Innovation in State Owned Enterprises (SOEs) in Developing Economies

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Despite massive privatization, State Owned Enterprises constitute an important contributor in the GDP of many developing countries. However, SOEs are feeling the heat of competition from their private counterparts, and those which could integrate innovation and R&D as a part of their corporate strategy and business models survived the tsunami of competition and others are perishing gradually. This paper focusses on innovation ecosystem existing in SOEs in various countries. Primary research was conducted in the 5 renowned SOEs in India through interviews with top leadership and field innovators. This data was corroborated with the published information on the SOEs in China and Russia. The objective of the paper is to answer research questions relating to drivers and facilitators of innovation and also barriers to innovation in SOEs. The paper brings out challenges in promoting innovation and presents a workable model for promoting Innovation in SOEs.

INTRODUCTION

Innovation in State Owned Enterprises (SOEs) has been intensely researched topic for many years by many researchers across the globe. Most of the research concentrated on SOEs in developed countries or OECD countries. Some research is also available on SOEs in controlled economies like China, Erstwhile USSR, Russia, etc. which is not directly useful in understanding innovation ecosystem in developing economies like India, Brazil, South Africa, etc., but throws light on how SOEs in those countries performed on Innovation front.

In a detailed report, Koch and Hauknes state that people in PSUs innovate to derive the pleasure of creating something unique and new, which is driven by a desire to help bringing in a better society. This paper also brings out various influencing factors in the hierarchy of an SOE for better innovation. (Koch & Hauknes 2005).

Geoff Mulgan in his paper on the subject indicates that innovation in SOEs is driven by creating developing and implementing new ideas for achieving benefit to the general public. (Geoff Mulgan 2014)

The importance of people as innovators and need for creating a facilitating people management system that can inspire innovators in SOEs was also studied in the literature. The research on the subject has been generic without any deeper study into presence or absence of a good innovation system for success or failure of innovations. A general attitude to avoid failures in a society where failures are looked down upon more than instruments to learn lessons is quoted as a main factor for less innovation in SOEs (Koch & Hauknes 2005).

Further, Organisational structure in many SOEs is hierarchical and command and control based which demotivates innovators. Even the work ecosystem in SOEs overloads its people with day to day activities

with routine work leaving no free time for innovative thinking. There are other factors like confidentiality and unhealthy competition among various divisions which prevents knowledge to freely flow across the organisation and ultimately affects innovation (Koch & Hauknes 2005).

As per Geoff Mulgan, financial factors like absence of earmarked budgets or spending models, non-availability of special teams of innovators powered with adequate skills, reward systems which provide more demotivation than encouragement and want of appropriate risk management system to facilitate experimentation were also described as barriers for innovation in SOEs (Geoff Mulgan 2014).

Organizational culture in SOEs, attitude of people and a feeling that people with power need not learn are also acting as obstacles for promoting innovation (Deutsch 1963).

SOEs offer products and services of a very diverse nature with a broad spectrum of consumers which make it difficult to define clear objectives and targets for innovation (Arnaboldee 2010). It is also difficult to define targets in terms of profit alone (Van thille & Leeuw 2002). Absence of a multi-dimensional metric to measure outcomes of innovation in SOEs makes the system more qualitative and abstract. With a mix of tacit and explicit impacts some definable in financial terms and some which can't be also influences innovation in SOEs (Kattel et al 2013). This is even more prominent as many economic impact measurement metrics find it difficult to quantify, in monetary terms, for factors such as quality of life, improvement of health, etc.

Many measurement methods recognized only tangible products as outcomes of innovation with no concept of process innovation or doing things in a better way or in a more efficient manner (De bruijen 2002). This product phobia discouraged people to innovate on processes or better customer experience.

Challenge becomes even more complex when the measurement systems are more static in nature whereas processes are essentially dynamic. Many times impact of any innovation in processes can only be experienced over a long time and measurement systems are not equipped to measure long term effects (Sillanpa 2013). Current measurement systems can utmost describe effectiveness over long term in qualitative terms without any cause and effect relationship. (Porter 2010)

To reduce ambiguity and to present the outcomes in a more objective manner, we need to resort to quantitative methods with fairly accurate measurement systems (Pidd 2008)

But in case of innovation, there are many situations where the outcome is better explained and understood qualitatively. Particularly in the absence of internationally accepted standards of measurement, this leads to a controversial argument and becomes more dependent on opinion of expert professionals in the absence of quantitative measurement. But it is not always possible to get opinion of experts (Noordegraff 2003).

