northeast Indian sports goods retailers. The supply chain challenges include demand management, distribution management, environmental uncertainty, information management challenges, and sourcing challenges. These challenges serve as independent variables within the conceptual framework. Dependent variables consist of delivery performance, financial performance, inventory performance, and customer service and satisfaction, collectively referred to as firm performance. Supply chain performance is a mediating variable in this study (Figure 4.21).

SmartPLS 4.0 was used to develop a path diagram with 10 constructs, which include retail supply chain challenges, firm performance indicators, and supply chain performance as the mediating variable. A master data sheet was prepared in MS Excel, and the data was directly imported into SmartPLS 4.0 for analysis. The construction indicators were assigned, and they were labelled. The PLS algorithm was used to test the structural model. The PLS algorithm provides the AVE, composite reliability, Cronbach's alpha, communality, redundancy, latent variable correlations, cross-loadings, outer loadings, and route coefficients. These variables were utilized to ensure that the structural model was valid and reliable. Figure 4.22 depicts the structural model tested using SmartPLS 4.0.

The hypothesized model was analyzed on its ability to reproduce the observed covariance matrix and the significance and direction of the hypothesized paths. The values of the hypothesized correlations were calculated using SEM analysis. Table 4.46 lists the conceptual model's exogenous and endogenous constructs.

**Table 4.46 Hypothesized Structural Model Constructs**

<b>Exogenous Constructs</b>	<b>Endogenous Variable</b>
Demand Management Challenges (DeMC)	Supply Chain Performance
Distribution Management Challenges (DiMC)	(SCP)
Environmental Uncertainty Challenges (EUC)	Delivery Performance (DP)
Information Management Challenges (IMC)	Financial Performance (FP)
Sourcing Challenges (SC)	Inventory Performance (INP) Customers Service and Satisfaction (CSS)



Retail Supply Chain Challenges

Firms Performance

**Figure 4.21. Path Model**

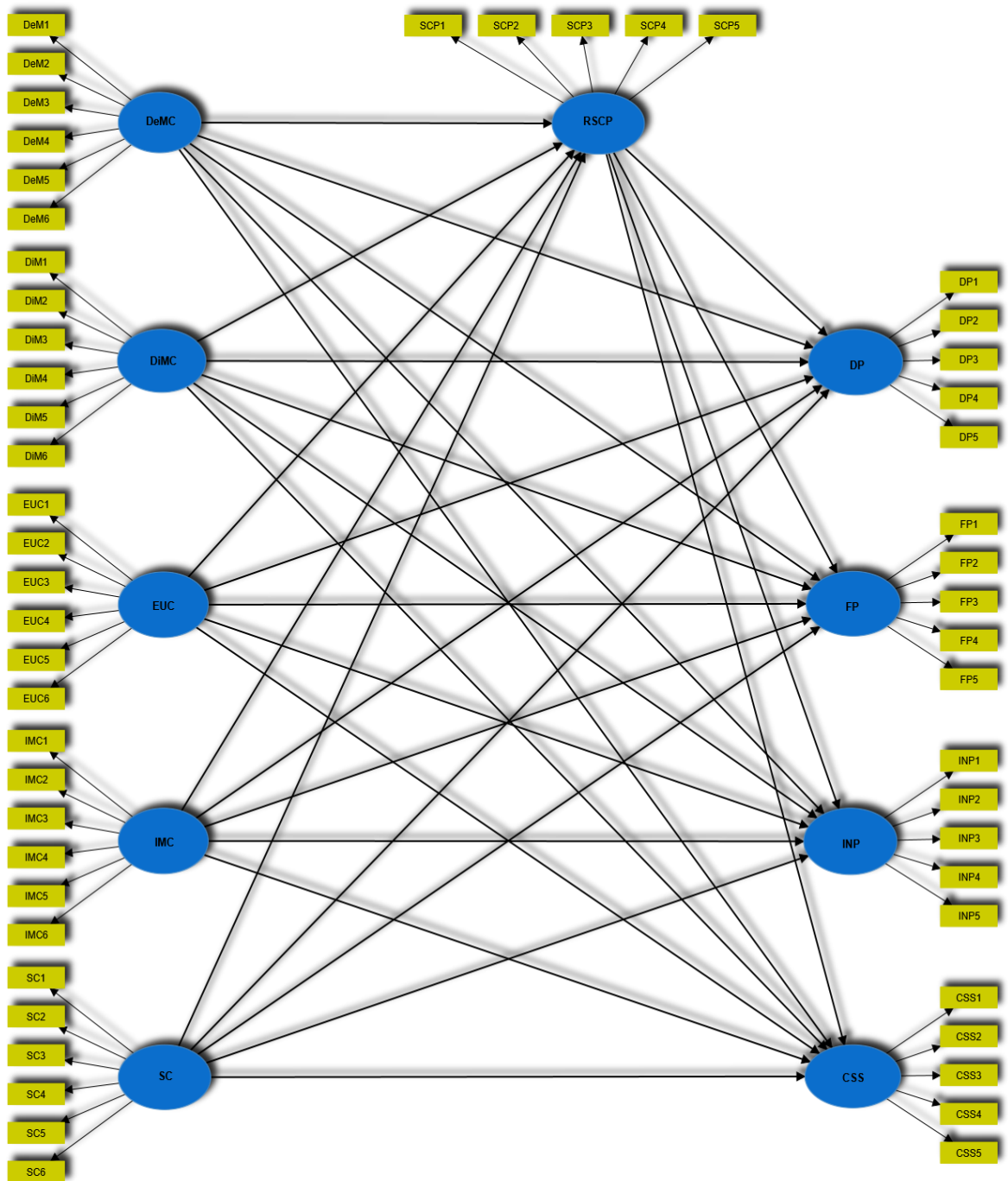


Figure.4.22 Structure Equation Model

## 4.11 Hypothesis Testing

The structural model includes five independent variables, four dependent variables, and one mediating variable. In the path model, a maximum of six arrowheads are pointed to one construct (Figure 4.22). Hypothesis testing is the process to determining and evaluating the links between independent and dependent variables. The path coefficient values were calculated using the PLS algorithm. The statistically significant nature of the path coefficient was validated by the T-statistic value. The T-statistics value was obtained by bootstrapping with the SmartPLS 4.0 software.

Bootstrapping analysis was performed using SmartPLS 4.0 with 513 cases and 10,000 samples to provide T-statistics to determine the significance of correlations among the latent variables. MS Excel's T-distribution function (TDIST) was used to calculate the P value. The results of all test hypotheses are accepted at the significant 0.05 level, which is significant at 0.1 level (Table 4.47). The bootstrapped confidence interval excludes zero, indicating the validity as well as the significance of correlations (Hair et al., 2014; Malhotra et al., 2014). The constructs are operationalized as follows:

*Demand management challenges (DMC):* DeMC construct is an independent variable and represents the retail supply chain challenges. Six items were used to measure the DeMC construct. All the items of the indicators reflect the sports goods retailers supply chain challenges, so it is a reflective measurement. It has five direct and four indirect relationships with the dependent variables in pathway models (figure 4.22).

*Distribution management Challenges (DiMC):* DiMC is a reflective measurement model and it has six items to measure the distribution management challenges construct. DiMC is an independent variable and indicator of retail supply chain challenges. It has five direct relationships and four indirect relationships with the dependent variables in the path diagram (Figure 4.22).

*Environmental Uncertainty Challenges (EUC):* Environmental Uncertainty Challenges is an independent construct in the path model, representing the retail supply chain challenges. EUC is a reflective measurement model and has six items to measure the construct. It has five direct and four indirect relationships with the dependent variables in the path diagram (Figure 4.22).

*Information management challenges (IMC):* IMC construct is one among the variables that represent the retail supply chain challenges. IMC is an independent variable consisting of six items in the measurement scale. IMC is also a reflective measurement. It has five direct relationships and four indirect relationships with the dependent variables in the path model (Figure 4.22).

