CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview

Being the world's third largest oil consumer coupled with clocking the fastest economic growth, India is a key player in the world. The state owned OMCs - IOCL, HPCL and BPCL, together with a combined share of 94% of the total retail outlets in the country, will occupy an important place in the fuel retailing business in India. Increased competition from the private sector players such as Reliance Industries, Essar Oil and Shell would make the OMCs to adopt innovative disruptive technologies such as IoT at their oil outlets. This would enable the OMCs to retain their dominance in the Indian market apart from staying ahead of competition. This chapter analyzes the key factors responsible for increasing operational efficiency and employee productivity through the IoT business model applicable for Indian OMCs' Retail Oil Outlets. The contribution to literature, limitations of study and the theoretical premise for this study are also mentioned in this chapter.

5.2 Conclusions

Based on the research study and analysis, the researcher was able to identify the factors impacting the development of an IoT business model for increasing operational efficiency and employee productivity in Indian Public Sector Retail Oil Outlets are as follows:

- **Customer Focus (Factor 1)** – IoT can help create more sustained value through moving from a one-time transaction focus to a continuous, relationship focus with customers, suppliers, workers and assets. Improved refueling experience, business outcomes, smarter discount offers at convenience stores are some of the attributes that the IoT can provide to customers at Retail Oil Outlets.
- **Increase in Operating Profit (Factor 2)** - IoT can help generate higher profits at convenience stores through optimizing the inventory and merchandise, pricing and promotion. Automation and innovation need to be vigorously embraced by these companies where they seem to be lacking as compared to the Integrated Oil and Gas majors.
- **Differentiation (Factor 3)** - IoT can enable to sell new products and services at Retail Oil Outlets, thereby enabling fuel retailers to gain new revenue streams and competitive advantage.
- **Value to Customer (Factor 4) –** IoT can enable customers to pay securely through Smartphones at Retail Oil Outlets. IoT can help unlock value for Retail Oil Outlet business through faster networks, storage in cloud and higher computing performance. Predictive Analytics coupled with Cloud enabled solutions can correlate the profiles of consumers with the respective fuel purchases at Retail Pumps along with any in-store purchases. Thorough analysis of the data, attractive discount offers can then be provided on the user's smartphone.
- **Adoption of Latest Technology (Factor 5)** - IoT can also enable to provide dashboards on the customer's smartphone relating to the inventory of fuel, consumption rate, when to replenish fuel, monitors tyre pressure and provides signals when to refill the tyres.
- **Enabling IoT Ecosystem (Factor 6)** - Personalized offers can bring more customers to convenience stores, who used to formerly only refuel at the pump. IoT provides information to the consumers on their smartphone app - the nearest oil outlet, shortest route to the outlet, the items along with

their respective prices that are available at the outlets. Indian Public Sector fuel retailers can boost sales of their convenience stores through connected marketing. Customer data is protected using enhanced security features of IoT.

- **Connected Objects (Factor 7) -** IoT enabled sensors can be used to track the power consumption, regulation of traffic at the service stations apart from providing weather related information at the Retail Oil Outlets. Wearable watches can increase collaboration with workers at the pumps.
- **Better usage of customer data (Factor 8) -** Connecting the unconnected objects results in huge generation of data. IoT provides customer insights through predictive analytics such as tracking the chain of past transactions and payment modes. Predictive Analytics tools help generate actionable customer insights through churning of customer data. These insights should be used to provide smarter discount offers to customers at convenience stores and while they are refueling at pumps.
- **Application Service Provider (Factor 9)** - Public Sector Oil Retailers need to leverage the partnership with their respective Application Service Providers for effective implementation of IoT at their Retail Oil Outlets for interpretation and analysis of generated data. They also need to engage with the service provider to bring in innovative solutions which will automate their business processes.

