CHAPTER 4

FINDINGS AND DATA ANALYSIS

4.1 Overview

This Chapter highlights the findings such as identification of 26 significant variables for RO1, Cronbach's Alpha, KMO Test, Bartlett Test and reduction of 26 variables into nine factors through factor analysis. It also mentions the key findings for RO2 which includes open-ended and closed-ended questions, identification of eight research papers that contained an actual IoT business model, depiction of relative significance of variables within each building block, output of ATLAS.Ti software, validation of IoT Business Model through an in-depth interview and the connections of the various significant variables through an IoT business model. Using the Osterwalder's Business Model Canvas Tool (Osterwalder & Pigneur, 2009) and the responses received from the respondents through the survey, these 26 variables were incorporated under the nine building blocks to come up with an IoT business model for Indian Public Sector Retail Oil Outlets. For each of the significant variable the mean score was computed and the relative importance of variables within each building block was computed through the mean score. In each building block, the means of all the variables were measured against the average of all the variables and significant differences were searched for. The relative importance of the variables in every building block was highlighted in the IoT business model. The interviews for the open ended questions were coded with ATLAS.Ti software and the output was incorporated in the IoT Business Model to identify the connection between the identified variables. The IoT business model was validated through an in-depth interview of three senior executives, one each from IOCL, BPCL and HPCL. The findings also show the contribution to the 'Thing Theory' by depicting the interrelation of Processes with People, Data and Things through the IoT Business Model for the Indian Public Sector Retail Oil Outlets.

4.2 Digital Enablers for Increased Operational Efficiency and Employee Productivity

The researcher has identified 29 key digital enabling variables (mentioned in Appendix A). Based on the outcome of the semi-structured interview of 15 respondents (Guest, Bunce, & Johnson, 2006), till data saturation happened, the following three variables were omitted while the rest 26 variables were considered for study:

- ***Sensor and hardware producers*** – Tie-ups have to be set up with Service Providers for IoT adoption
- ***Mass market*** – Scalability of IoT adoption will address the broader mass market over a period of time
- ***Market share*** – IoT grows the market share for Indian Public Sector fuel retailers by adding more customers to the respective Company /Outlet

The internal consistency was checked using Cronbach's Alpha Test; if it is more than 0.70 then it is considered to be an allowable degree of internal consistency

(Nunnally & Bernstein, 1994); the result is shown below in Table 4.1. The 26 variables were finalized through face validity (mentioned in Appendix J).

Table 4.1: Reliability statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.920	26

The Cronbach's Alpha value came out to be 0.920 which indicated the scale to be quite reliable. This result has been validated through Convergent validity (mentioned in Appendix G). The adequacy of the sample size was checked using the KMO test; if it is more than 0.60 then it is considered to be acceptable (Kaiser & Rice, 1974). In the current research, the KMO score came out to be 0.715 as depicted in Table 4.2, this was adequate to proceed with Factor Analysis. It has been validated through Construct validity (mentioned in Appendix H).

Table 4.2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.715
Bartlett's Test of Sphericity	Approx. Chi-Square	3791.459
	Df	325
	Sig.	.000

Both the KMO and Bartlett tests were acceptable for factor analysis to be taken forward. The Principal Component Analysis (PCA) technique was utilized to analyze the identified 26 variables, nine factors were determined as shown in Table 4.4. It is observed that 68.7% variance is explained by the 9 factors as depicted in Table 4.3.

Table 4.3: Total variance explained through PCA

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.242	20.162	20.162	5.242	20.162	20.162	3.819	14.690	14.690
2	2.712	10.432	30.594	2.712	10.432	30.594	2.044	7.862	22.552
3	1.963	7.552	38.146	1.963	7.552	38.146	2.024	7.785	30.337
4	1.860	7.154	45.300	1.860	7.154	45.300	1.910	7.347	37.684
5	1.455	5.595	50.895	1.455	5.595	50.895	1.781	6.849	44.533
6	1.302	5.006	55.901	1.302	5.006	55.901	1.779	6.844	51.377
7	1.197	4.605	60.506	1.197	4.605	60.506	1.603	6.165	57.542
8	1.086	4.176	64.682	1.086	4.176	64.682	1.580	6.077	63.619
9	1.047	4.026	68.708	1.047	4.026	68.708	1.323	5.088	68.708
10	.936	3.601	72.309						
11	.866	3.332	75.641						
12	.754	2.900	78.541						
13	.653	2.513	81.054						
14	.604	2.323	83.377						
15	.585	2.251	85.628						
16	.566	2.176	87.804						
17	.513	1.972	89.776						
18	.434	1.670	91.447						
19	.395	1.519	92.966						
20	.353	1.357	94.323						
21	.324	1.247	95.570						
22	.292	1.122	96.692						
23	.264	1.015	97.707						
24	.254	.979	98.686						
25	.191	.733	99.419						
26	.151	.581	100.000						

Table 4.3 shows that the sum of the variance described by all the elements equal 100% of variance. The first component comprises of 20% of the total variance,

the second component 10% of the variance, the third 7.5%, the fourth 7%, the fifth 5.6%, the sixth 5%, the seventh 4.6%, the eighth 4.17% and the ninth 4% variance. It is inferred that the nine factors account for 68.7% of the entire variation in the 26 variables. In the below mentioned Figure 4.1, it is observed that there is a sharp drop in the curve at the beginning; thereafter it becomes flat after the 9th factor. This indicates that a total of nine factors are adequate to address the variation in the 26 variables.

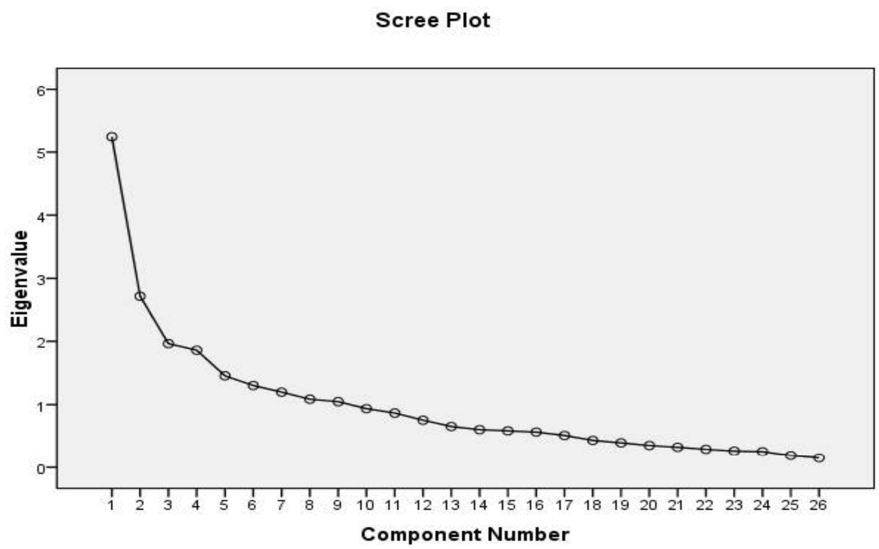


Figure 4.1: Scree Plot[24]

The rotated component matrix was thereafter obtained using the Varimax with Kaiser Normalization technique as depicted in Table 4.4 below.

[24] Scree Plot is a visual representation of the factors being extracted. It is a graph plotted where the x axis is the number of factors being extracted while the y axis is the Eigen value.

