



Proceedings of GLOGIFT 12
July 30 – August 1, 2012
University of Vienna, Austria
pp. 815-825

The System Dynamics Model of Post Merger Integration (A case study of Kelvinator of India and Whirlpool Corporation USA)

Shyam Sethi¹ and Neetu Yadav²

Abstract

The managerial problems are becoming complex due to rapid socio-economic changes. The manager finds it difficult to cope with the complex problems with the 'traditional management' approach. In order to manage the complexities and contradictions, system dynamics (sd) is a methodology that judiciously combines the traditional management with cybernetics and computer simulation so as to carry out sound policy analysis.

This paper discusses the concept of System Dynamics Methodology and its effectiveness as a modern management tool. The post merger integration of Kelvinator and Whirlpool is analyzed and a System Dynamics Model developed taking 'market share' and 'profit before tax' (PBT) as key parameters. A causal loop diagram for the market share and PBT is developed along with stock and flow diagrams. From the closeness of simulation results with that of reality, we found that the policies assumed for formulating the SD model have been more or less corroborated by the actual results.

Keywords: Causal loop diagram, Cybernetics, Integration, System dynamics.

Introduction

The manager finds it difficult to cope with the complex problems with the 'traditional management' approach based on mental models, intuition, experience and judgement. In order to manage the complexities and contradictions, we need to substantiate a manager's knowledge with tools of selecting and structuring available information, to generate formal models, so that the working of the system can be better understood and policies improved. System Dynamics (SD) is a methodology that judiciously combines the traditional management with cybernetics and computer simulation so as to carry out sound policy analysis (Forrester, 1995). An approach that can capture the underlying dynamics of these systems will be highly suitable for the management. The dynamic behavior of these systems is, to a great extent, governed by its structure, which is composed of various cause effect relationships. There is information feedback, which drives these systems.

The managerial and social systems are governed predominantly by 'endogenous relationships' rather than by the external influences. The internal policies affect a great deal in shaping their performance. So the system that generates the behavior endogenously will be most suitable in dealing with managerial problems.

In the present study, the post merger integration of Kelvinator and Whirlpool is discussed and a

-
1. Life time associate, Whirlpool Corporation, Guest Faculty, Indian Institute of Technology Delhi
 2. Research Scholar, Department of Management Studies, Indian Institute of Technology Delhi

*The System Dynamics Model of Post Merger Integration
(A case study of Kelvinator of India and Whirlpool Corporation USA)*

System Dynamics Model developed taking 'market share' and 'profit before tax' (PBT) as key parameters. A causal loop diagram for the market share and PBT is developed along with stock and flow diagrams. The simulation results using Powersim software have been used for future predictions.

The objective of this study is to present the post facto validation of system dynamics simulation results with the actual results.

Research Methodology

The principles and concepts of Traditional Management, Cybernetics and Computer Simulation form the foundation of System Dynamics, overcoming their weaknesses and utilizing their strengths synergistically. In the discipline of traditional management, the judgement and experience of managers are used to solve problem situations. Cybernetics or feedback theory provides principles that help a manager to filter out the real information useful in a problem situation and then relating various information elements to find out the causal relationships and feedback in the system. The computer simulation is used to generate the consequences for studying the dynamic behavior of the system, as human mind is weak in generating and relating higher order consequences. Thus, SD makes use of the strengths of the human mind for gathering information, generates a structure with the help of known principles and surmounts the shortcomings of the human mind by computers. The SD methodology with its causal philosophy is for gaining deep insight into a system.

The SD process starts from a problem to be solved—a situation that needs to be better understood, or an undesirable behavior that is to be corrected or avoided. Presumably a SD model will organize, clarify and unify knowledge. SD models are built to determine and modify the processes that cause desirable and undesirable behavior (Sushil, 1994).