Therefore, for state run enterprises we will need a new set of key performance indicators which are both qualitative and quantitative and should include aspects of social capital, human capital, innovation, environmental capital, etc. Also, the board and the top leadership must meet four attributes, namely-clarity, capacity, capability and integrity (Jan Sturesson 2015).

Carsten Sprenger in his analysis of State Owned Enterprises in Russia felt that Organisational structure, legal and regulatory constructions and negligible competition have not proved to be facilitating innovation to the required level in SOEs of Russia (Carsten Sprenger, 2008).

In another paper on State Owned Enterprises in China, Garry Jefferson stated that several sets of reforms introduced in the running of SOEs had gradually increased the efficiency and innovative output. They had given more autonomy to the boards, without much of government interventions, the compensation of managers was brought at par at the industry norms with clear accountability stipulations and diluting ownership from full to mixed level through selling shares to employees and public are some of these reforms. This had helped China in meeting its SOE reform objective and helped SOEs to perform better (Gary Jefferson 2016).

Fan Gang and Nicholas Hope in their paper "On role of state owned enterprises in Chinese Economy" felt that while the SOEs contributed significantly to many economies, a large sized public sector breeds inefficiencies with market competition getting stifled and frustrates innovation. Therefore co-existence of a vibrant private sector along with the SOEs would be a major prerequisite for innovation to prosper in SOEs (Fan Gang and Nicholas 2012).

In another paper on China "Lessons in public sector reforms from China" Xiaoyun Li et al feel that result orientation is the key to innovation or development effectiveness and goes on to explain how China had adopted this orientation through internalization of political and administrative governance mechanism (Xiaoyun Li, et al 2011)

Kou Kou and Henning Kroll in their paper on "Innovation output and state Ownership in China" argue ownership by state and associated management models could be a hindrance to innovative activities. The influence of State Ownership on Innovation depend a lot on the dynamics of political and Organisational framework and exposing them to a developed innovation ecosystem might help better innovation as against their private counterparts. This study concluded that evidence from Chinese economy confirms that influence of state ownership on innovation performance needs to be studied with respect to contemporary economic Organisational and political context and not in a generic manner. These authors recommended that a detailed research study needs to be conducted on corporate governance and internal innovation structures to know their impact on research and innovation output. They however agree that smart reform programmes in the SOE sector will positively yield concrete benefits on the innovation front (Kou & Kroll 2017).This is in line with the conclusions of Garry Jefferson and Jan Sturesson et al discussed above.

Most of the literature surveyed dealt with impact of reforms in their respective economies on innovation and recommended further research in the areas of innovation infrastructure, ecosystem and factors that act as facilitators or challenges for innovation promotion in SOEs.

METHODOLOGY

The subject research was carried out using empirical research methodology, in which intensive interviews were conducted with the top echelons of some established State Owned Enterprises in India. While selecting the companies following factors were kept in mind:

1. SOEs selected should be involved in manufacturing and commercial operations, should have been existence for at least 5 decades and touched a turnover of 500 million to 1 billion USD at least once in the last 20 years.
2. A few SOEs which had an established record of research and development and innovation and have been continuously growing in their revenues are selected and also a few SOEs which were at the peak of their business at some point in the past, but gradually dipped in their performance as they couldn't innovate enough to withstand technology and market pressure were also selected.
3. Apart from the top leaders directly responsible for innovation in the company, a few employees at various other levels were also interviewed to get a holistic view.
4. The total field personnel interviewed was 48 in number and it encompassed a large bandwidth of Industry executives ranging from top leadership to field innovation engineers.