Table 4.4: Total variance explained

Rotated Component Matrix									
	Component								
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
Data security				0.779					
Faster decision making				0.748					
Customer insights								0.755	
Security risks						0.727			
Customer experience	0.697								
Connecting Customers' mobile phones to petrol pumps						0.603			
Increased in-store sales from formerly fuel-only customers						0.404			
Convenience									0.493
Customer expectation	0.587								
Relations with Stakeholders	0.791								
Brand value	0.866								
Workforce at Outlets	0.713								
Marketing	0.635								
Return on Investment		0.808							
Automation of manual processes		0.509							
Cost Optimization		0.673							
Efficient new method for performing existing tasks					0.618				
Cashless transaction					0.709				
Process Optimization	0.461								
Generation of New revenue stream			0.787						
Competitive Advantage			0.790						
Application Service Provider									0.815
Wearables							0.811		
Sensors							0.705		
Asset Optimization						0.516			
Business value				0.561					

Extraction Method: PCA; Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 34 iterations.

It is inferred from the rotated component matrix provided in Table 4.4 that each variable loads significantly on only one factor. The variations are distributed equally among the nine factors through the varimax rotation. After getting the rotated component matrix, it enables to identify the variables under the respective nine factors as shown in the table 4.5 below. It has been validated through Content validity provided in Appendix I.

All the 26 variables were considered significant as they were having factor loading greater than 0.3 (Hair, Anderson, Tatham, & Black, 1998). It has been validated through Criterion validity provided in Appendix K.

Table 4.5: Variables grouped under nine factors

	Rotated Component Matrix		
S.No.	**Factor Name**	**Factor Loading**	**Variables loading on a factor**
1	Customer focus	0.697	Customer experience
		0.587	Customer Expectation
		0.791	Relations with Stakeholders
		0.866	Brand value
		0.713	Workforce at Outlets
		0.635	Marketing
		0.461	Process Optimization
2	Increase in Operating profit	0.808	Return on Investment
		0.509	Automation of manual processes
		0.673	Cost Optimization
3	Differentiation	0.787	Generation of new revenue stream
		0.790	Competitive advantage

4	Value to Customer	0.779	Data Security
		0.748	Faster decision making
		0.561	Business value
5	Adoption of latest technology	0.618	Efficient new method for performing existing tasks
		0.709	Cashless transaction
6	Enabling IoT ecosystem	0.727	Security Risks
		0.603	Connecting Customers' mobile phones to petrol pumps
		0.404	Increased in-store sales from formerly fuel-only customers
		0.516	Asset Optimization
7	Connected objects	0.811	Wearables
		0.705	Sensors
8	Better usage of customer data	0.755	Customer Insights
9	Partnership with IT Service Provider	0.493	Convenience
		0.815	Application Service Provider

The rationale for choosing the names of the different factors have been elaborated in Appendix I.

4.3 IoT Business Model

The researcher has developed an IoT business model for increasing operational efficiency and employee productivity in Indian Public Sector Retail Oil Outlets and discussed in following subsections 4.3.1 and 4.3.2

4.3.1 Findings for Closed-Ended Questions

To incorporate the 26 significant variables under the nine building blocks of the Business Model Canvas tool (Osterwalder & Pigneur, 2009), the researcher has subjected the identified variables to a semi-structured interview consisting of a few 'Close ended Questions' (Appendix D) and a few open ended questions (Appendix E) for a sample size of 15 respondents (Guest, Bunce, & Johnson, 2006). Results of the closed ended questions for incorporating the 26 significant variables under the nine building blocks are given in Table 4.6; for each variable the mean score was also computed.

Table 4.6: Results of closed-ended questions for incorporating 26 significant variables under nine building blocks

#	Variable	Building Block	# of Respondents	Mean Score
1	Data Security	Key Activities	14	0.93
2	Faster decision making	Value Proposition	14	0.93
3	Customer Insights	Customer Relationship	14	0.93
4	Security Risks	Key Activities	14	0.93
5	Customer Experience	Customer Relationship	13	0.87
6	Connecting Customers' mobile phones to petrol pumps	Customer Relationship	12	0.8
7	Increased in-store sales from formerly fuel-only customers	Value Proposition	8	0.53
8	Convenience	Value Proposition	9	0.6
9	Customer expectation	Value Proposition	10	0.67
10	Relations with stakeholders	Customer Relationship	14	0.93
11	Brand value	Key Resources	13	0.87
12	Workforce at Outlets	Channels	14	0.93
13	Marketing	Key Activities	12	0.8
14	Return on Investment	Revenue Segments	15	1
15	Automation of manual processes	Value Proposition	9	0.6
16	Cost Optimization	Cost Structure	13	0.87

17	Efficient new method for performing existing tasks	Value Proposition	12	0.8
18	Cashless transaction	Value Proposition	13	0.87
19	Process Optimization	Value Proposition	11	0.73
20	Generation of new revenue stream	Revenue Segments	13	0.87
21	Competitive Advantage	Value Proposition	13	0.87
22	Application Service Provider	Key Partners	14	0.93
23	Wearables	Key Resources	14	0.93
24	Sensors	Key Resources	14	0.93
25	Asset Optimization	Value Proposition	11	0.73
26	Business Value	Value Proposition	14	0.93

The results of the closed-ended questions for incorporating 26 significant variables under the nine building blocks as shown in Table 4.6 was depicted through Figure 4.2

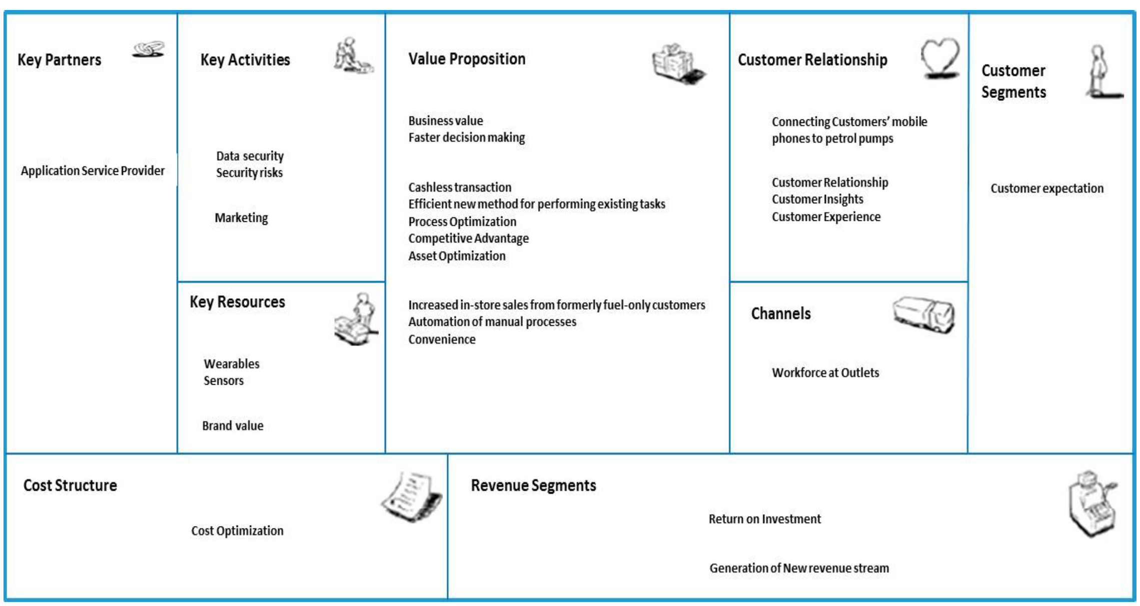


Figure 4.2: Twenty six (26) significant variables incorporated under the 9 building blocks of Business Model Canvas tool (Osterwalder & Pigneur, 2009)

Depiction of Relative Importance of Variables within each Building Block

- The Relative significance of variables within each building block was computed through the mean score.
- In each building block, the means of all the variables were measured against the average of all the variables and significant differences were searched for.
- In each building block, variables that scored significantly higher than the average were marked 'Green', variables that received points lower than the average were marked 'Pink', while those variables that did not have any marked difference from the average were marked 'Yellow'. This is depicted through Figure 4.3 below.