The approach to development of a SD model involves the following steps:

- Problem identification and definition
- System conceptualization
- Model formulation
- Simulation and validation
- Policy analysis and improvement
- Policy implementation

The System Dynamics process starts with the understanding of the system, through the problem definition, identification and formulation, followed by redefinition of the problem, repeated if required, till an acceptable system conceptualization is obtained. The model is formulated in detail then, in terms of mathematical equations, which further widen our understanding of the system, and the process is continued till a logical model in tune with the reality is arrived at. Simulation and validation of the model comes next to formulation, leading to the refinement and reformulation of the model. The valid model is then subjected to policy analysis and improvement; the improved policies can be implemented on the basis of feedback, which will enhance the understanding of the system.

Problem Definition

Whirlpool India Limited (WIL) acquired Kelvinator of India Limited and TVS in 1995. Most of the mergers and acquisitions activities fail due to an array of reasons post, merger/acquisition integration being the most important.

Whirlpool went into the inorganic growth route by acquiring Kelvinator and TVS in order to realize the following goals. It formulated a five-year strategic plan, set targets and actions required achieving them (Whitwam, 1994).

- To become a market leader and sustain market leadership in the segments they entered (i.e., refrigerator and washing machines). For this, Whirlpool had defined a target market share during the strategic plan period.

In order to gain and maintain market share, Whirlpool had to build its brand name, since it had to surrender the Kelvinator brand to Electrolux within one- and –half-years of acquisition of Kelvinator. At the time of acquisition, the brand awareness of Whirlpool was only 20 per cent.

- In order to sustain itself, WIL should earn a minimum profit (which would grow over the period of time). This would not only enable WIL to pay the agreed royalty to its parent company but also expand its operations in the country to convert it into a manufacturing hub, which was an important part of the company's mission statement.

In order to achieve the twin objectives of market leadership and a reasonable profit (within the planned horizon 1995-2001), the following measures have to be taken:

- i. The brand awareness has to be increased from 20 per cent (at 1996 level) to 90per cent by 2002 (Euromonitor data base, 2001). This can be accomplished by increased spending in the following areas:
 - Advertisement (Media)
 - Sales Promotion
- ii. In order to obtain the desired profit level, the following policy measures have to be initiated:
 - *Reduce material cost*, by means of global sourcing, volume leverage and value engineering.
 - *Reduce manufacturing cost* by
 - (a) Technological upgradation divesting the unprofitable manufacturing facilities and outsourcing some functions.
 - (b) Improving productivity by imparting training and development of employee skills and also by offering financial and non-financial incentives.
 - *Reduce employee cost* by means of manpower reduction, which, in turn, can be accomplished by offering attractive Voluntary Retirement Schemes (VRS).
 - *Reduce financial costs* by retiring high interest debts by means of external commercial borrowings (ECB) and by infusion of more equity from the parent company.

The above had to be accomplished taking into account the fact that there would be stiff competition offered by several multinational players like Electrolux, GE-Godrej, LG and Samsung as well as domestic players like Videocon and BPL (Yoshino and Srinivasa, 1995).

System Conceptualization

Components and Interactions

In order to form a basic framework for system conceptualization, the following components and their interactions have been considered below:

- Market Share – This can be classified as:
 - Desired Market Share
 - Market Share (Actual)
 - Discrepancy MS (Desired Market Share-Actual Market Share) [for feedback purpose]

- Sales Turnover
- Brand Awareness
- Advertisement and Sales Promotions
- Competitors Reaction (in terms of price reduction and promotional offerings)

This will form the 'Market Share' subsystem and this will interact with the 'Profit Before Tax' subsystem, which consists of the following components:

- Profit Before Tax (PBT) will be classified as
 - Desired PBT
 - PBT (Actual)
 - Discrepancy PBT (Desired PBT-PBT) [for feedback purpose]
- Material Cost will be Affected by
 - Volume Leverage
 - Value Engineering
- Manufacturing Cost will be affected by
 - Technological upgradation
 - Better trained personnel
- Employee Cost will be affected by
 - Manpower reduction
 - Salary increase and financial incentives
- Financial Cost will be affected by
 - Investments for technological upgradation
 - Investments for training and development
 - Retirement of debt
- Selling Expenses will include advertisement and sales promotions expenses

Causal Loop Diagram

The system has been conceptualized with the help of an Influence Diagram (also called Causal Loop Diagram) as shown in Figure 1.