*Sourcing Challenges (SC):* Sourcing Challenges is an independent construct in the path model, representing the retail supply chain challenges. SC is a reflective measurement model and has six items to measure the construct. It has five direct and four indirect relationships with the dependent variables in the path diagram (Figure 4.22).

*Supply Chain Performance (SCP):* SCP is the mediator variable in the path model. Five independent variables as retail supply chain challenges and four dependent variables as firm performance are used in the path diagram.

Five independent variables are having direct effect on SCP and SCP also has direct effect on the dependent variables. Also, SCP mediate the relationships between retail supply chain challenges and Firm's performance indicators (Figure 4.22). There were five items used to measure the SCP construct and it is a reflective measurement model.

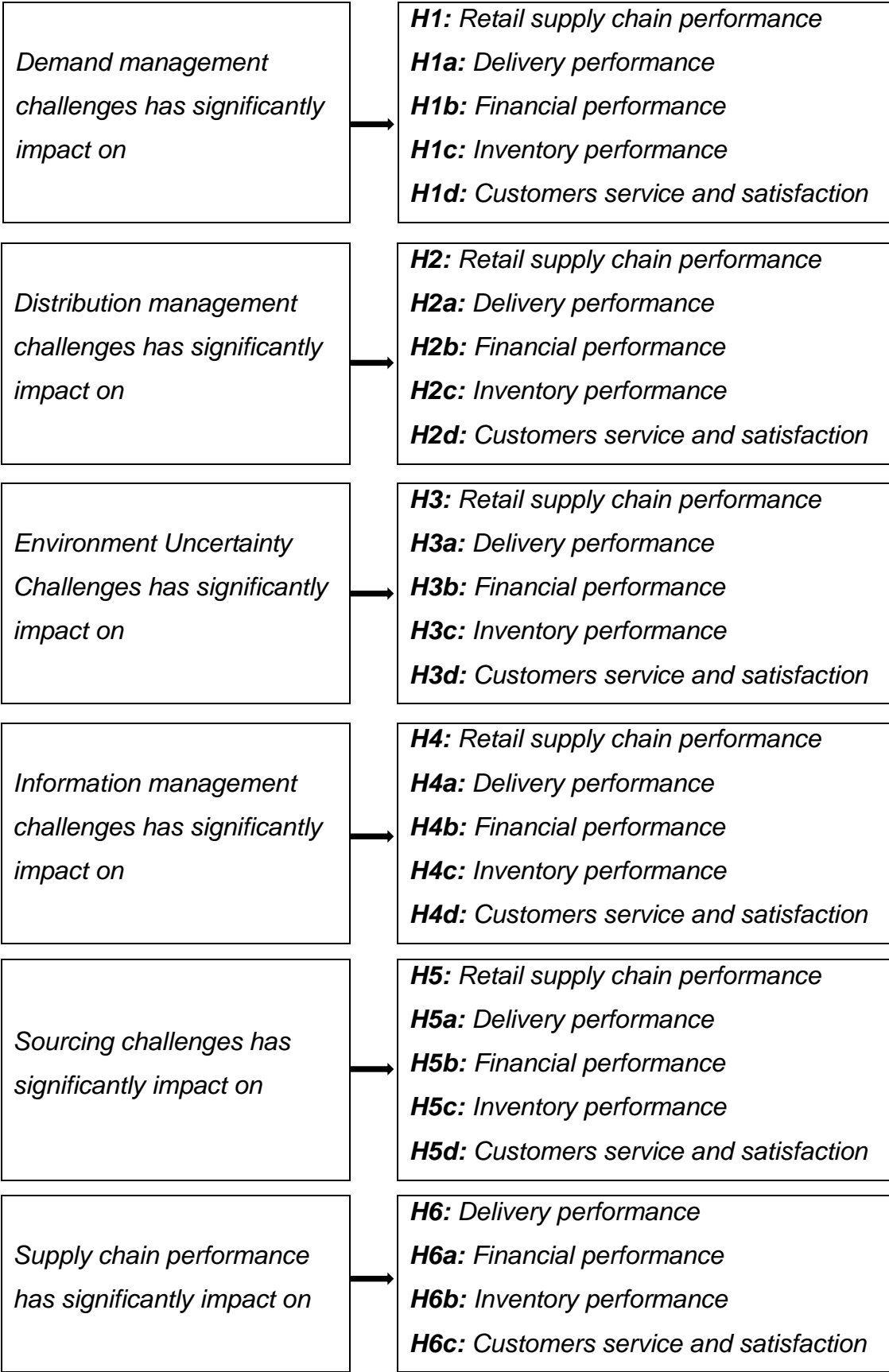
*Delivery Performance:* DP is a dependent variable in the path model. There were five indicators used to measure the reflective measurement scale DP (Figure 4.22). DP is used as a firm's performance indicator. DP has five exogenous variables, excluding mediator variable SCP.

*Financial Performance (FP):* FP is a dependent variable in the path model. There were five indicators used to measure the construct. FP is a reflective measurement scale. FP is used as a firm's performance indicator. FP has five exogenous variables, excluding mediator variable SCP (Figure 4.22).

*Inventory Performance (INP):* INP is a dependent variable in the path model. INP is a reflective measurement scale and five items were used to measure the construct. INP also used as a firm's performance indicator. INP has five exogenous variables, excluding mediator variable SCP (Figure 4.22).

*Customers Service and Satisfaction (CSS):* CSS is a dependent variable in the path model. CSS is a reflective measurement scale and five items were used to measure the construct. CSS also used as a firm's performance indicator. CSS has five exogenous variables, excluding mediator variable SCP (Figure 4.22).

The developed hypothesis for the structural model was detailly discussed. The research hypotheses are as follows:



**Table 4.47. Table Path Coefficient of Structural Model**

Hypothesis		Path Coefficient				Result
		Point Estimates	t-Value	St. Error	P	
H1	DeMC -> SCP	0.205	3.028	0.037	0.004	Supported
H1a	DeMC -> DP	0.392	6.024	0.096	0.000	Supported
H1b	DeMC -> FP	0.378	5.282	0.092	0.000	Supported
H1c	DeMC -> INP	0.456	5.286	0.093	0.000	Supported
H1d	DeMC -> CSS	0.396	3.803	0.061	0.000	Supported
H2	DiMC-> SCP	0.246	3.104	0.045	0.000	Supported
H2a	DiMC -> DP	0.429	4.834	0.087	0.000	Supported
H2b	DiMC -> FP	0.287	3.613	0.025	0.000	Supported
H2c	DiMC -> INP	0.344	5.627	0.068	0.000	Supported
H2d	DiMC -> CSS	0.502	6.853	0.097	0.000	Supported
H3	EUC -> SCP	0.216	3.412	0.044	0.006	Supported
H3a	EUC -> DP	0.415	4.791	0.057	0.000	Supported
H3b	EUC -> FP	0.323	4.137	0.037	0.000	Supported
H3c	EUC -> INP	0.312	2.982	0.028	0.009	Supported
H3d	EUC -> CSS	0.196	3.084	0.036	0.003	Supported
H4	IMC -> SCP	0.384	5.427	0.095	0.000	Supported
H4a	IMC -> DP	0.603	7.135	0.055	0.000	Supported
H4b	IMC -> FP	0.522	6.471	0.082	0.000	Supported
H4c	IMC -> INP	0.265	3.459	0.081	0.000	Supported
H4d	IMC -> CSS	0.447	4.931	0.074	0.000	Supported
H5	SC -> SCP	0.361	5.268	0.079	0.000	Supported
H5a	SC -> DP	0.402	4.392	0.066	0.000	Supported
H5b	SC -> FP	0.317	4.086	0.048	0.000	Supported
H5c	SC -> INP	0.576	6.508	0.094	0.000	Supported
H5d	SC -> CSS	0.247	3.216	0.035	0.000	Supported
H6	SCP -> DP	0.645	5.973	0.042	0.000	Supported
H6a	SCP -> FP	0.486	7.514	0.098	0.000	Supported
H6b	SCP -> INP	0.313	4.073	0.064	0.000	Supported
H6c	SCP -> CSS	0.462	5.612	0.085	0.000	Supported