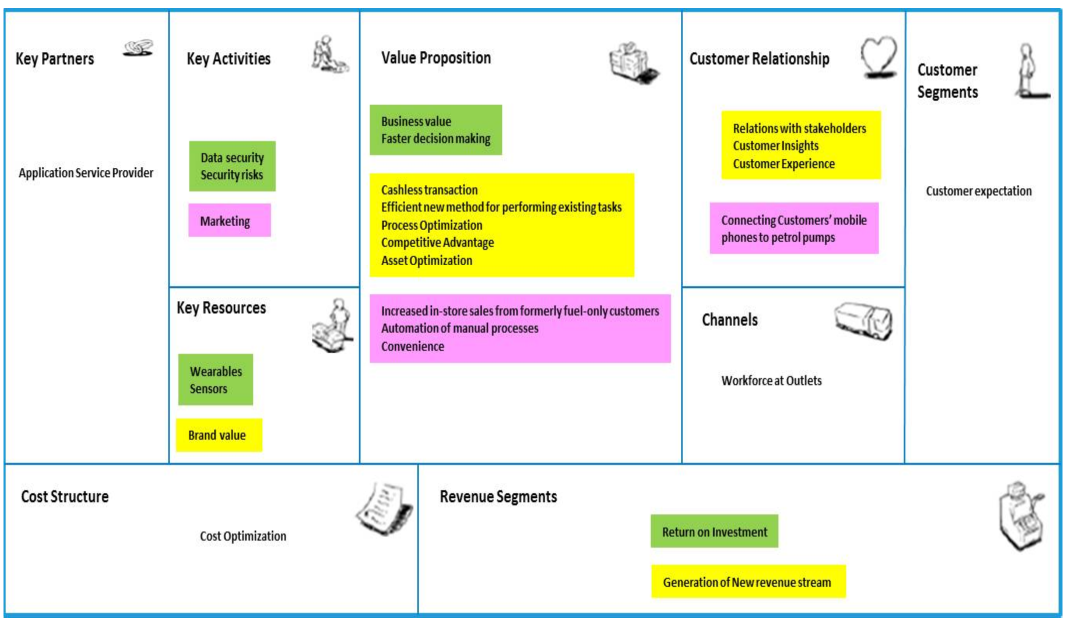
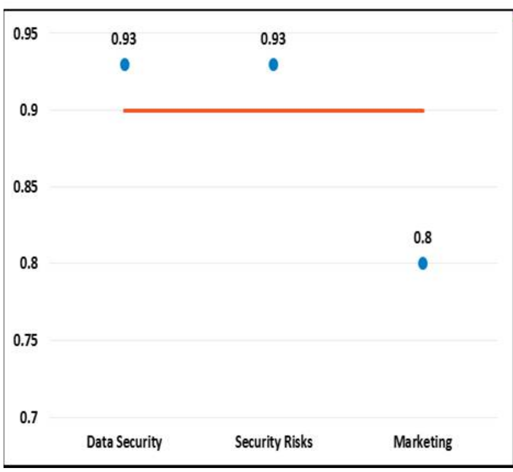


Figure 4.3 Results of the mean comparison analysis incorporated in Business Model Canvas tool (Osterwalder & Pigneur, 2009)

Relative Importance of Variables under the Building Block 'Key Activities'

Figure 4.4 shows that the variables ‘Data Security’ (μ^{25}=0.93) and ‘Security Risks’ (μ=0.93) scored highly. The variable ‘Marketing’ (μ=0.8) scored significantly lower than all other variables. Respondents indicated that Marketing is a less significant variable for IoT business model applicable in the context of Indian Public Sector Retail Oil Outlets.



#	Variable	Building Block	# of respondents	Mean Score	Average of Mean scores	Color
1	Data Security	Key Activities	14	0.93	0.9	Green
2	Security Risks		14	0.93		Green
3	Marketing		12	0.8		Pink

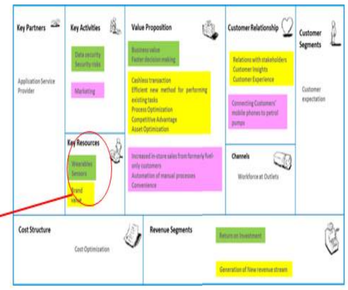
Figure 4.4 Relative importance of variables under the building block ‘Key Activities

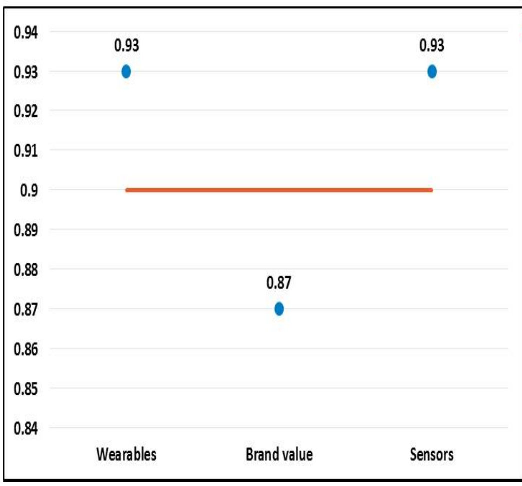
Relative Importance of Variables under the Building Block ‘Key Resources’

Figure 4.5 shows that the variables ‘Wearables’ (μ=0.93) and ‘Sensors’ (μ=0.93) scored the same, and have been ranked important by the respondents.

[25] *μ refers to a population mean*

Respondents have provided a low score to the remaining variable ‘Brand Value’ (µ=0.87).





#	Variable	Building Block	# of respondents	Mean Score	Average of Mean scores	Color
1	Wearables	Key Resources	14	0.93	0.9	Green
2	Brand Value		13	0.87		Yellow
3	Sensors		14	0.93		Green

Figure 4.5 Relative importance of variables under the building block ‘Key Resources

Relative Importance of Variables under the Building Block ‘Value Proposition’

Figure 4.6 shows that the variables ‘Business Value’ (µ=0.93) and ‘Faster decision making (µ=0.93) scored significantly higher than all the other variables. Both are important contributors to Value Proposition in the IoT business model. The variables ‘Cashless Transaction’ (µ=0.87) and ‘Competitive Advantage’ (µ=0.87) scored equally high. The Variable ‘Efficient New Method for Performing Existing Tasks’ (µ=0.8) is slightly significant and higher than five other variables. The respondents have ranked the variables 'Process Optimization' (μ=0.73) and 'Asset Optimization' (μ=0.73) slightly lower. The variables 'Automation of Manual Processes' (μ=0.6) and 'Convenience' (μ=0.6) scored lower and are less important. Respondents have indicated that they are less significant contributors to Value Proposition for IoT business models. The variable 'Increased In-store Sales from Formerly Fuel Only Customers' (μ=0.53) scored the lowest and is the least suitable for IoT business model.