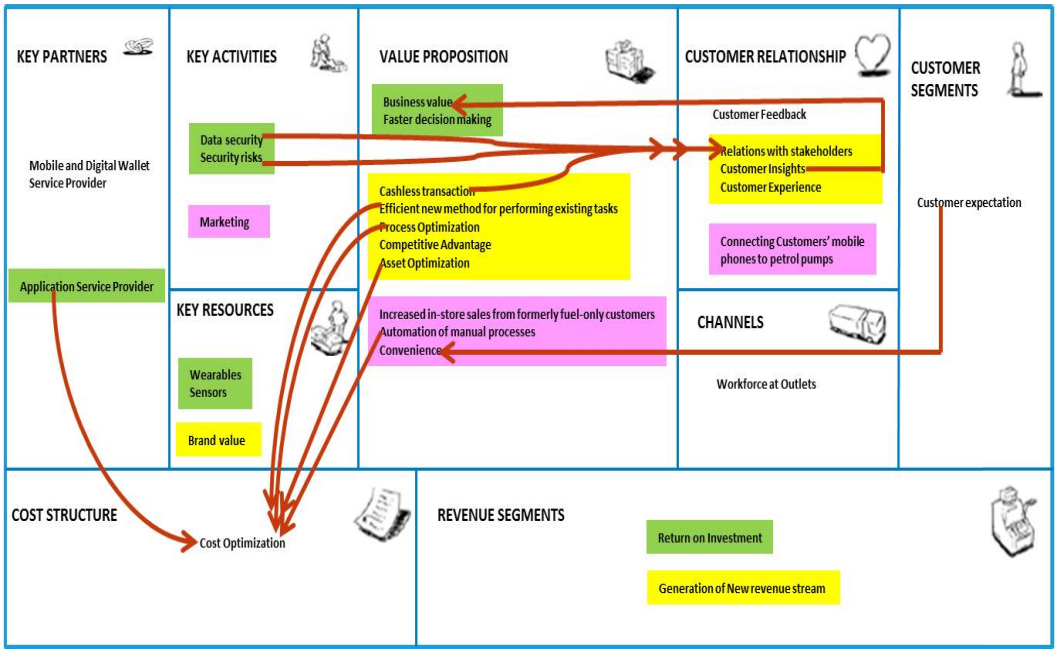

Figure 5.1: IoT Business Model for Indian Public Sector Retail Oil Outlets

It can be inferred from Figure 5.1 above that:

- The variables 'Data Security' and 'Security Risks' are more important than the others in the building block 'Key Activities'.
- 'Business value' and 'Faster Decision Making' are the important variables in the building block 'Value Proposition' as compared to others.
- 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'.
- 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 in turn 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.

5.3 Recommendations

Based on the research study the following recommendations are provided:

- **Adoption of IoT at OMCs' Retail Oil Outlets –** The OMCs need to decisively adopt IoT at their retail oil outlets in a phased manner - first at Tier1 cities, thereafter at Tier2 cities and lastly at remote places near villages. Improved refueling experience and smarter discount offers at convenience stores are some of the attributes that IoT can provide to customers at OMCs' fuel outlets.
- **Data Security –** IoT has created vast interconnected networks that are prone to cyber-attacks from hackers. Data security is an important aspect in internet-connected smart fuel oil outlets. Vehicles getting connected to the internet are prone to attack due to dependence on IP networking. The connected automobiles can have access points that are susceptible to electronic manipulation from cybercriminals. The OMCs need to ensure that customer data is protected and a robust security mechanism is in place to protect customer data. The networks, data centers and servers hosting IoT data should be proactively monitored and measures taken to protect

the infrastructure systems from malware attacks and software bugs. All systems and servers handling OMCs' oil outlets IoT data should be configured with antivirus software.