The companies selected and the people interviewed with the dates of interview are given in the table below:

TABLE 1
THE COMPANIES SELECTED AND THE PEOPLE INTERVIEWED WITH THE DATES OF INTERVIEW

Sl. No.	Company	Person Interviewed	Designation	Date of Interview	Average revenue of three years from 2014 (In Millions)	Mode of Interview
1	Hindustan Aeronautics Limited (HAL)	Mr. Suvarna Raju	Chairman and Managing Director	4th and 8th July 2016	180570.08	Face-to-face
2	Hindustan Aeronautics Limited (HAL)	Mr. V. Sridhara	General Manager Aero Engine Research and Development Centre	9th July 2016		Face-to-face
3	Bharat Electronics Limited (BEL)	Mr. Girish Kumar	Managing Director, Bengaluru Complex	17th June 2016	82531.166	Face-to-face
4	Bharat Electronics Limited (BEL)	Mr. I V Sarma	Former Director, R&D	18th June 2016		Face-to-face
5	Bharat Electronics Limited (BEL	Mr. Ajit Kalghatgi	Director, R & D	12th August 2016		Face-to-face
6	Bharat Heavy Electricals Limited	Mr. B P Rao	Then Chairman and Managing Director	15th Sept 2015	285200	Face-to-face
7	Bharat Heavy Electricals Limited	Mr. Atul Sobti	Present Chairman Managing Director	10th Dec 2015		Face-to-face
8	Bharat Heavy Electricals Limited	Mr. S Biswas	Director Research	10th Dec 2015		Face-to-face
9	Indian Telephone Industries (ITI)	Mr. Satish Minocha	Former chairmanand Managing Director	12th Sept 2016	14127.188	Telephonic
10	Hindustan Machine Tools Ltd (HMT)	Mr. G Sambath	Senior General Manager	14th Sep 2017	425.166	Telephonic

(Source: Prepared by Author)