#	Variable	Building Block	# of respondents	Mean Score	Color
1	Cashless transaction	Value Proposition	13	0..87	Yellow
2	Efficient new method for performing existing tasks		12	0.8	Yellow
3	Process Optimization		11	0.73	Yellow
4	Increased in-store sales from formerly fuel-only customers		8	0.53	Pink
5	Competitive advantage		13	0.87	Yellow
6	Business value		14	0.93	Green
7	Asset Optimization		11	0.73	Yellow
8	Faster decision making		14	0.93	Green
9	Automation of manual processes		9	0.6	Pink
10	Convenience		9	0.6	Pink

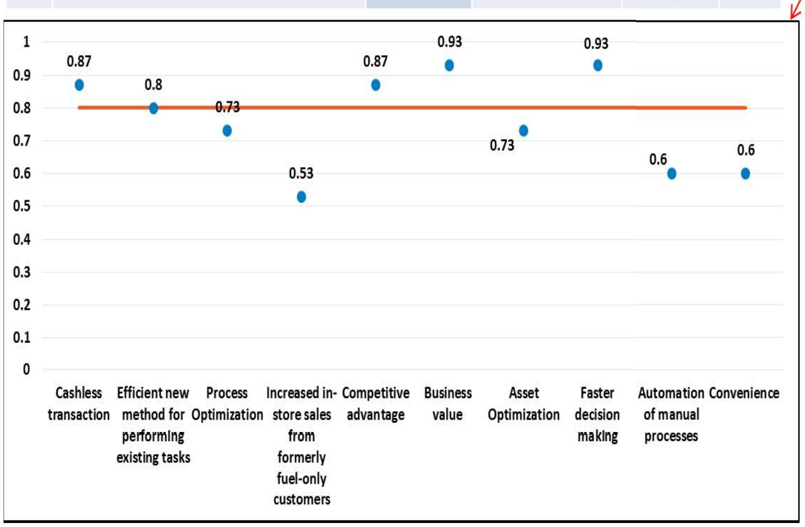
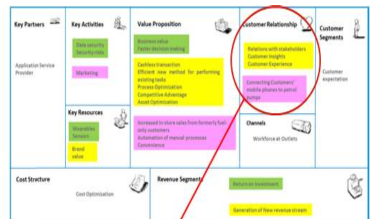


Figure 4.6: Relative importance of variables under the building block 'Value Proposition

Relative Importance of Variables under the Building Block 'Customer Relationship'

Figure 4.7 shows that the respondents have ranked the variables 'Relations with Stakeholders' (μ=0.93) and 'Customer Insights' (μ=0.93) the same and are significantly higher than all other variables. Respondents have ranked the variable 'Customer Experience' (μ=0.87) as less important. The variable 'Connecting Customers' Mobile Phones to Petrol Pumps' (μ=0.8) is the least suitable for IoT business model.

#	Variable	Building Block	# of respondents	Mean Score	Average of Mean scores	Color
1	Relations with stakeholders	Customer Relationship	14	0.93	0.9	Yellow
2	Customer Insights		14	0.93		Yellow
3	Customer Experience		13	0.87		Yellow
4	Connecting Customers' mobile phones to petrol pumps		12	0.8		Pink



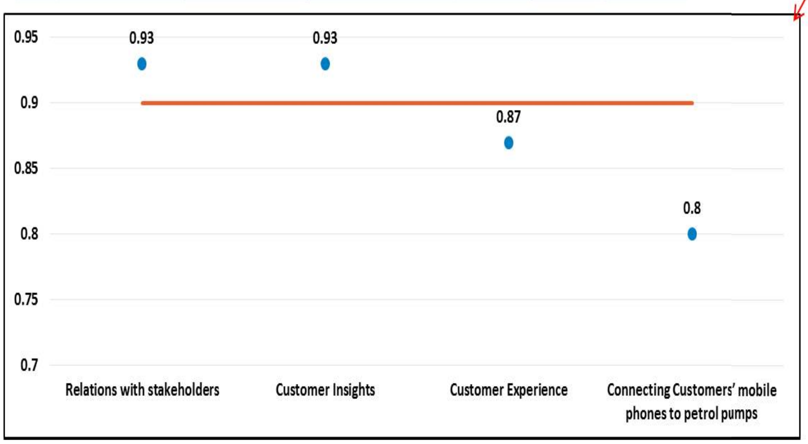
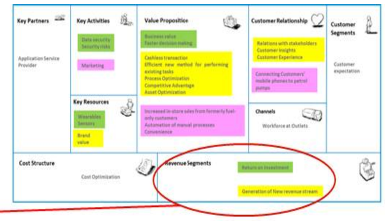
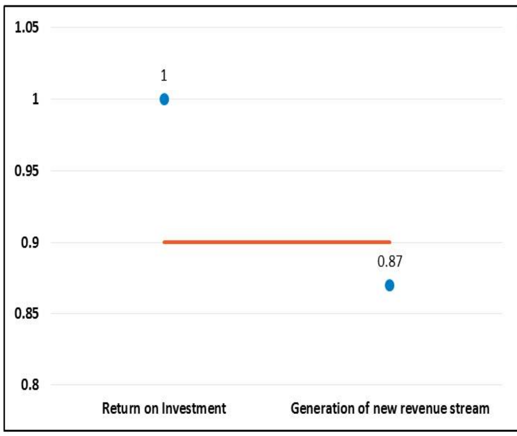


Figure 4.7: Relative importance of variables under the building block 'Customer Relationship'

Relative importance of variables under the building block 'Revenue Segments'

Figure 4.8 shows that the respondents have mentioned that the variable Return on Investment (μ=1) has been ranked highest and considered the most significant. The variable ‘Generation of New Revenue Stream’ (μ=0.87) is considered to be less significant.





#	Variable	Building Block	# of respondents	Mean Score	Average of Mean scores	Color
1	Return on investment	Revenue Segments	14	1	0.9	Green
2	Generation of new revenue stream		13	0.87		Yellow

Figure 4.8: Relative importance of variables under the building block ‘Revenue Segments’

Figure 4.9 placed below shows that the relative importance of variables for the below building blocks could not be done as each of the building blocks had one variable.

- **Key Partners** - There was only one variable ‘Application Service Provider’ (μ=0.93) in this building block
- **Cost Structure – ‘**Cost Optimization’ (μ=0.87) was the only variable in this building block
- **Customer Segments** - The only variable in this building block was ‘Customer Expectation’ (μ=0.67)

- **Channels –** There was only one variable 'Workforce at Outlets' (μ=0.93) in this building block

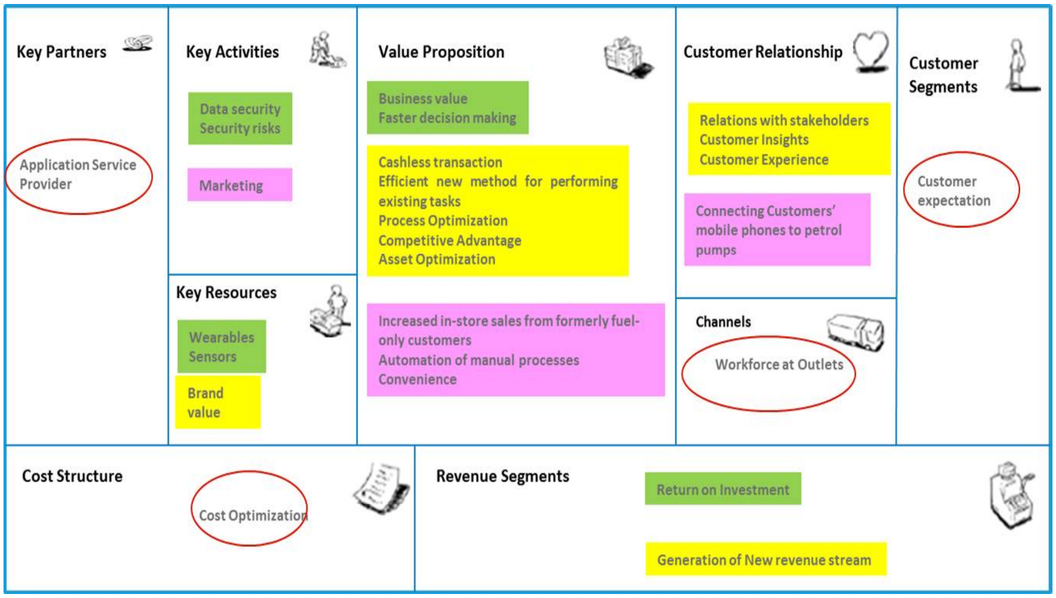


Figure 4.9 Building blocks that contained a single variable vis-à-vis other building blocks