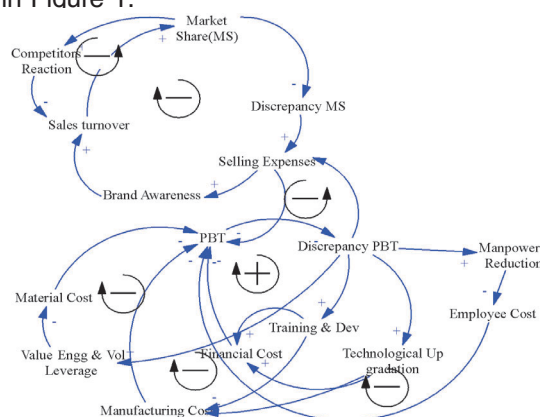


Figure 1: Causal Loop Diagram for Market Share and PBT

*The System Dynamics Model of Post Merger Integration
(A case study of Kelvinator of India and Whirlpool Corporation USA)*

The causal loop diagram mainly consists of two loops, which have sub loops attached to them.

- i Market share feedback loop describes the interaction between the various components like sales turnover, brand awareness etc. It is a stabilizing loop (or a -ve feedback loop) trying to achieve the market share target set and the discrepancy between the desired market share and the actual market share triggering the control mechanism. As an attachment we have the competitors reaction which is again a -ve feedback loop, being triggered when the market share of Whirlpool exceeds a particular market share (23 per cent has been defined here).
- ii The Profit Before Tax (PBT) feedback loop consists of the following sub-loops
 - a) Manufacturing expenses sub-loop is again a stabilizing feedback loop, which sets a target of productivity to be achieved and is triggered by discrepancy in the PBT, and is acted upon by training and development of employment.
 - b) Material expenses sub-loop is also similar to manufacturing expenses sub-loop except that the action variables change volume leverage and value engineering.
 - c) Employee cost sub-loop is also a stabilizing loop where employee reduction is the action variable.
 - d) Financial expenses sub-loop is the only reinforcing loop (+ve feedback) since the discrepancy in PBT triggers up-gradation of technology, which in isolation will shoot the discrepancies in PBT even further.

Model Development

After completing the causal loop diagram, the stock and flow diagram has been prepared. For the clarity of development of stock and flow diagram, the system has been divided into the following sub modules. Sub models are developed in Powersim, here only market share sub-model is presented for illustration:

- Market share
- Profit before tax (PBT)
 - Material and manufacturing expenses
 - Employee expenses

Market Share Sub Model

The stock and flow diagram of market share sub-total is presented in Figure 2.

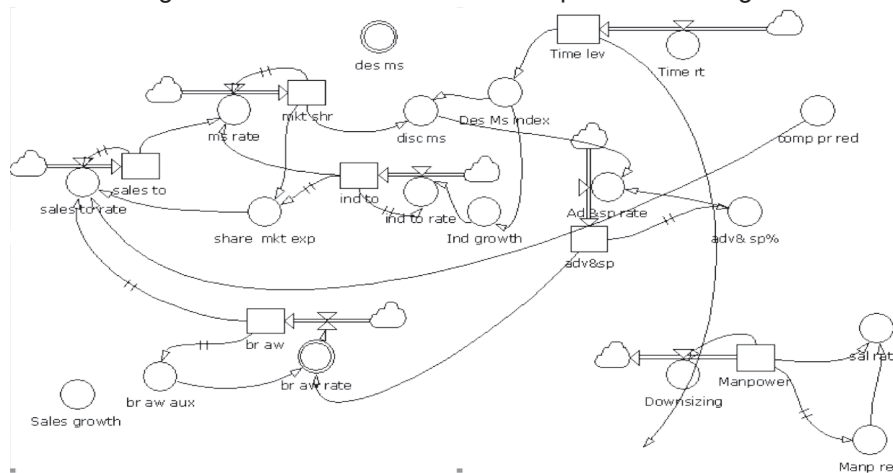


Figure 2: Stock and Flow Diagram of Market Share Sub Model

Validation of the Model

The validation of SD model is different from that of the conventional management science model. The validation is more about building confidence in terms of its suitability for model purposes, consistency with real system and utility and effectiveness. This research work was carried out in 2003 and simulation results were presented for year 2009. Now in 2011, post facto validation of the model has been done by matching the simulation results with the actual results.