\*Significant at 0.05 level

The results of the hypothesis testing are shown in Table 4.47. As stated in the previous section hypothesis one is *Demand management challenges has significantly impact on retail supply chain performance*. The hypothesis testing indicates that demand management challenges have significant impact with retail supply chain performance and t-value obtained through bootstrapping is 3.028, indicating significant impact. “Significance is verified by re-sampling

techniques” (Merschmann and Thonemann, 2011). Lowry, P.B. and Gaskin, J, (2014) stated that “Bootstrapping is a way of computing sampling error and generating t-values by using the available data as a distribution”. Alternatively, blindfolding test determines the path significance and the predictive relevance  $Q^2$  is greater than zero indicates the model’s fitness to predictability (Table 4.48). Also, demand management challenges have significant impact with supply chain performance including delivery performance, financial performance, inventory performance and customers service and satisfaction. Thus, hypothesis H1, H1a, H1b, H1c and H1d are accepted at the significance level of 0.05. The bootstrapping and blindfolding results indicates that the sampling error has not affected the study outcome.

Second hypothesis is *Distribution management challenges has significantly impact on retail supply chain performance*. The result of hypothesis test indicates distribution management challenges has significantly impact with retail supply chain performance. The t-value obtained through bootstrapping analysis is 3.104 and the predictive relevance  $Q^2$  is greater than zero indicates significance of the path between Distribution management challenge and supply chain performance. The relationship between Distribution management challenges and firms’ performance indicators such as delivery performance, financial performance, inventory performance and customers service and satisfaction are also significant at 0.05 level. The results support the Hypothesis H2, H2a, H2b, H2c and H2d. Further, the standard error obtained through bootstrapping is not affecting the significance of the relationships.

Third hypothesis for this research is *Environment Uncertainty Challenges has significantly impact on retail supply chain performance*. Result of hypothesis test indicates significant impact between environment uncertainty challenges and retail supply chain performance. Environment Uncertainty Challenges and retail supply chain performance path coefficient 0.216 and the t-value 3.412 obtained through bootstrapping indicates the significance. Further Environment Uncertainty Challenges has significant impact with delivery performance, financial performance, inventory performance and customers service and satisfaction. The relationships were significant at 0.05 level (t-value >2.4). The results support Hypothesis H3, H3a, H3b, H3c and H3d. Predictive relevance  $Q^2$  value greater-than zero indicates the model fitness to predictive accuracy.

Fourth hypothesis for this research is *Information management challenges has significantly impact on retail supply chain performance*. Results of the analysis indicate that the relationship between Information management challenges and supply chain performance is significant at 0.05 level. Path coefficient 0.384 and the t-value obtained through bootstrapping is 5.427 indicating that Information management challenges and retail supply chain performance have significantly related. The direct relationships between Information management challenges with firms' performance indicators such as delivery performance, financial performance, inventory performance and customers service and satisfaction are significant at 0.05 level. Hence hypothesis H4, H4a, H4b, H4c, and H4d are accepted.

Fifth hypothesis for this research is *Sourcing challenges has significantly impact on retail supply chain performance*. Results of the analysis indicate that the relationship between Sourcing challenges and SCP is significant at 0.05 level. Path coefficient 0.361 and the t-value obtained through bootstrapping is 5.268 indicating that sourcing challenges and SCP have significantly impact. The direct relationships between sourcing challenges with firms' performance indicators such as delivery performance, financial performance, inventory performance and customers service and satisfaction are significant level of 0.05. Hence hypothesis H5, H5a, H5b, H5c and H5d are accepted.

The last hypothesis is to test *the significant Impact between retail supply chain performance and the firm performance indicators* such as DP, FP, INP and CSS. As mentioned in the table 4.47, the path coefficient for retail supply chain performance and delivery performance is 0.645 and t-value 5.973 indicates positive and significant relationships. The path coefficient retail supply chain performance and financial performance is 0.486 and t-value 7.514 indicates significant relationships. The relationships between SCP and inventory performance are significant with the path coefficient 0.313 and t-value 4.073. The relationships between retail supply chain performance and customers service and satisfaction are significant with the path coefficient 0.462 and t-value 5.612. The hypotheses H6a, H6b, and H6c are accepted. Results indicates that SCP has significant impact on firm's performance indicators.

#### 4.12 Estimation of Structural Model

Structural model measures, and assessment, include analysing the model's ability to predict sports retail SC challenges as well as the relationships between the variables of the model construct. The Guidelines given by Peng and Lai (2012) were followed for measuring the validity of structural model. This study evaluated the collinearity problems, their significance and relevance to the structural model, the  $R^2$  level, the effect size  $f^2$ , and the predictive relevance of  $Q^2$  (Table 4.48).

**Table 4.48 VIF,  $R^2$  and Prediction Relevance ( $Q^2$ )**

Constructs	VIF	$R^2$	$Q^2$
DeMC	1.368	NA	0.624
DiMC	1.597	NA	0.642
EUC	1.626	NA	0.683
IMC	1.612	NA	0.659
SC	1.374	NA	0.627
SCP	NA	0.791	0.586
DP	NA	0.785	0.562
FP	NA	0.659	0.452
INP	NA	0.593	0.391
CSS	NA	0.698	0.494

The IBM SPSS, VIF for all exogenous constructs is less than the required value of 1.7, suggested that there is no substantial problem of collinearity. The predictive relevance was determine using the blindfolding method in SmartPLS 4.0, along with the Stone-Geisser test criteria  $Q^2$ .  $Q^2$  was computed for the latent variable with an omission distance of five, and the obtained  $Q^2$  values through blindfolding was greater than zero, indicating predictive relevance of the model (Table 4.48).