4.3.2 Findings for Open-ended Questions - Output of ATLAS.Ti

The 26 significant variables were subjected to a semi-structured interview consisting of a few open ended questions for a sample size of 15 (Guest, Bunce, & Johnson, 2006) respondents to depict the following:

- Connection of Processes with People, Data and Things
- Important variables and the interrelation among them
- Interrelation of People, Processes, Data and Things

The interviews were recorded, transcribed and coded with ATLAS.Ti software as shown in Figure 4.10 below.

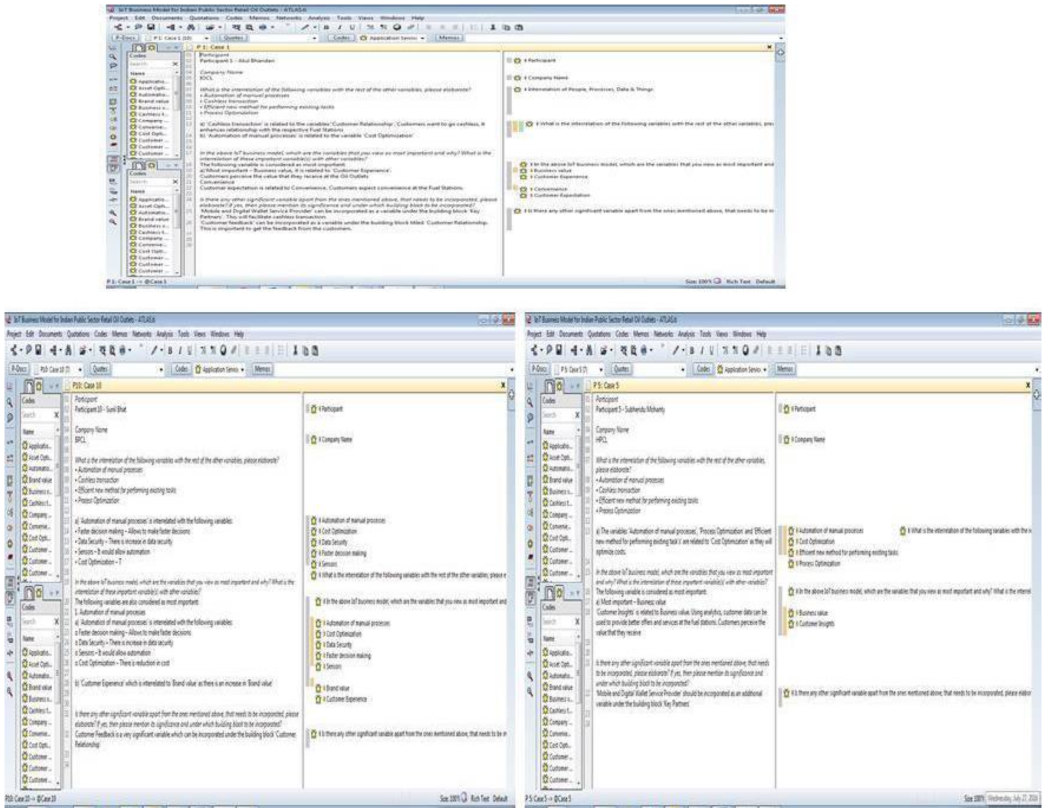


Figure 4.10: Codes and quotations in ATLAS.Ti

The output of the ATLAS.Ti software obtained through the Network Diagrams were analyzed and given below:

- **Connection of Processes with People, Data and Things**

The variables on processes having connections with the variables on people, data and things obtained through the Network diagram as an output of ATLAS.Ti are depicted in Figure 4.11. It can be inferred from Figure 4.11 that:

- The variables on processes are 'Automation of Manual Processes', 'Process Optimization', ' Asset Optimization', 'Efficient new method for performing existing tasks' and 'Cashless Transaction'

- The variables 'Automation of Manual Processes', 'Process Optimization', 'Asset Optimization' and 'Efficient New Method for Performing Existing Tasks' were found to be associated with 'Cost Optimization'. This leads to increased operating margins.
- The variable 'Cashless Transaction' is related to the variable 'Relationship with Stakeholders'. Public Sector Retail Oil Outlets are looking to go cashless as customers want the same. Customers are increasingly looking to pay through their smartphones using the digital wallet service providers such as Paytym, FreeCharge, PayPal, Apple Pay etc.

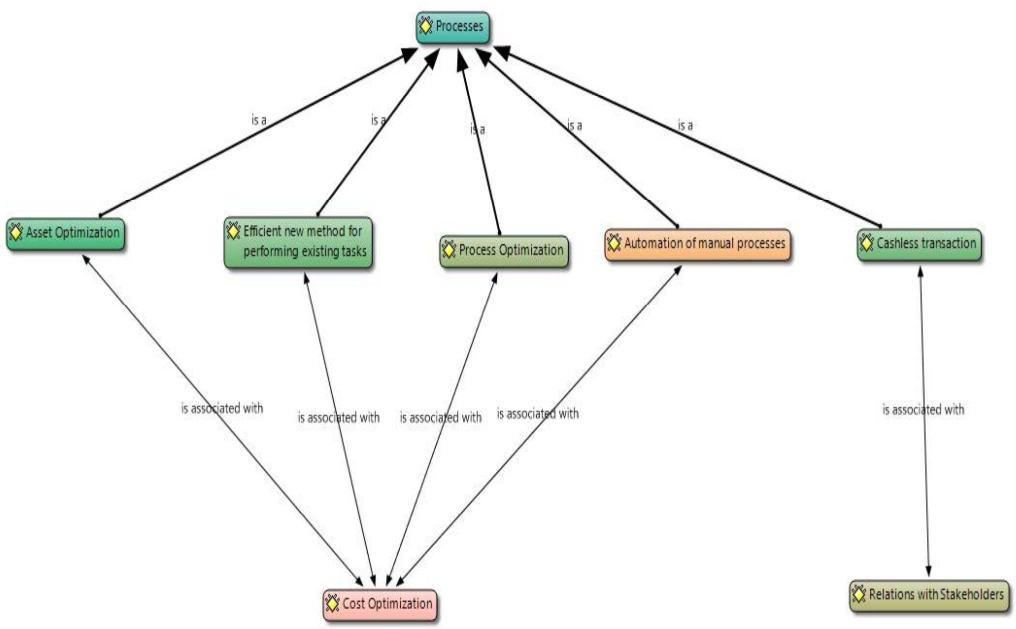


Figure 4.11: Network diagram depicting the interrelation of Processes with People, Data and Things

The variables on processes having connections with the variables on people, data and things obtained through the Network diagram (Output of ATLAS.Ti) and the results of the mean comparison analysis were incorporated in the Business Model Canvas (Osterwalder & Pigneur, 2009) tool as depicted in figure 4.12 below:

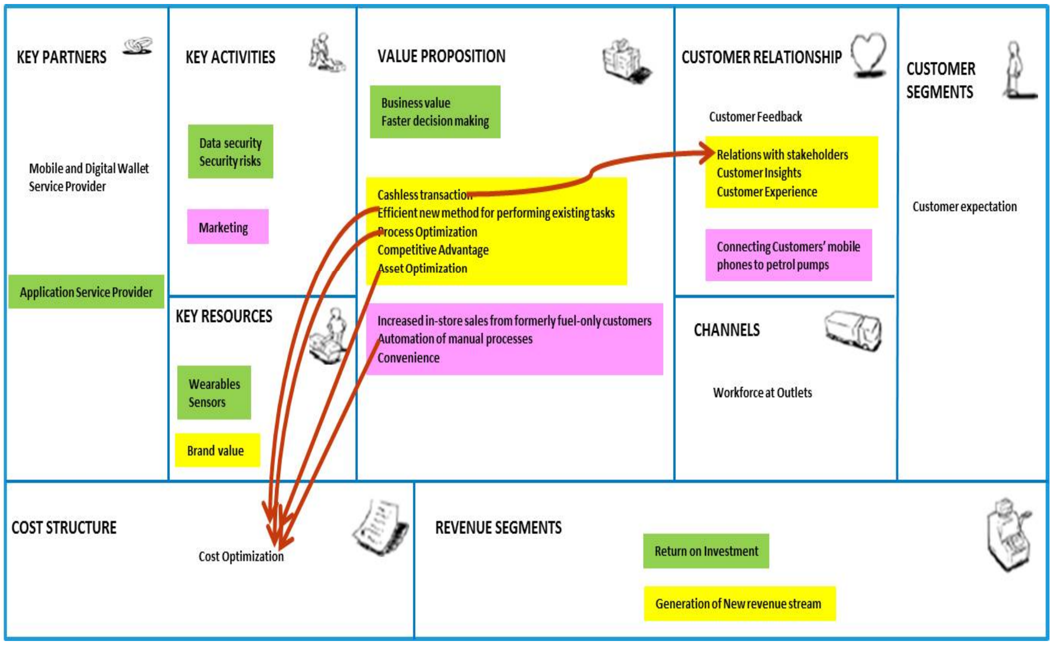


Figure 4.12: Interrelation of Processes with People, Data and Things in the Business Model Canvas tool (Osterwalder & Pigneur, 2009)

- **Important variables and the interrelation among them**

The important variables having connections with other variables obtained through the Network diagram as an output of ATLAS.Ti software is depicted in Figure 4.13. It can be inferred from the said figure that:

- The variables 'Customer Insights', 'Data Security, 'Security Risks', 'Application Service Provider' and 'Customer Expectation' are considered as important variables.
- 'Customer Insights' is associated with 'Business Value', using analytics Customer data can be used to provide better offers and services at the fuel stations. Customers perceive the value that they receive at the Oil outlets

- ‘Data Security’ and ‘Security Risks’ are associated with ‘Relations with Stakeholders’. Customers want privacy and protection of their data.
- ‘Application Service Provider’ is associated with ‘Cost Optimization’. Storing of data on the Cloud will enable the Public Sector Oil Marketing companies to use services as and when required and pay only for the time of their usage. This will certainly reduce cost.
- ‘Customer Expectation’ is associated with ‘Convenience’. Customers expect convenience at the fuel stations.

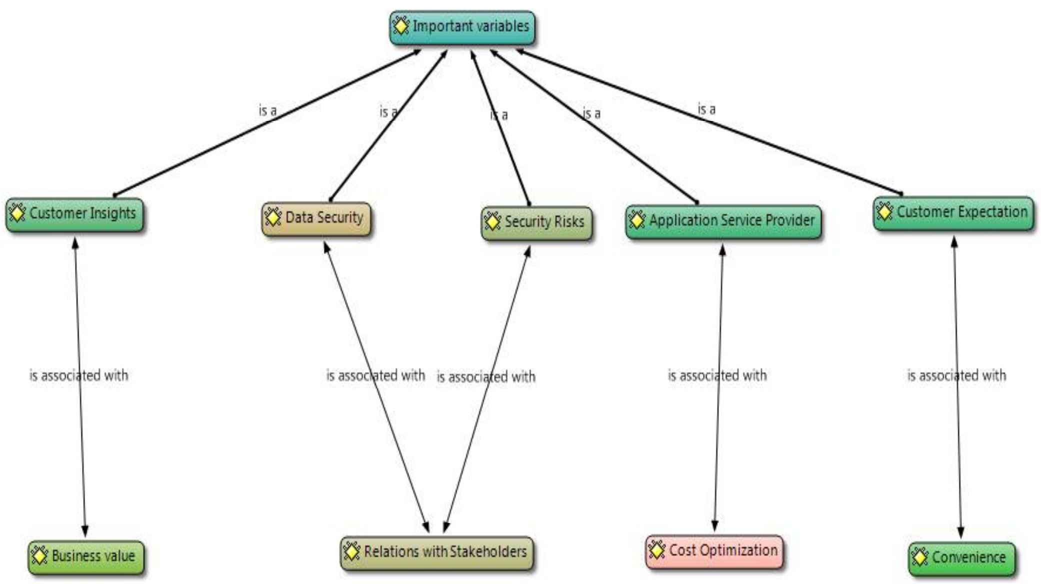


Figure 4.13: Network diagram depicting the interrelation of important variables

The important variables having connections with other variables obtained through the Network diagram and the results of the mean comparison analysis were incorporated in the Business Model Canvas (Osterwalder & Pigneur, 2009) tool as depicted in Figure 4.14 below.

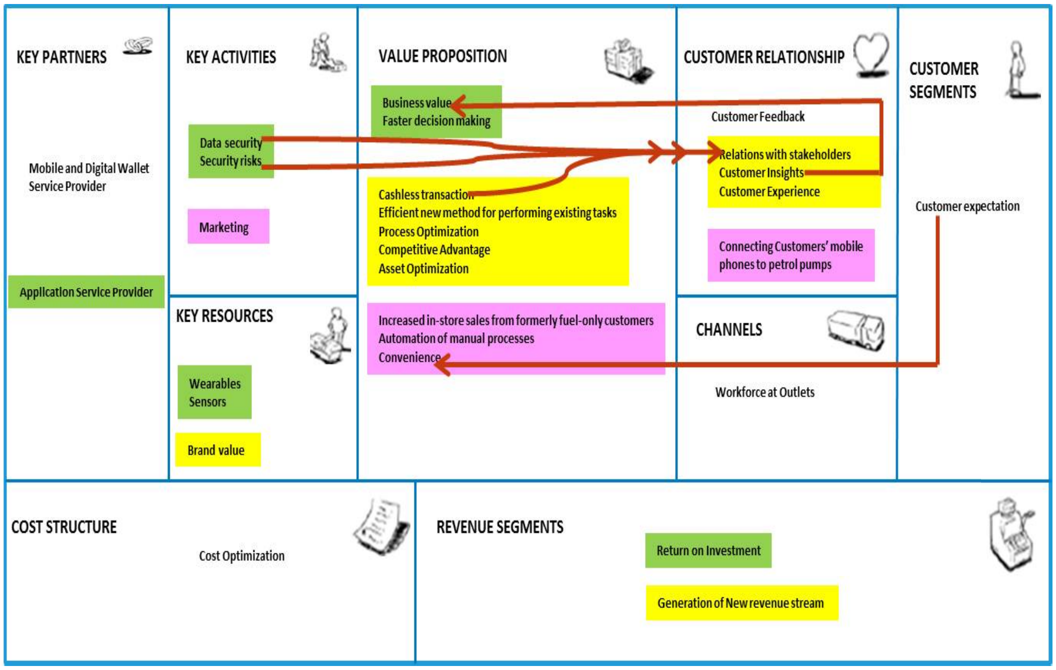


Figure 4.14: Interrelation of important variables in the Business Model Canvas tool

- **Interrelation of People, Processes, Data and Things**

The variables having interrelation of processes, people, data and things obtained through the Network diagram as an output of ATLAS.Ti software is depicted in Figure 4.15. It can be inferred from the said figure that:

- The variables 'Automation of Manual Processes', 'Process Optimization', 'Asset Optimization' and 'Efficient New Method for Performing Existing Tasks' are related to 'Cost Optimization', as they lead to improved operating margins.
- 'Cashless Transaction' is related to the variable 'Relations with Stakeholders'. Cashless transactions lead to brand stickiness. Fuel stations are already looking for going cashless.