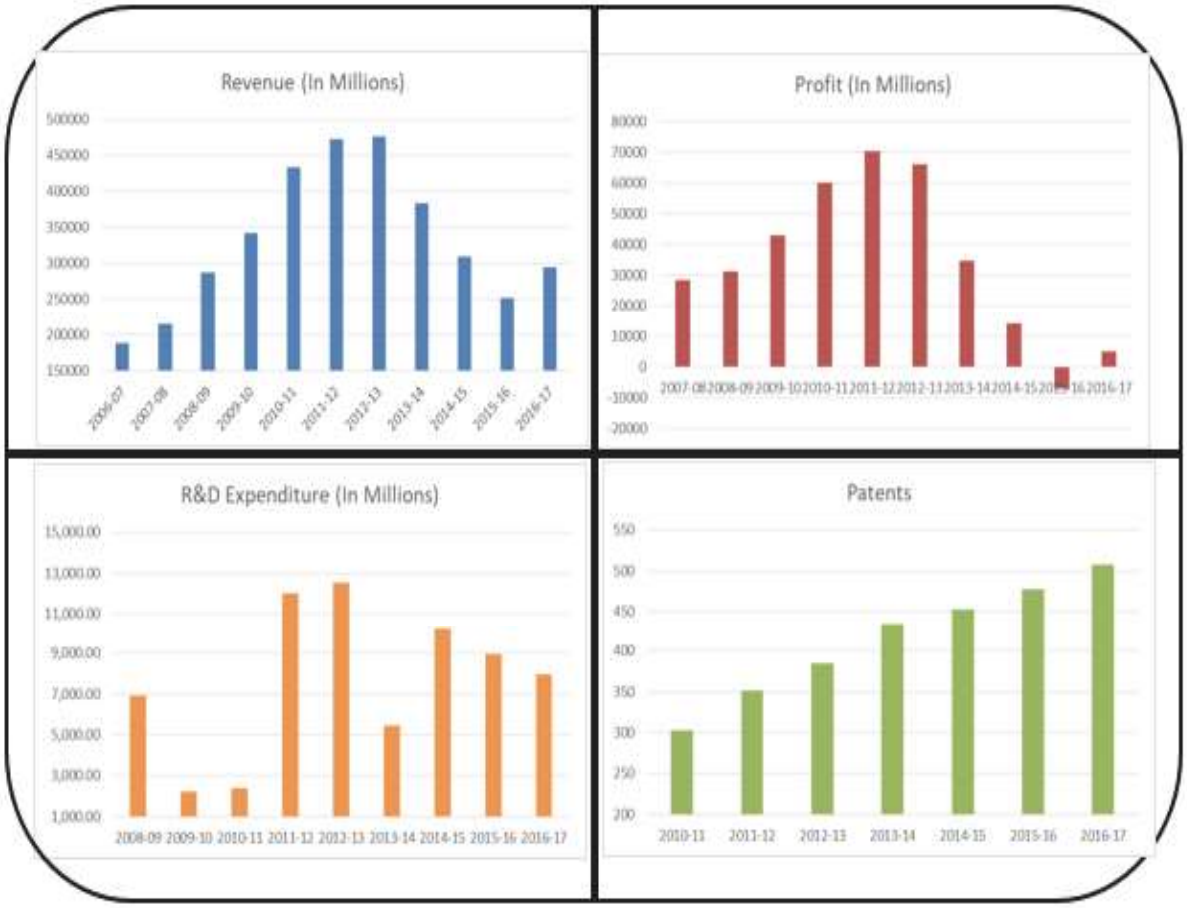
BRIEF PROFILE OF THE COMPANIES SELECTED FOR FIELD RESEARCH

Bharat Heavy Electricals Limited (BHEL)

BHEL was set up in 1964 with an objective of achieving self-sufficiency in heavy electrical and Power Plant equipment. It has now grown to be 7th largest power plant manufacturers across the globe. It has its customer presence in 26 countries. Apart from Power plants, BHEL had diversified into manufacture of Oil and gas rigs, Transportation and locomotives. Transmission equipment and nuclear

reactor related equipment. Though, initially started with partnerships from global power plant manufacturers like Siemens, ABB etc., It has, through its in-house R&D developed Advanced Ultra Super critical technologies and is now at the verge of manufacturing power plants using these technologies. It has 17 manufacturing plants spread across the length and breadth of India with its corporate office in New Delhi, the Indian Capital city. It has dedicated Research and Development Labs in Hyderabad and has been consistently researching on futuristic technologies. BHEL recorded a turnover of INR 350 BN (approx. 5.5 BN USD) in 2016-17. Innovation has been at the core of the growth of this heavy electricals company and it has been consistently spending close to 8-10% of its profits on research. In 2016-17, it has spent INR 8 BN (0.12 BN USD) on Research and Development. It also has a good track record of Patents filing with more than 500 patents filed in 2016-17.