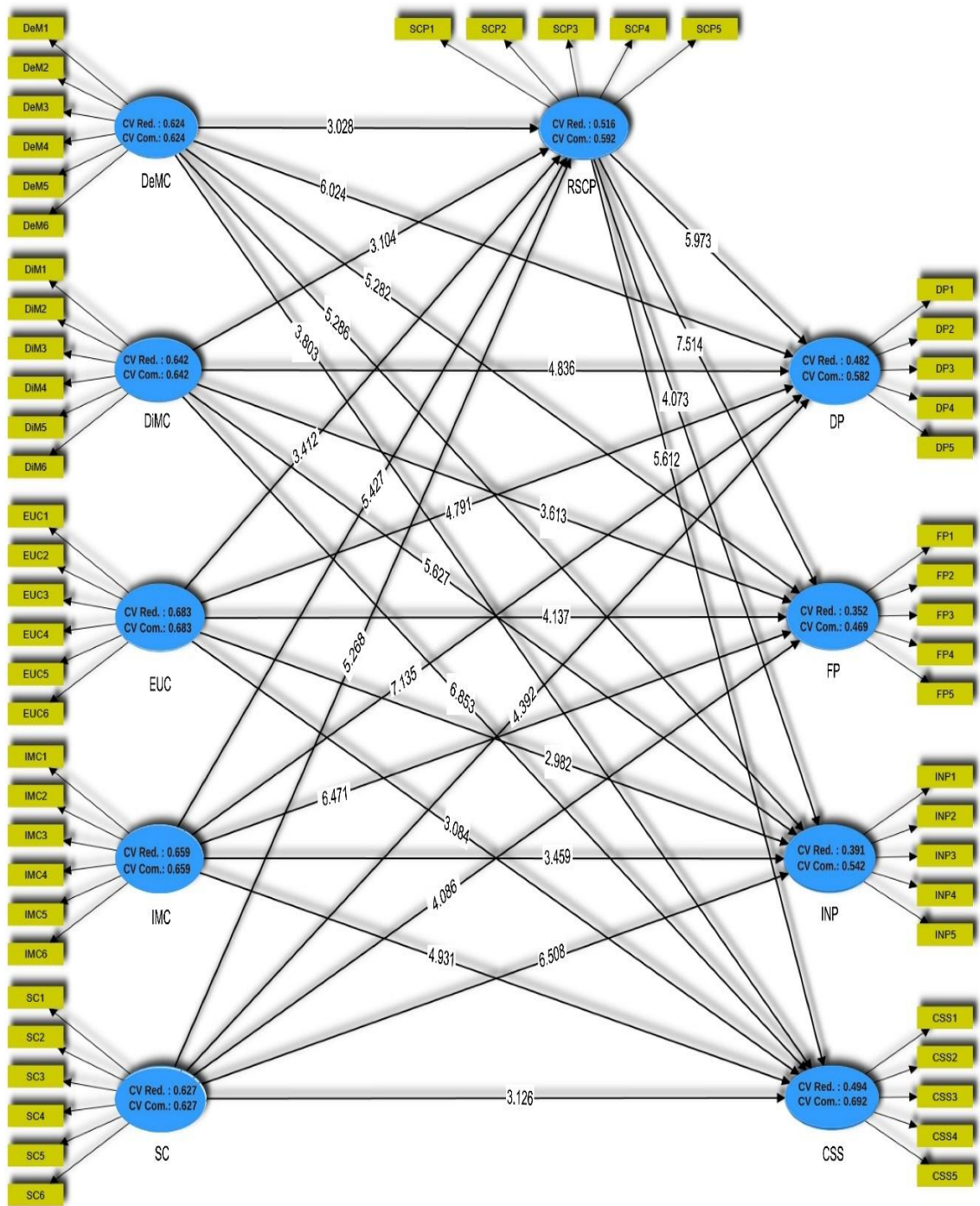


Figure 4.23 PLS-SEM – Blindfolding Test

**Table 4.49 Effect Size ( $f^2$ )**

<b>Exogenous Variables</b>	<b>SCP-<math>f^2</math></b>	<b>DP-<math>f^2</math></b>	<b>FP-<math>f^2</math></b>	<b>INP-<math>f^2</math></b>	<b>CSS-<math>f^2</math></b>
<b>DeMC</b>	0.218	0.182	0.232	0.306	0.176
<b>DiMC</b>	0.341	0.247	0.157	0.187	0.197
<b>EUC</b>	0.224	0.198	0.178	0.218	0.285
<b>IMC</b>	0.315	0.236	0.256	0.356	0.326
<b>SC</b>	0.196	0.287	0.317	0.167	0.162
<b>SCP</b>		0.204	0.282	0.281	0.152

Figure 4.23 depicts the results of the blindfolding test. Table 4.49 shows the effect size of the exogenous variable on the endogenous variable, the  $f^2$  value effect size of the exogenous latent variable has medium effect size on all the endogenous variable except IMC on INP having large effect size, the  $f^2$  was obtained using the method given by Hair et al. (2017).  $F^2$  indicates the change in  $R^2$  when an exogenous variable is removed from the model. "The  $f^2$  value effect size of the exogenous latent variable represents  $\geq 0.02$  is small;  $\geq 0.15$  is medium;  $\geq 0.35$  is large" (Cohen, 1988).

### **4.13 Mediation Effect of Supply Chain Performance**

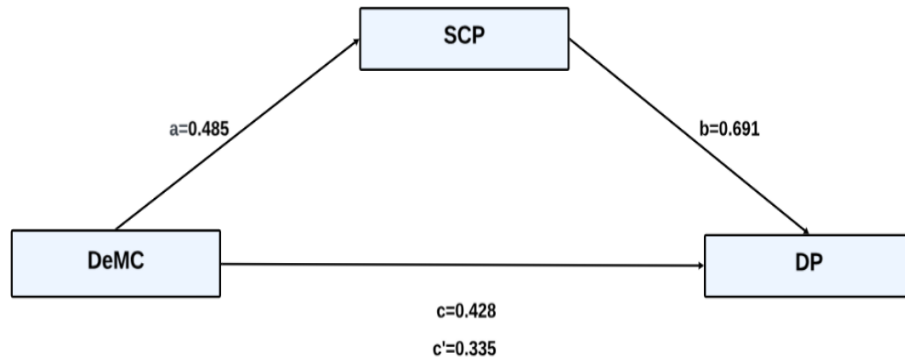
A mediation analysis was performed in response to the research question, "What is the role of retail SCP as a mediator in the relationships between retail SC challenges and firm performance?" The method suggested by Hair et al. (2014) was used to examine the mediation effect of SCP on the relationships between retail supply chain challenges and firm performance indicators. The direct effect was tested without SCP and found significant, indicating the need for mediation analysis. The indirect effect was evaluated using the mediating variable, and all the indirect relationships were statistically

significant. The variance account for (VAF) is calculated by using the formula  $VAF = (P12 \cdot P23) / (P12 \cdot P23 + P13)$ . This study indicated that VAF values are in the range of 20% to 80%, which shows partial mediation (Table 4.50). The SCP helps to improve the relationships between the exogenous and endogenous variables. A detailed explanation with a diagram is provided in the below section.

**Table: 4.50 Mediation Effect of SCP**

Endogenous Variables	Delivery Performance		
	Direct Effect	Indirect Effect	VAF
DeMC	0.428	0.335	0.439
DiMC	0.684	0.467	0.406
EUC	0.692	0.398	0.365
IMC	0.716	0.475	0.399
SC	0.657	0.482	0.424
	Financial Performance		
DeMC	0.468	0.359	0.431
DiMC	0.624	0.506	0.448
EUC	0.673	0.505	0.429
IMC	0.758	0.544	0.418
SC	0.673	0.454	0.403
	Inventory Performance		
DeMC	0.518	0.378	0.422
DiMC	0.689	0.463	0.402
EUC	0.648	0.525	0.448
IMC	0.562	0.399	0.415
SC	0.716	0.449	0.386
	Customers Service and Satisfaction		
DeMC	0.524	0.388	0.426
DiMC	0.592	0.397	0.401
EUC	0.536	0.580	0.520
IMC	0.647	0.477	0.425
SC	0.686	0.476	0.410

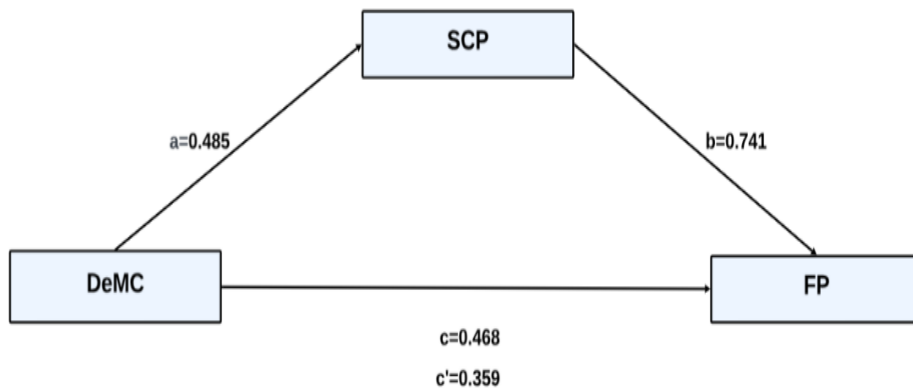
#### 4.13.1 Mediating Role of DeMC-SCP- DP (Direct and Indirect Effects)



*c=Direct effect; c' = Indirect effect; DeMC= Demand Management Challenges; SCP= Supply Chain Performance; DP = Delivery Performance*

In the above table 4.50, it was show that the VAF value for the mediation effect is 0.439, which is between 20% and 80% showing partial mediation. The relationship between DeMC and DP is partially mediated by SCP. The relationships between the variables DeMC and DP strengthened by having better SCP in the sports retails firm.