- **Increased Collaboration between OMCs and Application Service Providers –** As our society gets digitally connected, more and more data is available on real time basis. Application Service Providers play a crucial role in transforming the retail oil outlets into internet-connected smart pumps; enhanced collaboration between them and OMCs will help build the right partner ecosystem. The Application Service Providers should ensure secure data connection between people, sensors and mobile devices at the oil outlets, host the OMCs' outlet data on the Cloud and install the sensors at the OMCs' outlets. Video calling through Skype and Lync can be enabled by them at all the OMCs' oil outlets, this would ensure effective communication and greater knowledge sharing among oil outlets and with channel partners, vendors and the head office. This will reduce operational cost, cut travel cost and improve productivity. All outlets can get interconnected, thereby, enhancing greater knowledge collaboration among the various stakeholders.
- **Tie-ups with Insurance Companies –** OMCs can tie-up with insurance companies for selling usage-based vehicle insurance policies at their fuel outlets. The sensors incorporated in the connected vehicle can track the vehicle's mileage apart from driver behavior and driving style. These can be leveraged by the respective insurance company at the oil outlet to sell mileage and usage based policies, thus, opening up a new revenue stream to the public sector fuel retailers. In usage based insurance policies, rash drivers are charged more than safe drivers.
- **Tie-ups with 'Mobile, Digital Wallet and Credit Card Providers' –** OMCs need to tie-up with Paytym, FreeCharge, PayPal, Apple Pay etc. for facilitating cashless transactions at their oil outlets. OMCs are already looking for innovative means to reduce cash transactions at their oil

outlets, and embracing of digital wallets will allow them to tap into smartphone generation. Tie-ups can also be forged with credit-card providers so that personalized real-time discounts for products and services (available at oil outlets and convenience stores) can be sent to consumers through a mobile app when they visit the fuel stations for refueling. The app can generate offers by matching consumers' locations, which is determined through their smartphones that should appeal to them given their purchasing preferences. Credit card companies can work with social media players to draw on the inferences of consumers using "likes" to refine its offers, it can help them to strengthen their relationships with OMCs and increase loyalty with young digital savvy consumers at the fuel stations.

- **Customer Feedback –** The Indian consumers want a one stop fuel outlet that can fulfil their needs i.e. refuel and buy convenience store items such as soft drinks, household and food items along with a small restaurant where they can hang out. They are also looking for pumps which can have an ATM, luxury bathrooms, car washing facility and repairs, tyre pressure check and air fill the affected tyres. They also want the weather and traffic updates to be displayed at "smart" pumps and on their "smartphones". Some of the customers also wish to avail the facility of cashless transactions at a premium amount at the fuel pumps. OMCs should take feedback from their customers using services at their oil outlets on IoT enabled services so that they can take necessary steps for improvement.
- **Automation and Innovation –** 'Automation and Innovation' phenomenon needs to be vigorously embraced by the OMCs at the fuel outlets. The connected car/vehicle of the future will leverage IoT to integrate vehicle related services on automobiles. IoT sensors on automobiles can track the mileage of the vehicles, indicate the tyre pressure and consumption of fuel, provide traffic and weather related information. The smart mobile app can enable consumers to connect via

the cloud and provide information about - the location of the vehicle, the nearest oil outlet and the distance, the shortest route to be taken to reach the outlet, availability of car wash, ATM, specific brand of lubricant and other services at the outlet. The payment at the oil outlet and at the convenience store can be cashless and can be made through the scan of the mobile phone instead of the swipe of the credit/debit card. IoT can also help in optimum utilization of manpower at OMCs' oil outlets, bring about automation and eliminate unproductive work practices.