- The variables ‘Data Security’ and ‘Security Risks’ are related to the variable ‘Relations with Stakeholders’
- ‘Application Service Provider’ is related to Cost Optimization. Data hosted on the Cloud will enable these companies to use services as and when required, this will optimize cost
- ‘Customer Expectation’ is associated with ‘Convenience’. Customers expect convenience at the Fuel Stations.
- ‘Customer Insights’ is associated with ‘Business Value’. Using analytics, customer data can be used to provide better offers and services at the fuel stations. Customers perceive the value that they receive at the oil outlets
- ‘Customer Feedback’ should be incorporated as an additional variable under ‘Customer Relationship’. This will enable the retail oil outlets to view the responses from the customers on their services
- ‘Mobile and Digital Wallet Service Provider’ should be incorporated as an additional variable under ‘Key Partners’. Tie-ups have to be forged with them for facilitating cashless transactions.

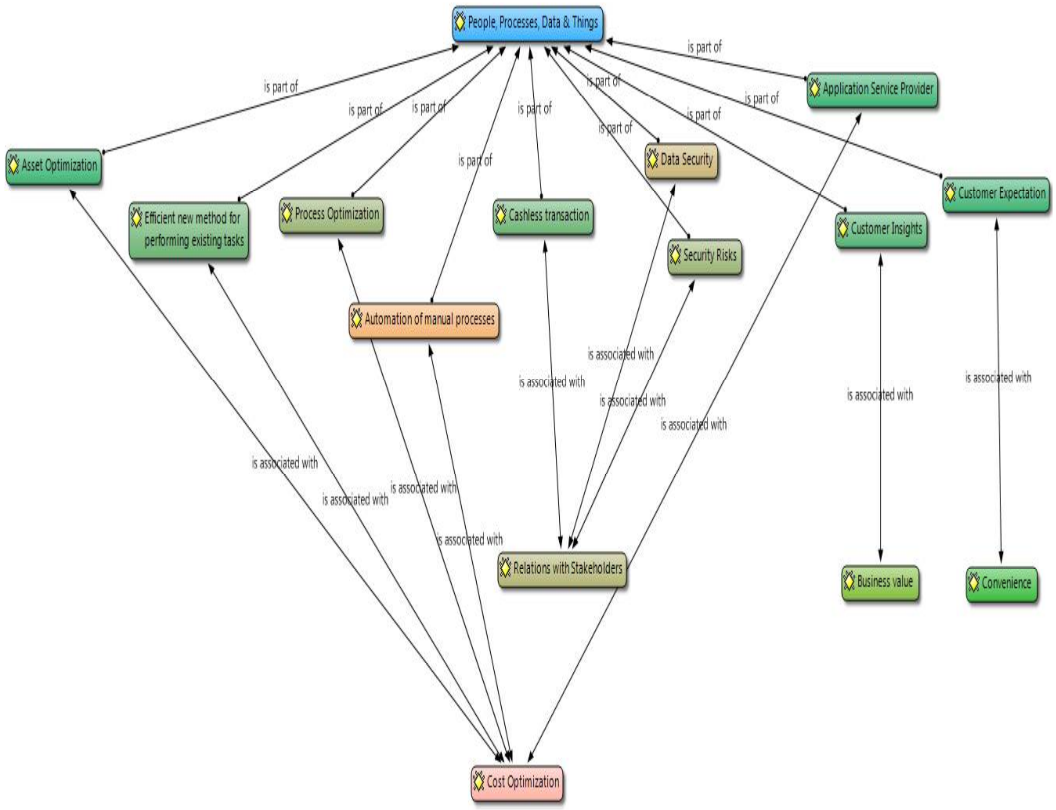


Figure 4.15: Network diagram depicting the interrelation of People, Processes, Data and Things

The connections of the various significant variables showing interrelation of people, processes, data and things obtained through the Network diagram and the results of the mean comparison analysis were incorporated in the Business Model Canvas tool (Osterwalder & Pigneur, 2009) as shown in the Figure 4.16 below:

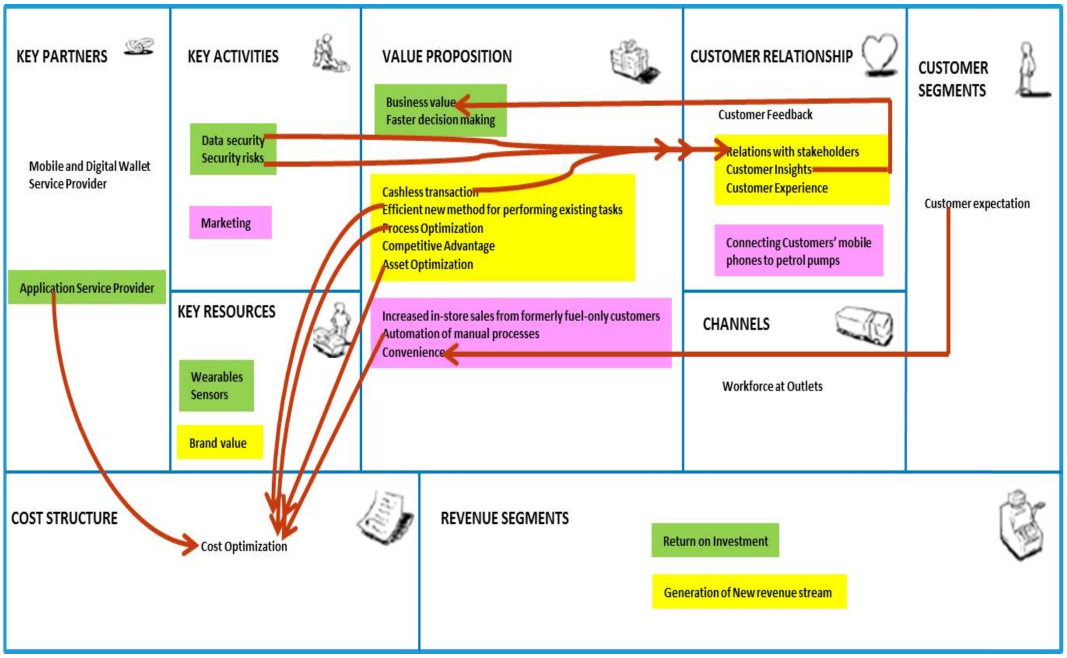


Figure 4.16: IoT Business Model for Indian Public Sector Retail Oil Outlets

It can be inferred from Figure 4.16 that:

- The variables 'Data Security' and 'Security Risks' are more important than the others in the building block 'Key Activities', and therefore, marked as 'Green' color.
- 'Business value' and 'Faster Decision Making' are the important variables in the building block 'Value Proposition' as compared to others and hence marked 'Green' color.
- In the building block 'Revenue Segments', the variable 'Return on Investment' is considered an important variable as compared to the variable 'Generation of New Revenue Stream' and hence marked 'Green' color.
- The variables 'Automation of manual processes', 'Process Optimization', 'Asset Optimization' and 'Efficient New Method for Performing Existing Tasks' are related to 'Cost Optimization' as they lead to improved operating margins.