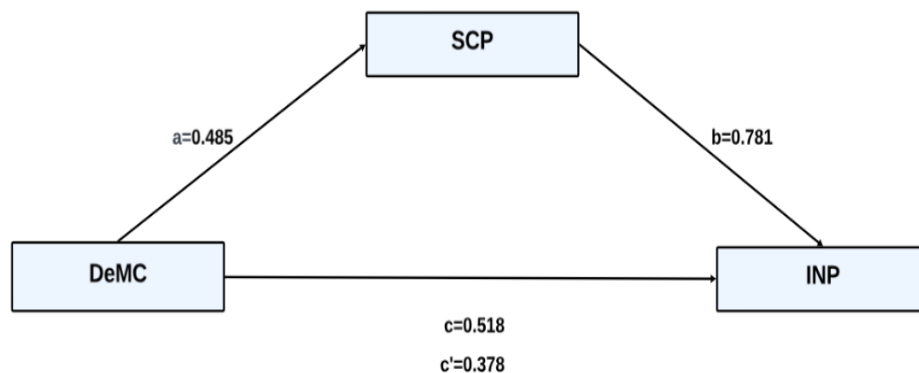
#### 4.13.2 Mediating Role of DeMC-SCP- FP (Direct and Indirect Effects)



*c=Direct effect; c' = Indirect effect; DeMC= Demand Management Challenges; SCP= Supply Chain Performance; FP = Financial Performance*

The VAF value for the mediation effect is 0.431 (Table 4.50), shows partial mediation ranging between 20% and 80%. The relationship between DeMC and FP is partially mediated by SCP. SCP as a mediator variable enhances the strength of relationships between DeMC and FP in sports retail firms.

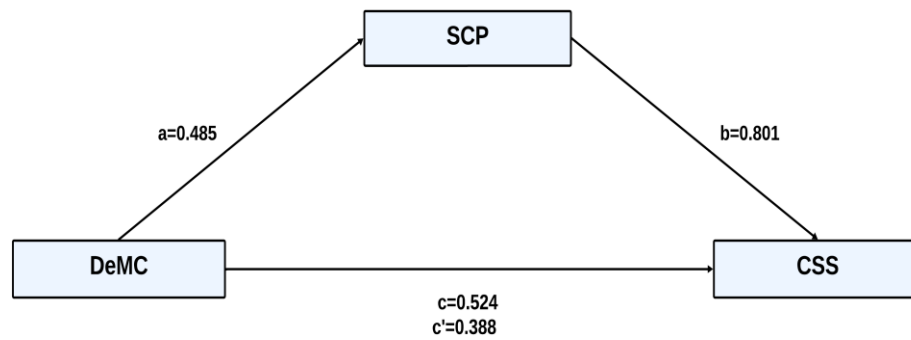
#### 4.13.3 Mediating Role of DeMC-SCP- INP (Direct and Indirect Effects)



*c=Direct effect; c' = Indirect effect; DeMC= Demand Management Challenges; SCP= Supply Chain Performance; INP= Inventory Performance*

The VAF value for the mediation effect is 0.422 (Table 4.50), which is between 20% and 80% showing partial mediation. The relationship between DeMC and INP is partially mediated by SCP. The mediation analysis indicates that the relationships between DeMC and INP enhanced by SCP.

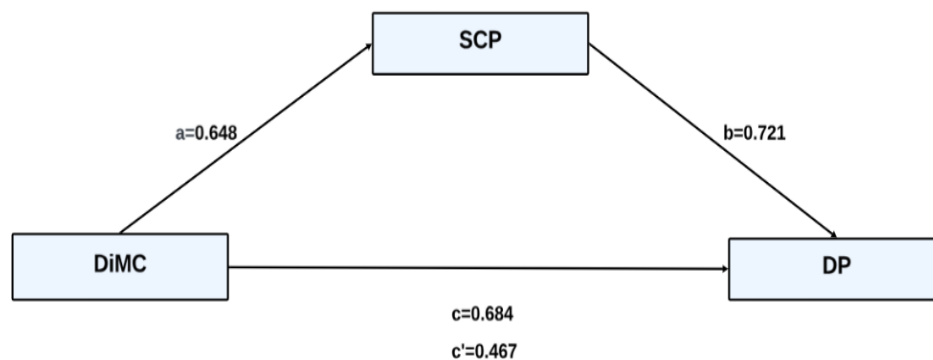
#### 4.13.4 Mediating Role of DeMC-SCP- CSS (Direct and Indirect Effects)



*c=Direct effect; c' = Indirect effect; DeMC= Demand Management Challenges; SCP= Supply Chain Performance; CSS= Customers Service and Satisfaction*

The VAF value for the mediation effect is 0.426 (Table 4.50), ranging from 20% and 80% which indicate partial mediation. The relationship between DeMC and CSS is partially mediated by SCP. Results of the analysis shows that the SCP enhances the relationships between DeMC and CSS in the sports retail firms.

#### 4.13.5 Mediating Role of DiMC-SCP- DP (Direct and Indirect Effects)

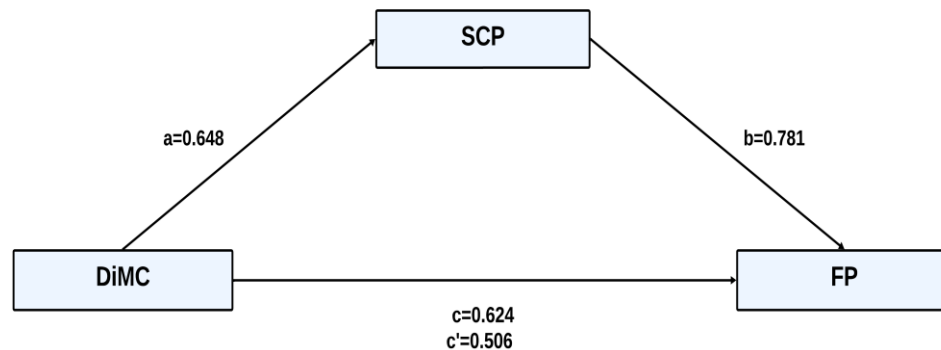


*c=Direct effect; c' = Indirect effect; DiMC= Distribution Management Challenges; SCP= Supply Chain Performance; DP= Delivery Performance*

The VAF value for the mediation effect is 0.406 (Table 4.50), which is between 20% and 80% show a partial mediation. The relationship between

DiMC and DP is partially mediated by SCP. SCP as a mediator variable enhances the strength of relationships between DiMC and DP.

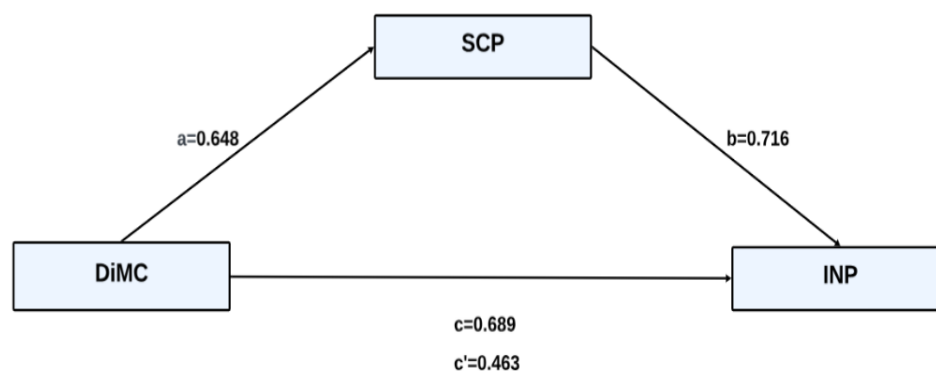
#### 4.13.6 Mediating Role of DiMC-SCP- FP (Direct and Indirect Effects)



*c*=Direct effect; *c'* = Indirect effect; DiMC= Distribution Management Challenges; SCP= Supply Chain Performance; FP = Financial Performance

The VAF value for the mediation effect is 0.448 (Table 4.50), which is between 20% and 80%, confirmed that it was partial mediation. The relationship between DiMC and FP is partially mediated by SCP. SCP as a mediator variable enhances the strength of relationships between DiMC and FP in sports retail firms.