- **Personalize Customer Experience –** In a competitive world, firms have always sought to understand customer behavior better so that they tailor their services accordingly. With the exponential growth of mobile devices and availability of data, services provided to customers can now be personalized (D'Emidio, Dorton, & Duncan, 2015). As our society gets digitally connected, more and more data is available on real time basis. IoT can help in collection of data from various touch points at the OMCs' oil outlets apart from mapping of consumer profiles. Data Analytics coupled with artificial intelligence can help in analyzing this data which could aid the OMCs to provide customized services and products to their customers. IoT enables in creating a consumer profile based on the transactions done by the consumer through the mobile, this would be relevant for the convenience stores at the oil outlets and they can customize and deliver targeted advertisements to the consumers. OMCs should leverage the IoT and provide customized smarter discount offers to customers based on their previous purchase history at their oil outlets. IoT can help the convenience store managers to optimize their inventory and take faster decisions on optimal price points apart from reducing costs. Every purchase at a convenience store entitles a consumer to acquire points for availing discounts in future thereby augmenting the probability of repeat business. The customer data enabled by IoT can provide the convenience stores to offer better services customized to the consumer's

preference thereby enhancing the user experience at the convenience store. It also increases greater customer loyalty, brand stickiness apart from increasing the revenue for the convenience stores. IoT can add immense value to the various stakeholders of the public sector fuel retailers by helping them make informed decisions.

- **Hosting of IoT Data on Cloud –** The OMCs should look at hosting of the IoT data on the Cloud. The IoT sensors at the OMCs' oil outlets can collect data on a real time basis, and simultaneously send it to the Cloud platform. Cloud Computing can enable OMCs to save costs on storage by hosting the data on Cloud. It will also allow OMCs to free up their storage infrastructure and execute systems processing at high speed and pay for only the duration and amount of usage. The OMCs can store massive terabytes of IoT data on the Cloud which can be secured. The OMCs need to pay only for the duration of the resources and services that they utilize. They can save costs which would otherwise have been spent on setting up the infrastructure, related hardware, data center energy usage and operations personnel. This could potentially save cost for the OMCs apart from making their processes more efficient, productive and cost effective at their oil outlets.

5.4 Contribution to Literature

The study provides a comprehensive list of digital enablers that can be used to enhance employee productivity and operational efficiency in Indian Public Sector Retail Oil Outlets. The IoT business model developed in this study will help the Indian Public Sector OMCs to implement it at their Retail Oil Outlets for increased employee productivity, operational efficiency and revenue. It would also enable them to lower their Operating costs. The base theory for the current research is the **'Thing Theory**'.

The **'Thing Theory'** (Applin & Fischer) mentions about linking persons to site specific intelligent ecosystem. The 'Thing Theory' mentions about the interrelation between devices, human beings and technologies and how they can be practically operationalized. When people enter the location-specific smart environment, the sensors integrate with the location and the environment responds to them. 'Thing Theory' is an approach that uses software agents applied in well-thought-out contexts to help with the organization and interpretation of the messages that these devices will be broadcasting and exchanging. Thing Theory is inspired by the Addams Family's "Thing", a disembodied hand that navigates between boxes in different rooms in the family home. 'Thing' works as an agent and helps organizations by parsing, collating and sifting through multiple messages in location-aware environments.

Contribution to Thing Theory – The study shows the interrelation of Processes with People, Data and Things within the integrated IoT ecosystem as depicted in figure 5.2 below. It can be inferred from the figure that:

- The variables on processes are 'Automation of Manual Processes', 'Process Optimization', ' Asset Optimization', 'Efficient New Method for Performing Existing Tasks' and 'Cashless Transaction'
- '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.
- 'Cashless transaction' is related to the variable 'Customer Relationship'. 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.