FIGURE 1
IMPORTANT R&D RELATED OUTCOMES OF BHEL



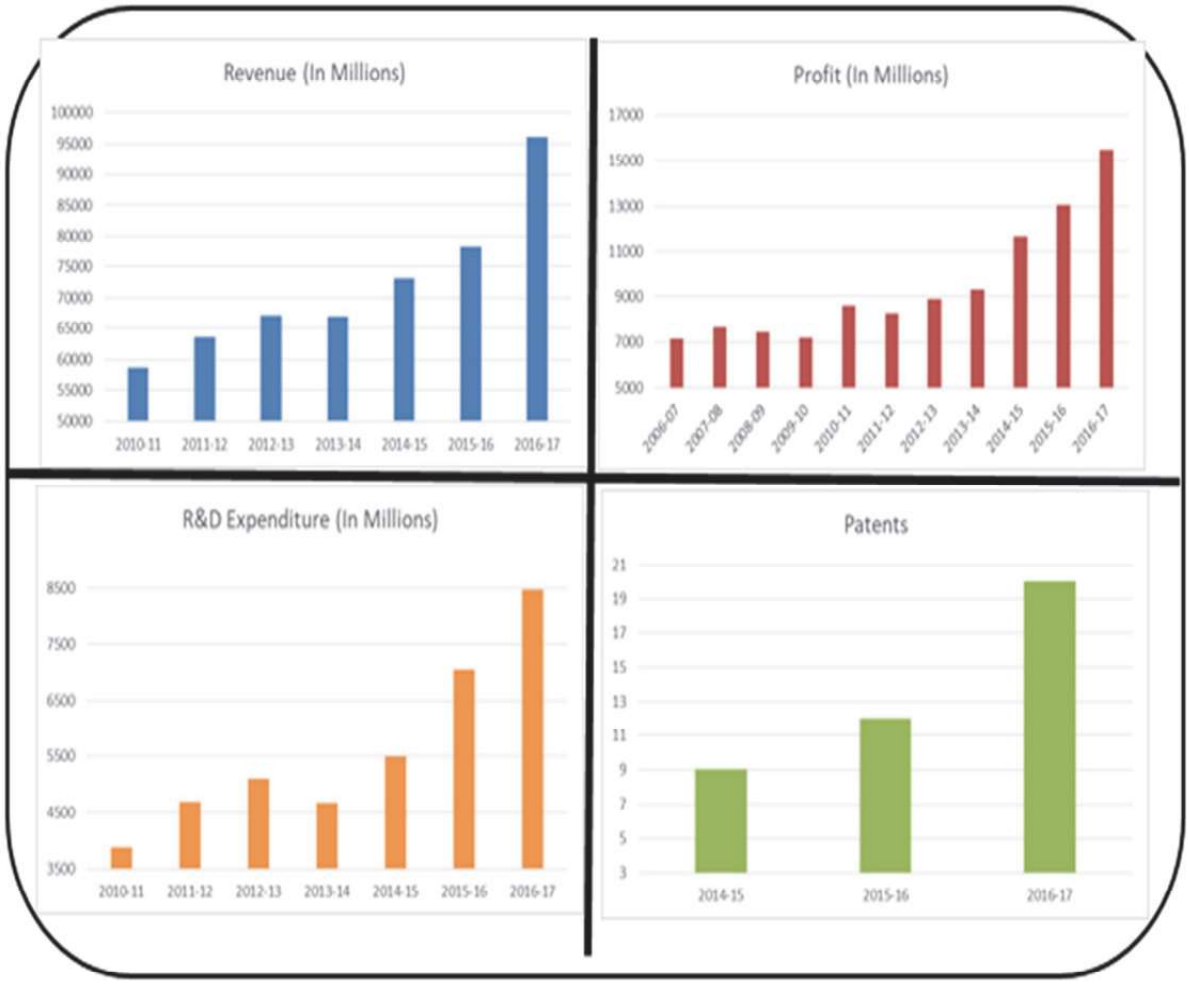
(Source; Prepared By Author On The Basis Of Information Contained In BHEL Annual Reports http://www.bhel.com/financial_information/index.php and MoneyControl.com)

Bharat Electronics Limited (BEL)

With an objective of building a self-reliant nation and to develop Industries indigenously, Indian Government had set up many Public sector Undertakings in 1954 and one of the major ones among these was Bharat Electronics Limited (BEL). It was initially set up under partnership with CSF France (now Thales) to manufacture defense communication equipment for Indian military. It has now grown to be a state of the art military electronics systems manufacturer. With about 10 Strategic Business Divisions as

manufacturing plants spread across India, BEL now manufactures military radars, communication, electronic warfare and cyber security equipment. Electronic Voting Machines designed and developed by BEL have been in use in Indian elections since 2 decades and had won world acclaim to be the most reliable and tamper proof voting machinery in the world. BEL has laid a lot of emphasis on innovation and research and Development right from its initial days. It has to its credit, design and development of several state of the art technology electronic equipment and has consistently grown its revenues over the last six decades. It has registered a revenue of INR 95 BN (approx. 1.5 BN USD) and profits of INR 16 BN (0.25 BN USD) in 2016-17. It has been increasing its R&D spend consistently over the years with 10% of the total revenue spent on research last year. It has its dedicated Central Research Laboratory in Bangalore with individual business units having their own research set ups.