Comparison of Simulation Results with Actual Results

The simulation results obtained from the SD models are first compared with the real data obtained from the Profit and Loss Account and the Balance Sheets of Whirlpool India Limited. The results have been compared with actual data. The behavior of the model seems to follow the pattern of the real data, which verifies the model. For data on market share, business journal reports (Hindu, Business-line, Economic Times, and ORG-Marg) have been referred.

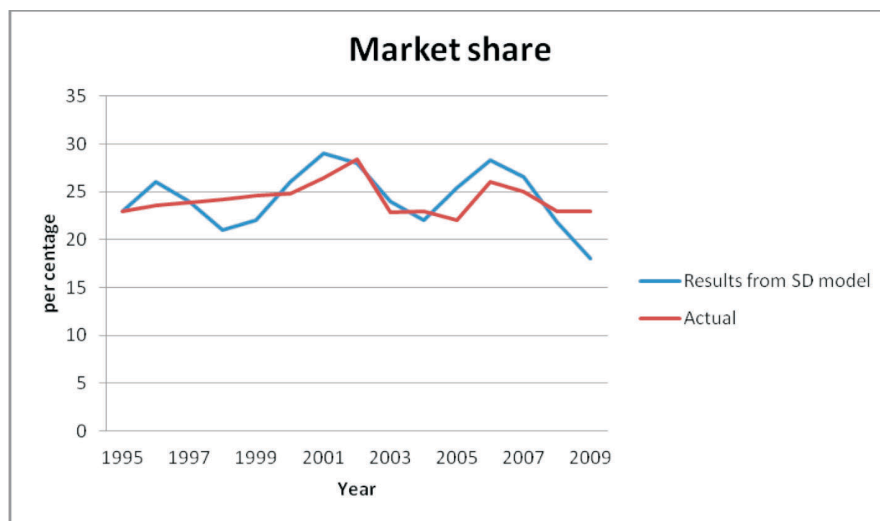


Figure 3: Simulation Results vs. Actual data - Market share

It is observed from Figure 3 that market share is following a sinusoidal pattern, though in later years there is a distinctive downward trend. Whirlpool with its dynamic, afforded in last years has reversed the trends.

Future Prediction: Market Share, 2003 - 2009

Year	2003	2004	2005	2006	2007	2008	2009
Market Share (per cent)	26	22	25.4	28.3	26.5	21.8	18
Actual	26	23	22	26	25	23	18

For the other variables also, we have followed the same pattern of discussion with some brevity

*The System Dynamics Model of Post Merger Integration
(A case study of Kelvinator of India and Whirlpool Corporation USA)*