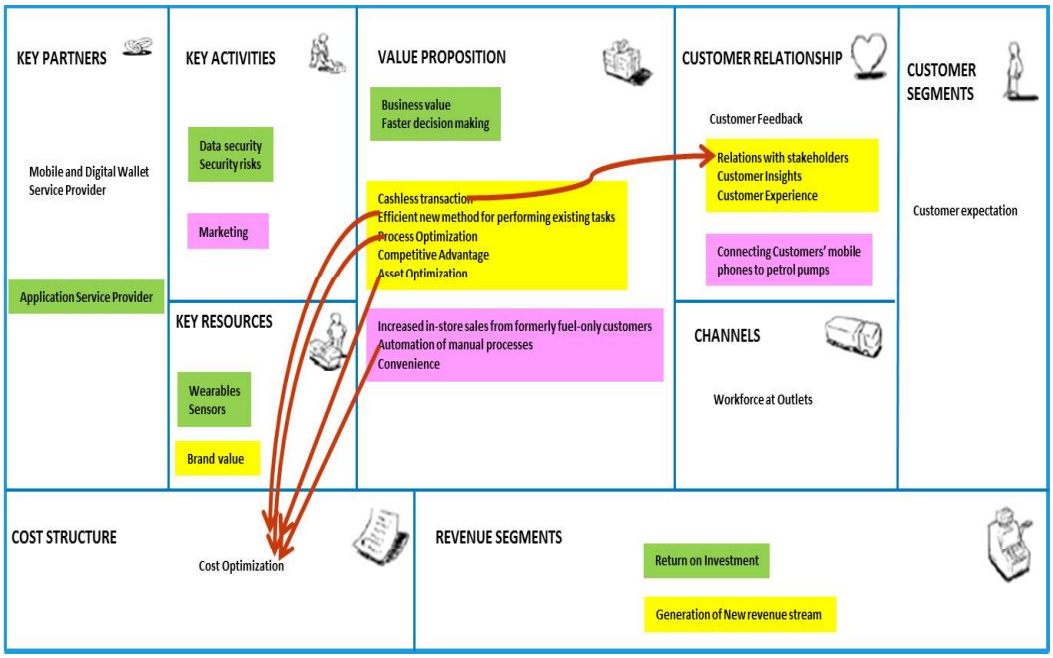

Figure 5.2: Interrelation of Processes with People, Data and Things in the IoT Business Model for Indian Public Sector Retail Oil Outlets

5.5 Limitations of Study

- The research is limited to Indian Public Sector Retail Oil Outlets such as IOCL, HPCL and BPCL. The study is limited to their retail oil outlets and not their downstream operations.
- BPCL, IOCL and HPCL have different micro-marketing strategies and different dispensers. The IoT business model can be further tailored for a specific Retail Oil PSU which is scope for further study.
- One of the means of survey distribution employed was the online channel GoogleDOCS. It was not possible to know how much well informed were the survey participants.
- The scope of study did not consider the Internet Protocol versions IPv4 or IPv6. IPv4 has a smaller IP address of 32-bits, whereas IPv6 has a larger IP address of 128 bits; thus IPv6 has a larger address area as compared to

IPv4. IPv6 is a key communication enabler for the future IoT which is scope for further study.

5.6 Future Scope of Study

Elaborate study can be undertaken by interested scholars in future for incorporating the following three variables in the IoT business model:

- ***'Selective Implementation'*** - The Public Sector Oil Marketing Companies may implement the IoT business model selectively – first at Tier1 cities and thereafter at Tier2 cities and lastly at Retail Oil Outlets near villages.
- ***'Innovation'*** - Indian Public Sector Oil Retailers' focus on IoT innovation initiatives.
- IPv6 which is a communication enabler for the future IoT.

Future research can be done tailoring the IoT business model for a specific OMC.

5.7 Concluding Remarks

Public Sector Oil marketing companies which view the IoT as a means of disruption and innovation, can bring out enhanced business value to their customers and various stakeholders through the implementation of the IoT business model at their retail oil outlets, and thereby, have a competitive advantage. To transform the existing Retail Oil Outlets into "Smart Pumps" and to become a Digital business, the Indian Public Sector OMCs need to harness the huge amount of data encompassing their business by connecting their people, processes and assets through implementation of the IoT business model. This would improve productivity and efficiency at their oil outlets, streamline processes, provide better management of inventory and bring about greater collaboration with the various stakeholders – employees, dealers, consumers,

channel partners, vendors and Application Service Provider. The next chapter mentions about the references used in the thesis.