FIGURE 2
IMPORTANT R&D RELATED OUTCOMES OF BEL



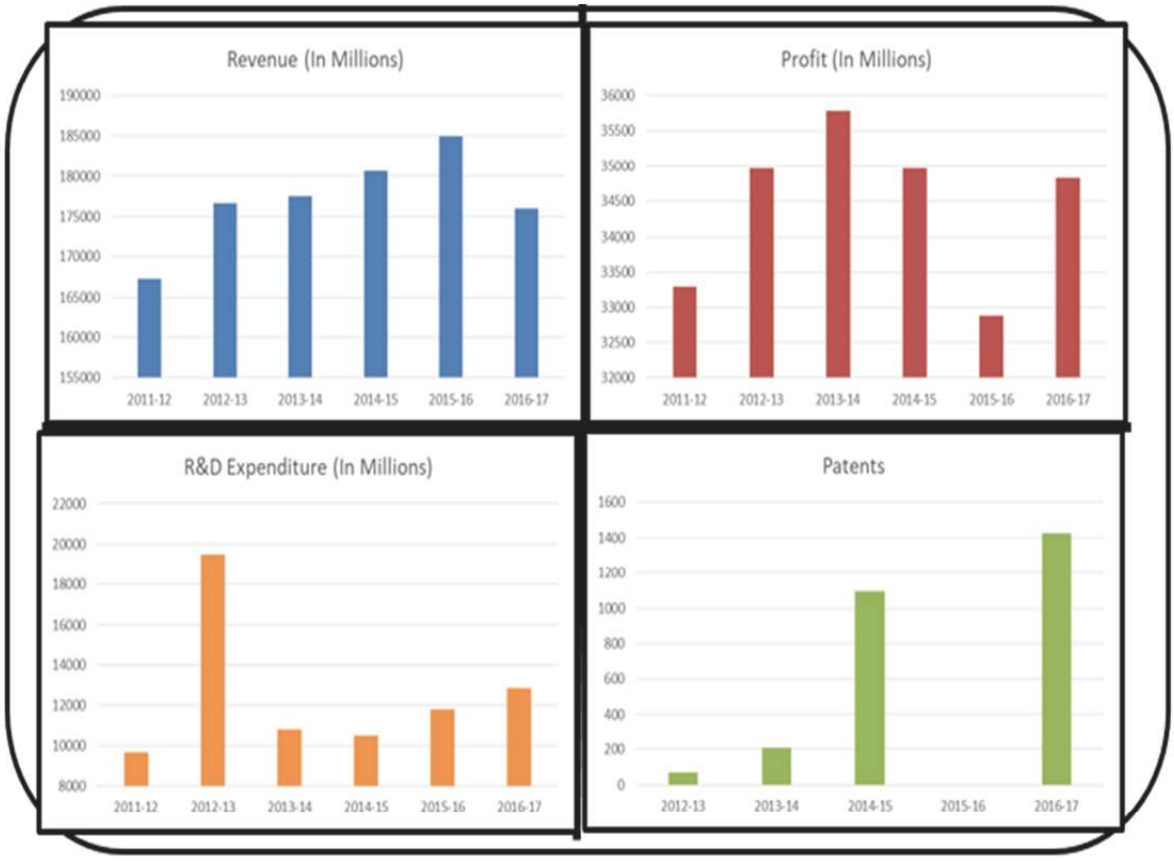
(Source; Prepared by author on the basis of information contained in BEL Annual Reports http://www.bel-india.com/ and MoneyControl.com)

Hindustan Aeronautics Limited (HAL)

Initially set up as Hindustan Aircraft Factory in 1940, this state owned enterprise has rechristened itself as Hindustan Aeronautics Limited in 1963.It commenced its operations with assembly of military aircraft under technology partnerships with major global aircraft manufacturers, especially those in

erstwhile USSR. In the later years, it went on to develop the design and production capability of both fixed wing and rotary wing aircraft for military requirements. With experience gained from major aircraft industries worldwide like Airbus, Boeing, Sukhoi, Israel Aircraft Industries, British Aerospace, Rolls Royce, Dassault Aviation etc., HAL could build up its own innovation capability. It has succeeded in designing and building four fixed wing aircraft and one Light Combat Helicopter which not only have been successfully operating in Indian Military but also exported to some friendly countries. It has also concentrated its innovation efforts on building its own aero engine, and successfully developed up to 3.8 Kilo Newton (KN) aero-engine. It is currently engaged in development of 25 KN aero-engine which will be capable of powering military trainers, business jets and Unmanned Aerial Vehicles (UAVs). It has also specialized in production of Air Traffic Control Radars, aerospace equipment and Avionics. It has a dedicated Aeronautical Research and development Center in Bangalore, India with similar R&D centers for aero-engines and other ancillary assemblies. Revenues of HAL have been above INR 175 BN (2.8 BN USD) over the last 5 years with INR 13 BN (0.2 BN USD) spent on R&D in the last year. It also has a consistent patent filing record with 1400 patents filed in 2016-17 and overall patents filed till date was over 5000.