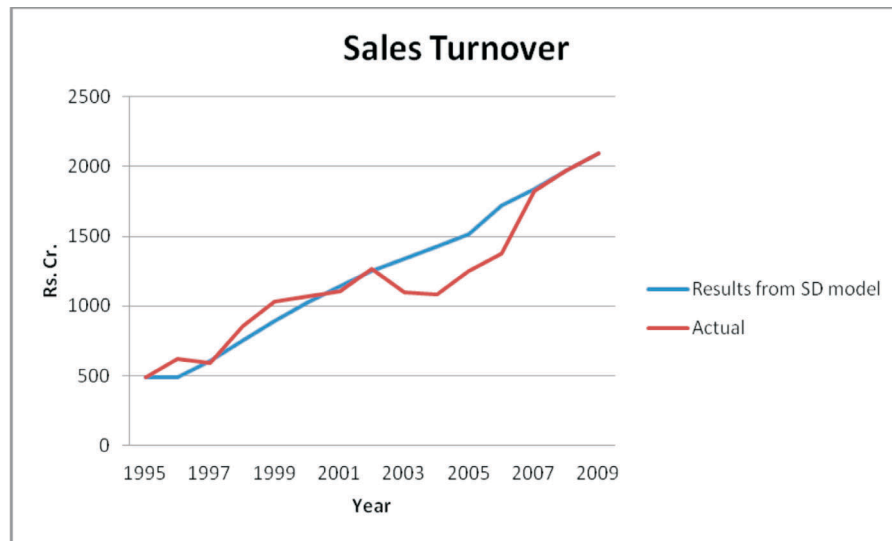


Figure 4: Simulation Results vs. Actual data – Sales Turnover

We observe from Figure 4 that sales turnover is following a steady growth pattern though in 2005, the growth has flattened a bit due to restructuring and re-organizing the sales setup. Whirlpool improved sales considerably by introducing new models. Sales was rs. 2095 Crore as against the prediction of 2093 Crore. by SD model. This shows that the SD model describes the behavior of system very well.

Future Prediction and actual results: Sales Turnover, 2003 - 2009

Year	2003	2004	2005	2006	2007	2008	2009
Sales turnover (Rs cr)	1338	1429	1515	1717	1837	1966	2093
Actual (rs. Cr.)	-	1085	1250	1376	1623	1970	2095

The study was conducted in 2003 and simulation results were predicted till 2009. However, recently the data from 2009 till 2011 had been collected which shows the continuous growth pattern in sales after integration which is shown in Figure 5.

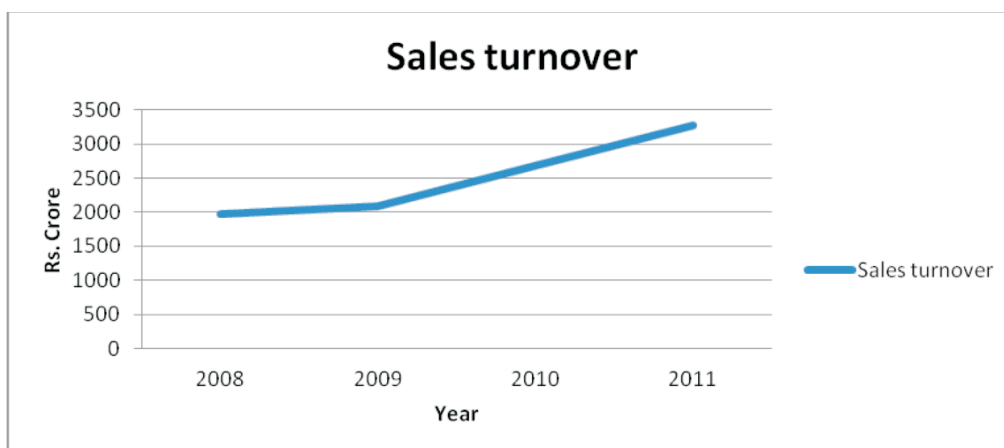


Figure 5: Sales Turnover (For year 2008-2011)