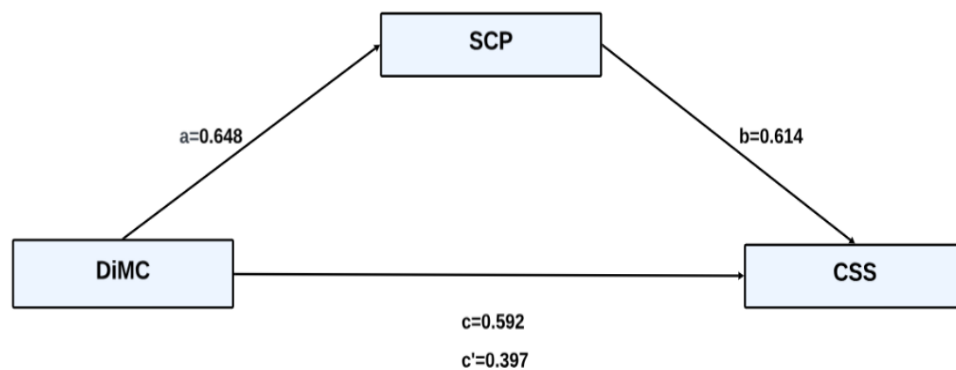
#### 4.13.7 Mediating Role of DiMC-SCP- INP (Direct and Indirect Effects)



*c*=Direct effect; *c'* = Indirect effect; DiMC= Distribution Management Challenges; SCP= Supply Chain Performance; INP= Inventory Performance

The VAF value for the mediation effect is 0.402 (Table 4.50), which is between 20% and 80% show that it has partial mediation. The relationship between DiMC and INP is partially mediated by SCP. The mediation analysis indicates that the relationships between DiMC and INP enhanced by SCP.

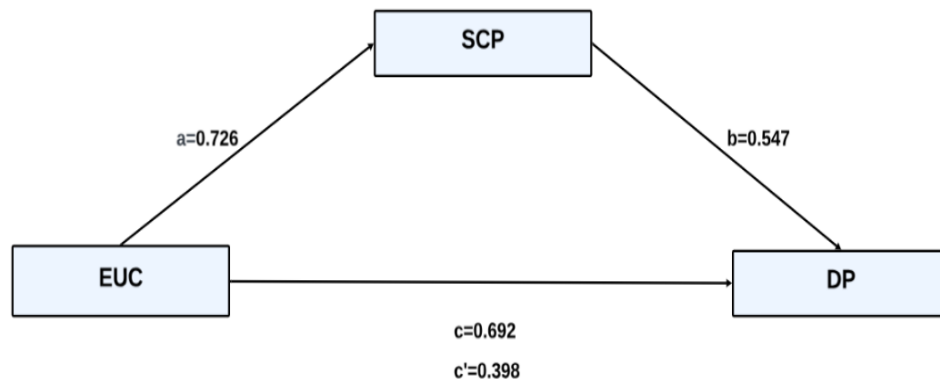
#### 4.13.8 Mediating Role of DiMC-SCP- CSS (Direct and Indirect Effects)



*c=Direct effect; c' = Indirect effect; DiMC= Distribution Management Challenges; SCP= Supply Chain Performance; CSS= Customers Service and Satisfaction*

The VAF value for the mediation effect is 0.401 (Table 4.50), which is between 20% and 80% shows partial mediation. The relationship between DiMC and CSS is partially mediated by SCP. Results of the analysis shows that the SCP enhances the relationships between DiMC and CSS in the sports retail firms.

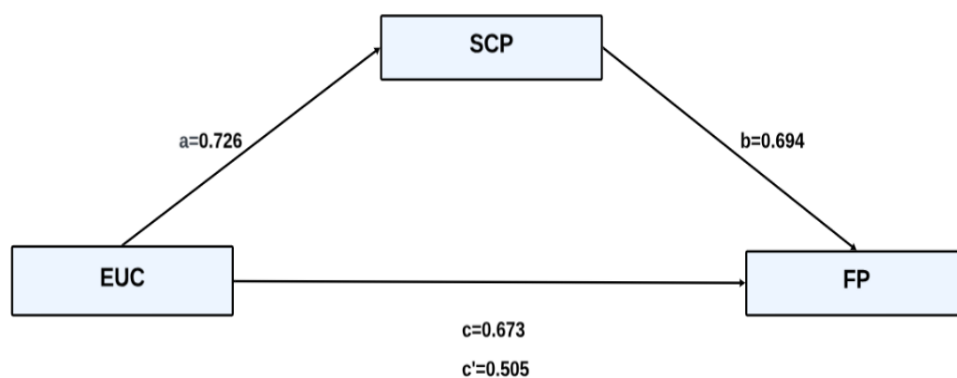
#### 4.13.9 Mediating Role of EUC-SCP- DP (Direct and Indirect Effects)



*c=Direct effect; c' = Indirect effect; EUC = Environmental Uncertainty Challenges; SCP = Supply Chain Performance; DP = Delivery Performance*

The VAF value for the mediation effect is 0.365 (Table 4.50), which is between 20% and 80% and indicating partial mediation. The relationship between EUC and DP is partially mediated by SCP. The relationships between exogenous variable EUC and endogenous variable DP are mediated by SCP.

#### 4.13.10 Mediating Role of EUC-SCP- FP (Direct and Indirect Effects)

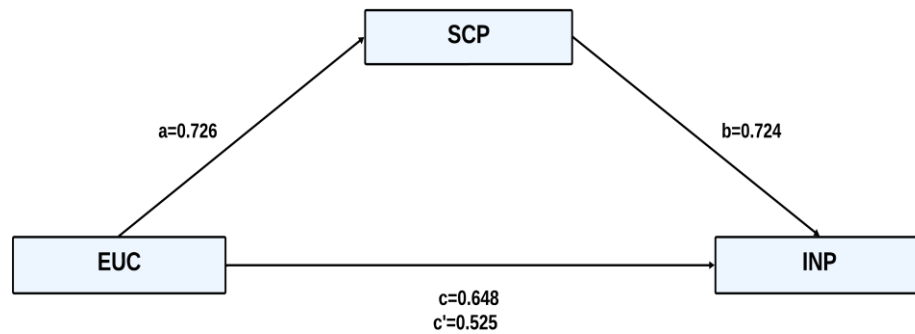


*c=Direct effect; c' = Indirect effect; EUC = Environmental Uncertainty Challenges; SCP = Supply Chain Performance; FP = Financial Performance*

The VAF value for the mediation effect is 0.429 (Table 4.50), which is between 20% and 80% indicate that it has partial mediation. The relationship

between EUC and FP is partially mediated by SCP. The relationships between exogenous variable EUC and endogenous variable FP are mediated by SCP.