- ‘Cashless Transaction’ is related to the variable ‘Relations with Stakeholders’. Cashless transactions lead to brand stickiness. Fuel stations are already looking for going cashless.
- The variables ‘Data Security’ and ‘Security Risks’ are considered as most important; they are related to the variable ‘Relations with Stakeholders’
- ‘Application Service Provider’ is related to cost optimization. Data hosted on the Cloud will enable these companies to use services as and when required, this will optimize cost
- ‘Customer Feedback’ should be incorporated as an additional variable under ‘Customer Relationship’. This will enable the Retail Oil Outlets to view the responses from the customers on their services
- ‘Mobile and Digital Wallet Service Provider’ should be incorporated as an additional variable under ‘Key Partners’. Tie-ups have to be forged with them for facilitating cashless transactions.

4.3.3 Validation of IoT Business Model

The IoT business model was subjected to an in-depth interview (Appendix F) consisting of a few Open ended questions for a sample size of three (Guest, Bunce, & Johnson, 2006) senior executives for validation. The interviews were recorded, transcribed and coded with ATLAS.Ti software. The output of the software obtained through the Network Diagram was analyzed and given in Figure 4.17 below:

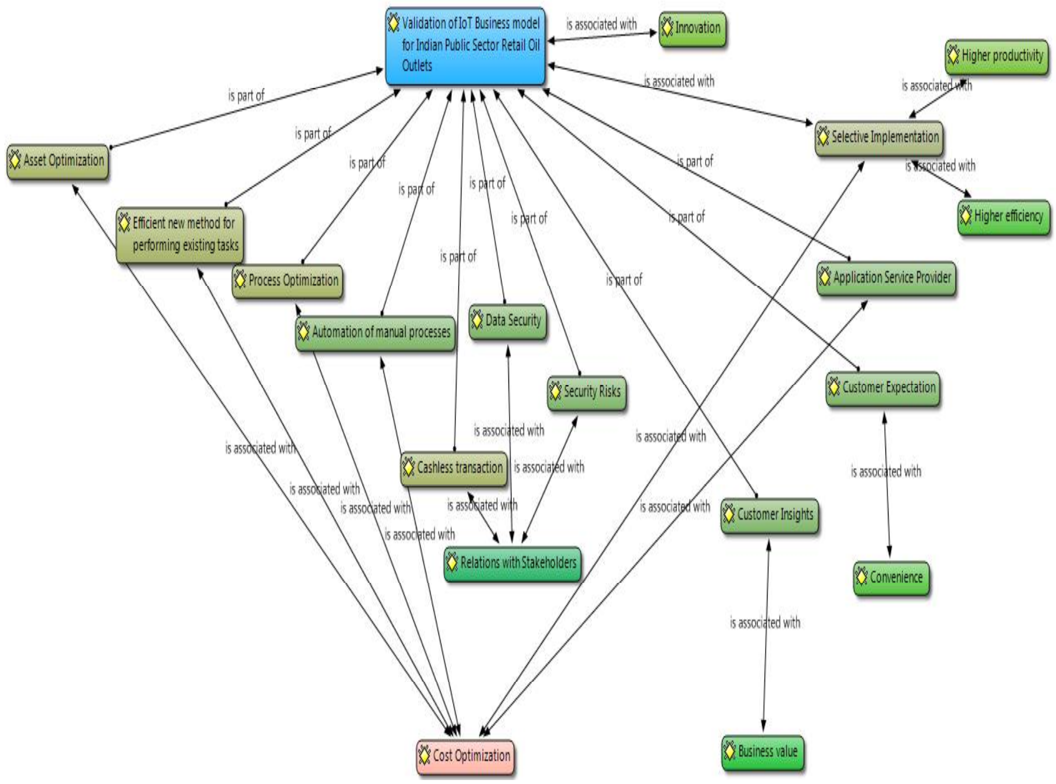


Figure 4.17: Network diagram depicting the validation of the IoT business model for Indian Public Sector Retail Oil Outlets

It can be inferred from the above figure that:

- The variables 'Automation of Manual Processes', 'Process Optimization', 'Asset Optimization' and 'Efficient New Method for Performing Existing Tasks' are related to 'Cost Optimization' as they lead to improved operating margins.
- 'Cashless Transaction' is related to the variable 'Relations with Stakeholders'. Cashless transactions lead to brand stickiness. Fuel stations are already looking for going cashless.
- The variables 'Data Security' and 'Security Risks' are considered as most important; they are related to the variable 'Relations with Stakeholders'

- ‘Application Service Provider’ is related to cost optimization. Data hosted on the Cloud will enable these companies to use services as and when required, this will optimize cost
- ‘Customer Feedback’ should be incorporated as an additional variable under ‘Customer Relationship’. This will enable the Retail Oil Outlets to view the responses from the customers on their services
- ‘Mobile and Digital Wallet Service Provider’ should be incorporated as an additional variable under ‘Key Partners’. Tie-ups have to be forged with them for facilitating cashless transactions.
- ‘Customer Expectation’ is associated with ‘Convenience’. Customers expect convenience at the fuel stations.
- ‘Customer Insights’ is associated with ‘Business Value’. Using analytics, customer data can be used to provide better offers and services at the fuel stations. Customers perceive the value that they receive at the oil outlets.

The undermentioned two variables were additionally suggested by the three senior executives (Guest, Bunce, & Johnson, 2006) which have been mentioned as scope of future study:

- ‘Selective Implementation’ is associated with the IoT business model. The Public Sector OMCs should implement the IoT business model selectively – first at Tier1 cities and thereafter at Tier2 cities and lastly at retail oil outlets near villages. Higher productivity and higher efficiency are associated with selective implementation of the IoT business model.
- ‘Innovation’ is interconnected with the IoT business model. The IoT business model emphasizes on innovation which is also the thrust provided by these PSU retailers. Innovation should be vigorously pursued by the OMCs at their retail oil outlets.

4.4 Concluding Remarks

The researcher was able to identify 26 variables which were grouped into nine factors through the factor analysis. 68.7% variance was explained by the nine factors which were Customer focus, Increase in operating profit, Differentiation, Value to customer, Adoption of latest technology, Enabling IoT ecosystem, Connected objects, Better usage of customer data, Partnership with IT service provider. The researcher has developed an IoT business model for Indian Public Sector Retail Oil Outlets using the Business Model Canvas tool (Osterwalder & Pigneur, 2009) whereby the 26 identified variables were incorporated under the 9 building blocks based on the responses received from the respondents through the survey. The IoT business model developed depicts the interrelation of people, processes, data and things. It was concluded that consumers were more likely to embrace digital wallets to pay at public sector fuel outlets. Customers gave importance to security of their data while doing cashless transactions at public sector fuel outlets. IoT enabled predictive analytics can help generate useful insights on customer purchasing pattern at convenience stores and associated fuel outlets. This data is churned and personalized discount offers are sent to consumers at convenience stores associated with public sector fuel outlets thereby increasing the profit margins of these fuel retailers. It also enables them to gain new revenue streams apart from unlocking business value to all stakeholders. The next chapter mentions about the conclusions of the research work and the recommendations provided by the researcher.