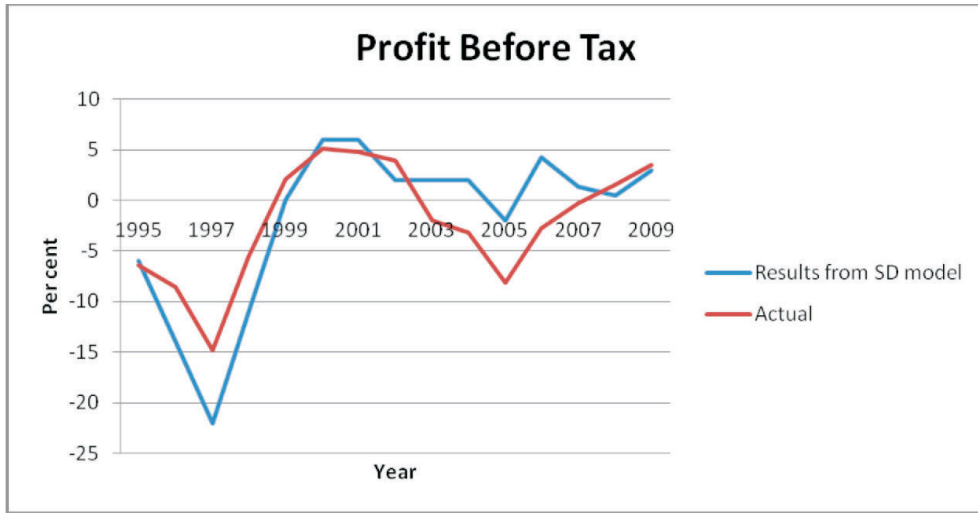


Figure 6: Simulation Results vs. Actual data – PBT

Year	2003	2004	2005	2006	2007	2008	2009
PBT (per cent)	2	2	-2	4.24	1.35	0.5	3
Actual %	-	-3.2	-8.1	-2.76	-0.30	1.6	3.5

It is observed from Figure 5 that PBT is following a sinusoidal pattern though in later years there is a distinctive trend of dampened oscillations. The upward trend from 2009 is continued in 2010 and 2011.

Future Prediction and actual results: PBT

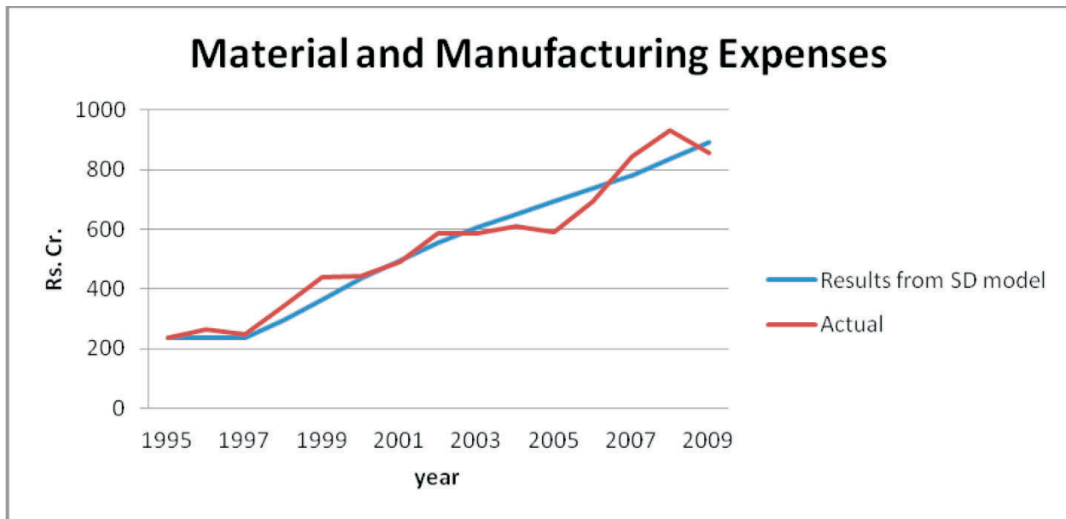


Figure 7: Simulation Results vs. Actual Data – Material & Manufacturing Expenses

*The System Dynamics Model of Post Merger Integration
(A case study of Kelvinator of India and Whirlpool Corporation USA)*

Figure 6 shows that material and manufacturing expense are following a steady growth pattern and it followed the SD model. Though the material cost has actually increased considerably, whirlpool has contracted it with outsourcing and improvement in technology and global procurement.