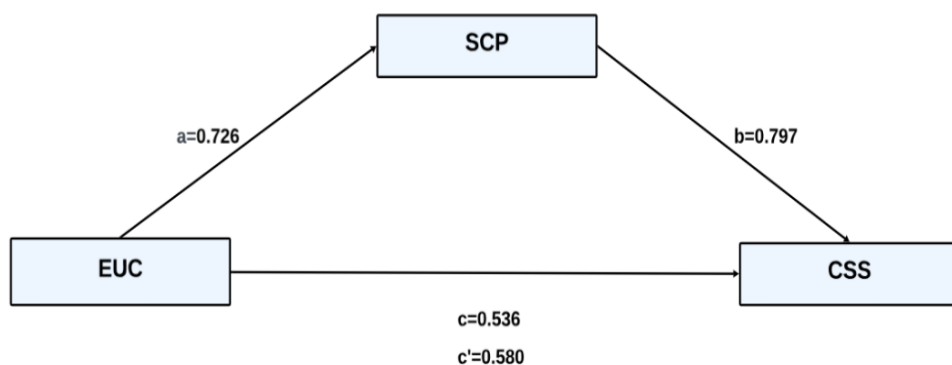
#### 4.13.11 Mediating Role of EUC-SCP- INP (Direct and Indirect Effects)



*c*=Direct effect; *c'* = Indirect effect; EUC = Environmental Uncertainty Challenges; SCP = Supply Chain Performance; INP = Inventory Performance

The VAF value for the mediation effect is 0.448 (Table 4.50), which is between 20% and 80% shows partial mediation. The relationship between EUC and INP is partially mediated by SCP. It shows EUC has significant impact on INP.

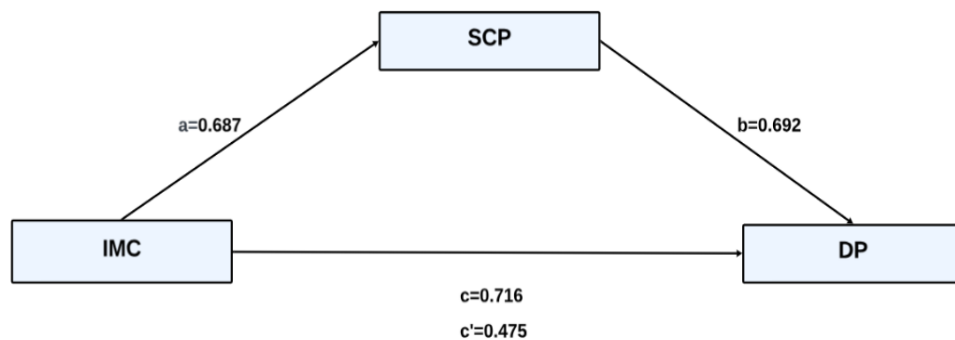
#### 4.13.12 Mediating Role of EUC-SCP- CSS (Direct and Indirect Effects)



*c*=Direct effect; *c'* = Indirect effect; EUC = Environmental Uncertainty Challenges; SCP = Supply Chain Performance; CSS = Customers Service and Satisfaction

The VAF value for the mediation effect is 0.520 (Table 4.50), ranging between 20% and 80% which indicate a partial mediation. The relationship between EUC and CSS is partially mediated by SCP. The relationships between exogenous variable EUC and endogenous variable CSS are mediated by SCP.

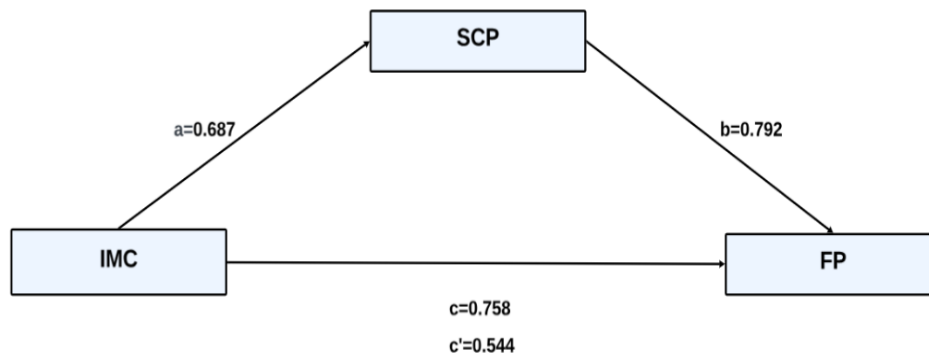
#### 4.13.13 Mediating Role of IMC-SCP- DP (Direct and Indirect Effects)



*c=Direct effect; c' = Indirect effect; IMC= Information Management Challenges; SCP = Supply Chain Performance; DP = Delivery Performance*

The VAF value for the mediation effect is 0.399 (Table 4.50), which is between 20% and 80% show a partial mediation. The relationship between IMC and DP is partially mediated by SCP. The mediation effect indicates that the relationship between IMC and DP strengthened by the mediating variable SCP.

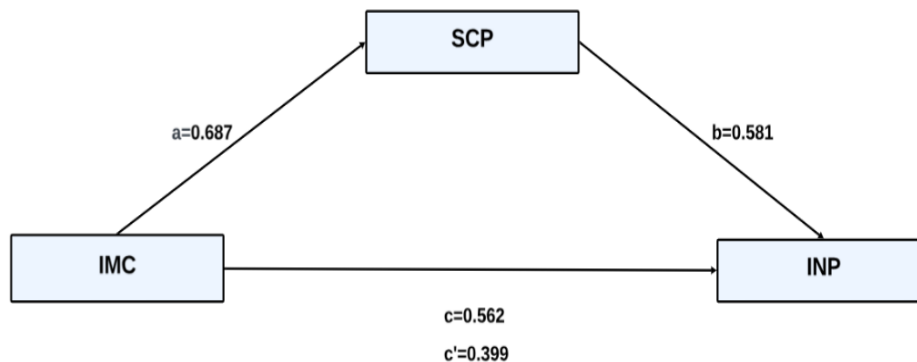
#### 4.13.14 Mediating Role of IMC-SCP- FP (Direct and Indirect Effects)



*c*=Direct effect; *c'* = Indirect effect; IMC= Information Management Challenges; SCP = Supply Chain Performance; FP = Financial Performance

The VAF value for the mediation effect is 0.418 (Table 4.50), which is between 20% and 80% indicates the partial mediation. The relationship between IMC and FP is partially mediated by SCP. It shows IMC has significant impact on FP.

#### 4.13.15 Mediating Role of IMC-SCP- INP (Direct and Indirect Effects)

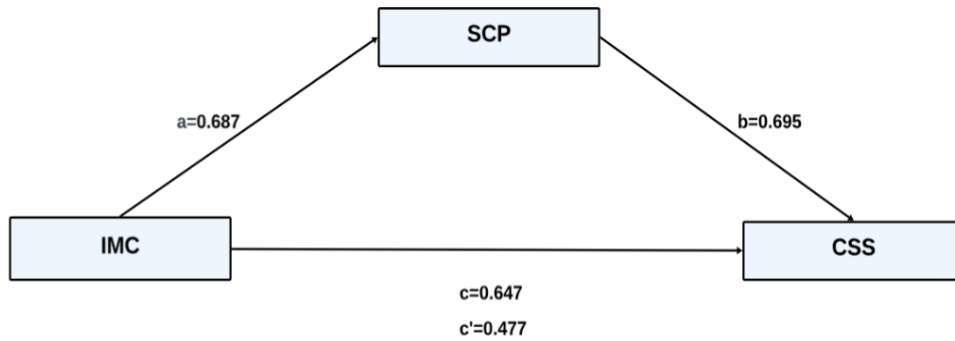


*c*=Direct effect; *c'* = Indirect effect; IMC= Information Management Challenges; SCP = Supply Chain Performance; INP = Inventory Performance

The VAF value for the mediation effect is 0.415 (Table 4.50), ranging between 20% and 80% show partial mediation. The relationship between IMC

and INP is partially mediated by SCP. It shows IMC has significant impact on INP.