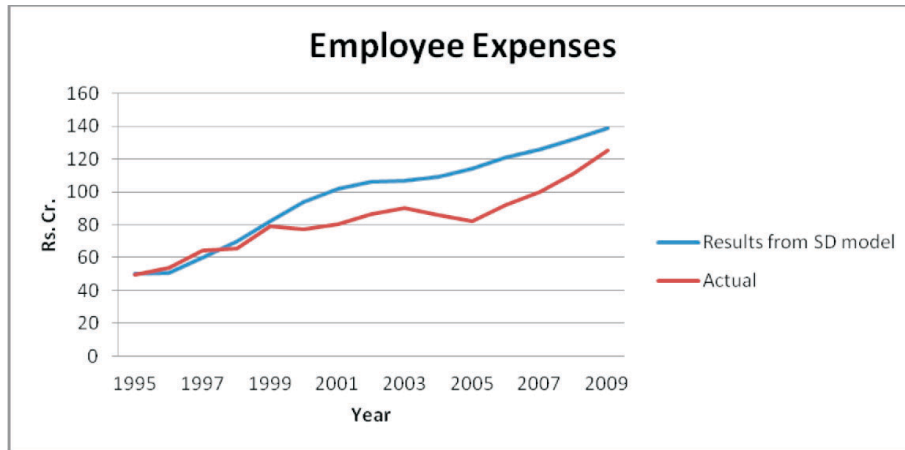


Figure 8: Simulation Results vs. Actual Data – Employee Expenses

We can observe from Figure 8 that employee expenses had fallen appreciably (This is because of the massive downsizing reducing manpower from 6000 persons to 2951 by the year 2000, and then gradually settle at 2238 by the year 2005, which has been assumed as the ‘bare-minimum’ manpower to carry on activities. So employee expenses have steadied in the 6-7 per cent range.

Conclusion

The conclusion is elaborated under the following sub headings:

- Summary of major findings
- Major recommendations

Major Findings

From the closeness of simulation results with that of reality, we can infer that the policies assumed by us for formulating the SD model have been more or less corroborated by the actual results. The major policies and findings are:

For gaining market share, Whirlpool of India Limited’s (WIL) policy (assumed for the SD model and corroborated by actual results) has been the following:

- WIL would spend heavily on advertising and sales promotion in order to build a strong brand awareness, which will, in turn, help WIL increase its market share to the desired level. If there is a discrepancy between the actual and desired market, the spending will be increased.
- If the market share of WIL goes on increasing, its competitors will react by either reducing prices and/or increasing promotional spending in order to retain the lost ground which will lead to a drop in the growth rate of WIL. That can have two implications:
 - a. WIL sales turnover will take a hit (which may not be in absolute terms but its sales growth will come down).

b. WIL will respond by offering a price-cut, which will further erode its margins and bring down PBT.

- It should be noted that WIL doesn't follow the path of increasing Market Share by proactively slashing prices.

Integrating the operations with Kelvinator necessitated the following steps :

- Technological upgradation of the manufacturing facilities (and starting a new facility) of Kelvinator was required in order to achieve better productivity and produce high quality products for the domestic market and for export.
- Productivity improvement could happen by shedding the excess workforce, inherited by taking over Kelvinator and consequently providing them with training for skill up- gradation. Also in order to motivate the apprehensive employees, WIL need to increase salaries and offer other financial incentives.
- The burden of high interest paying debts had to be retired with softer loans available from the parent company. This can also be exploited for further investment required for technological up gradation.
- Better bargaining power with the suppliers including global procurement because of the volume leverage along with value engineering would help the company to increase material productivity and consequently the PBT.

To sum up, it can be said that Whirlpool of India was able to manage the post acquisition scenario considering its objective of building up brand awareness and consequently gaining market share. But it's objective in terms of profit (we have taken PBT as the variable) has not been realized and as per the model predictions may be realized in the near future.

Also it can be seen that of late the market share has also been coming down, though WIL still remains the market leader in the overall refrigerator market and number two in washing machines. This can be attributed to the entry of new multinationals and to the market becoming fragmented. The saturation of urban markets and lack of significant presence of WIL in rural markets could also be a reason for the decreasing market share. However, Whirlpool has made major strides in subsequent years and greatly improved its PBT (profit before tax), net profit and interest cost as shown in Figure 9.