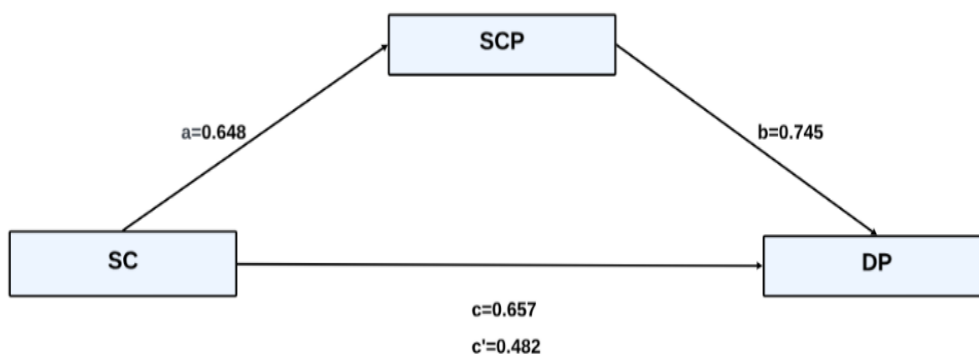
#### 4.13.16 Mediating Role of IMC-SCP- CSS (Direct and Indirect Effects)



*c*=Direct effect; *c'* = Indirect effect; IMC= Information Management Challenges; SCP = Supply Chain Performance; CSS = Customers Service and satisfaction

The VAF value for the mediation effect is 0.425 (Table 4.50), shows partial mediation ranging between 20% and 80%. The relationship between IMC and CSS is partially mediated by SCP. The mediation effect indicates that the relationship between IMC and CSS is strengthened by the mediating variable SCP.

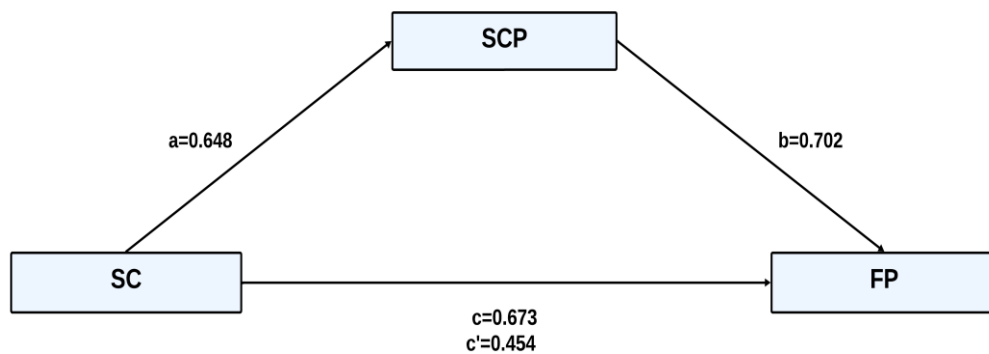
#### 4.13.17 Mediating Role of SC-SCP- DP (Direct and Indirect Effects)



*c*=Direct effect; *c'* = Indirect effect; SC = Sourcing Challenges; SCP = Supply Chain Performance; DP = Delivery Performance

The VAF value for the mediation effect is 0.424 (Table 4.50), indicate a partial mediation and which is between 20% and 80%. The relationship between SC and DP is partially mediated by SCP. The mediation effect indicates that the relationship between SC and DP is strengthened by the mediating variable SCP.

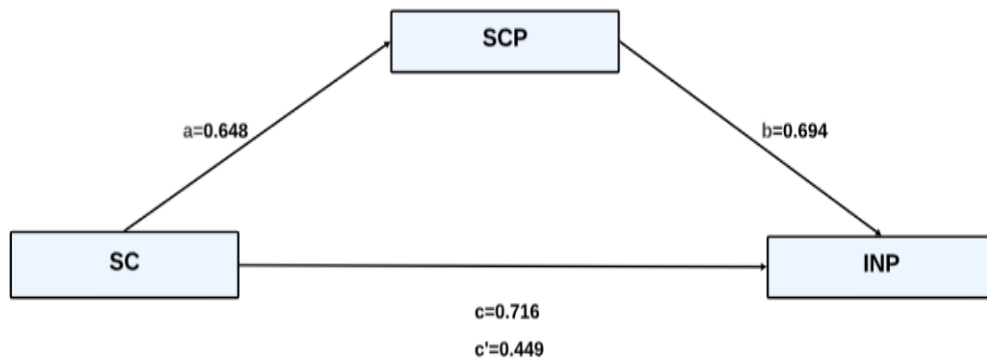
#### 4.13.18 Mediating Role of SC-SCP- FP (Direct and Indirect Effects)



*c=Direct effect; c' = Indirect effect; SC = Sourcing Challenges; SCP = Supply Chain Performance; FP = Financial Performance*

The VAF value for the mediation effect is 0.403 (Table 4.50), which is between 20% and 80% show a partial mediation. The relationship between SC and FP is partially mediated by SCP. It shows SC has significant impact on FP.

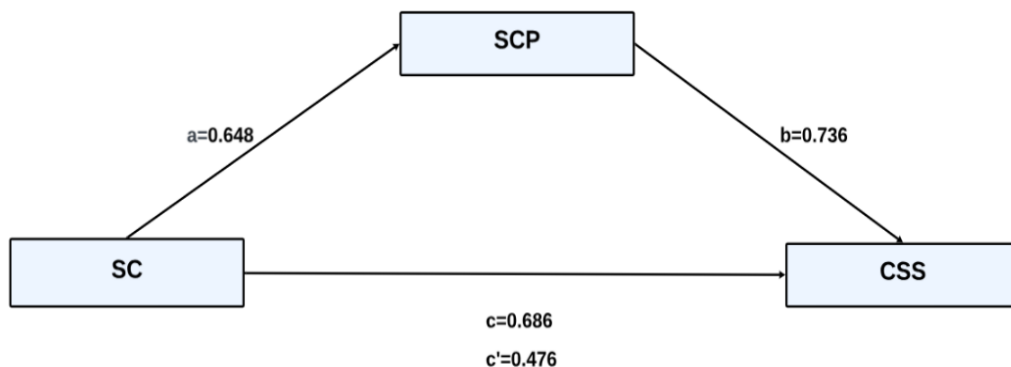
#### 4.13.19 Mediating Role of SC-SCP- INP (Direct and Indirect Effects)



*c*=Direct effect; *c'* = Indirect effect; SC = Sourcing Challenges; SCP = Supply Chain Performance; INP = Inventory Performance

The VAF value for the mediation effect is 0.386 (Table 4.50), which is between 20% and 80% show a partial mediation. The relationship between SC and INP is partially mediated by SCP. It shows SC has significant impact on INP.

#### 4.13.20 Mediating Role of SC-SCP- CSS (Direct and Indirect Effects)



*c*=Direct effect; *c'* = Indirect effect; SC = Sourcing Challenges; SCP = Supply Chain Performance; CSS = Customers Service and satisfaction

The VAF value for the mediation effect is 0.410 (Table 4.50), which is between 20% and 80% indicate a partial mediation. The relationship between SC and CSS is partially mediated by SCP. The mediation effect indicates that

the relationship between SC and CSS strengthened by the mediating variable SCP.

#### **4.14 Chapter Summary**

This empirical research used non-probabilistic convenience sampling techniques to collect data as the population size is not clearly available and it is difficult to determine the population. The inherent problems of convenience sampling were kept in mind while collecting data from the respondents. The respondents of this survey are from the sports goods retail industry in northeast India. There were 513 data used in the study. The survey instruments were developed for all ten reflective variables. The survey was pre-tested and administered to collect data from the respondents. The reliability of the scales was checked, along with outliers and incomplete responses removed. The result shows that all the scales meet the required convergent and discriminant validity. The PLS-SEM result shows that the model meets the required fitness. The results indicate that all hypotheses are supported at a significance level of 0.05. The bootstrapped confidence intervals exclude zero, affirming the significance of the relationships. Additionally, mediation analysis reveals that SCP partially mediates the relationship between retail supply chain challenges and firm performance indicators. The analysis shows that retail supply chain challenges have a significant effect on SCP. Also, retail supply chain challenges indicators like DeMC, DiMC, EUC, IMC, and SC are having significant effects on firms' performance indicators, also SCP have significant impact on firms' performance. Also, SCP strengthens the relationship between retail supply chain challenges and firm performance.