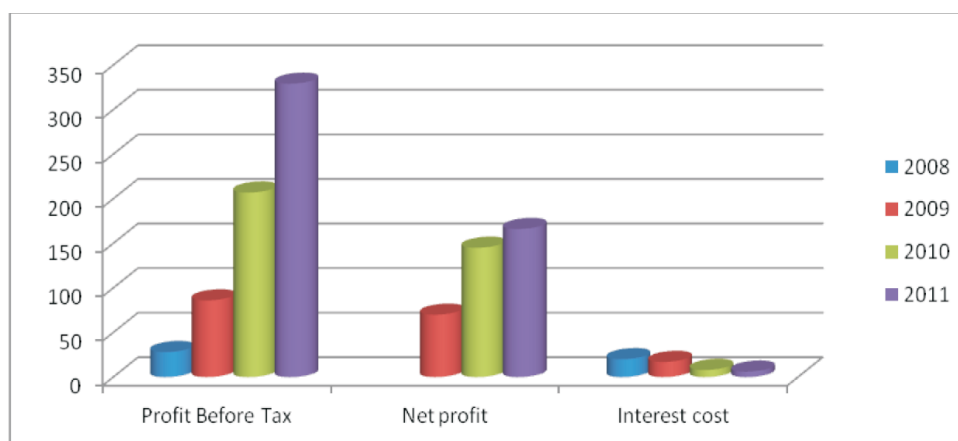


Figure 9: PBT, Net profit and Interest Cost for the Year 2008-2011

Major Recommendations

On the basis of the insight gained from the SD model, the major recommendations are:

- **Focus on Reduction in Material Expenses:** The material expenses have the maximum share of the expenses (around 50 per cent of sales turnover). There had been limited gain in material productivity due to raising prices of steel sheets, copper and plastic in the international market. This has been reduced in the later years by outsourcing and global procurement especially during the years 2010 and 2011.
- **Focus on New Markets:** The market share is not increasing over a period of time despite substantial growth in the industry. To regain this market share, the company has to take necessary action. India's rural market is growing at a brisk pace because of the credit facility, growing purchasing power and low market penetration. Whirlpool does not have a significant presence out there, which remains an unexplored potential. For rural markets, WIL will have to bring out a cheaper and innovative refrigerator.

It is observed that merger integration process helped Whirlpool attain global leverage in India. The integration process also helped in launching a well-conceived brand strategy to gain market share. It also aided the company in managing complex changes. It is facing severe challenges in the emerging competitive environments with the entry of new players like LG, Samsung and Haier. It has improved the financials as shown in the figures above.

This study presented the methodology of post-facto validation of system dynamics methodology and modeling. The results obtained by the simulation are very close to the results came out over the period of 2004-2009. This study can be considered to develop more confidence in system dynamics methodology to predict the behavior of the system.

References

- Euromonitor Database (2001, 2002, 2003 and 2004) , Published by Euromonitor International Inc, USA.
- Gluck, F.W., Kaufman, S.P. and Walleck, A.S. (1980) Strategic Management for Competitive Advantage, *Harvard Business Review*, 58, July-Dec, 154-161.
- Goold, M. and Campbell, A. (1987) Many best Ways to Make Strategy, *Harvard Business Review*, 70-76.
- Jay W. Forrester (1995) The beginning of System Dynamics, *McKinsey Quarterly*, Number 4.
- Kogut, B. (1985) Designing Global Strategies: Profiting from Operation Flexibility, *Sloan Management Review*, Feb. 27-38.
- Lasserre, P. (2003) Global Strategic Management, Macmillan Press, New York.
- Sushil, (1994) Flexible System's Methodology, *System's Practice*, 7(6), 633-652.
- Sushil, (1999) *Flexibility in Management*, Global Institute of Flexible Systems Management, New Delhi.
- Whitwam, D. (1994) The Right way to go Global, An interview by Regina Fazio Maruca. *Harvard Business Review*, March – April, 135-145.
- Yoshino, M.Y. and Srinivasa, R. (1995) *Strategic, Alliances – An Entrepreneurial Approach To Globalization*, Harvard Business School Press.