FIGURE 3
IMPORTANT R&D RELATED OUTCOMES OF HAL

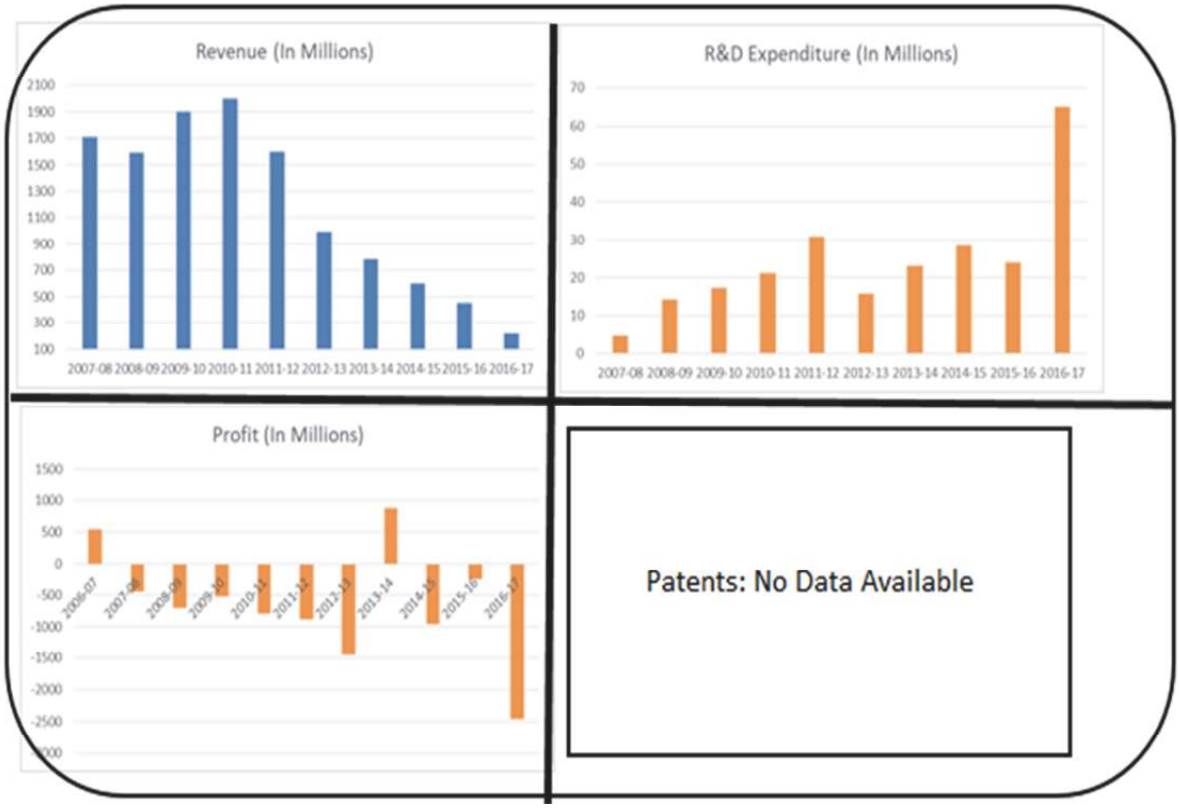


(Source: Prepared by author on the basis of information contained in HAL Annual Reports http://www.hal-india.com/Financial%20Highlights/M22 and MoneyControl.com)

Hindustan Machine Tools Limited (HMT)

Initially set up as a machine tool manufacturing company by Government of India in 1953, Hindustan Machine Tools gradually diversified its activities into manufacture of watches, agricultural machinery like tractors, electrical ancillaries like bulbs etc. It has five manufacturing units today with a corporate office in Bangalore, India. At one time HMT watches used be the pride of the nation with almost 80% market share in India. However, over the last 10 years, revenues of HMT had gradually fallen from INR 1700 MN (28 M USD) to INR 200 MN (3 MN USD). Also the company was registering huge losses. However expenditure on R&D continued growing from INR 5 MN (0.08 MN USD) to INR 60 MN (0.9 MN USD) over the last 10 years.

FIGURE 4
IMPORTANT R&D RELATED OUTCOMES OF HMT

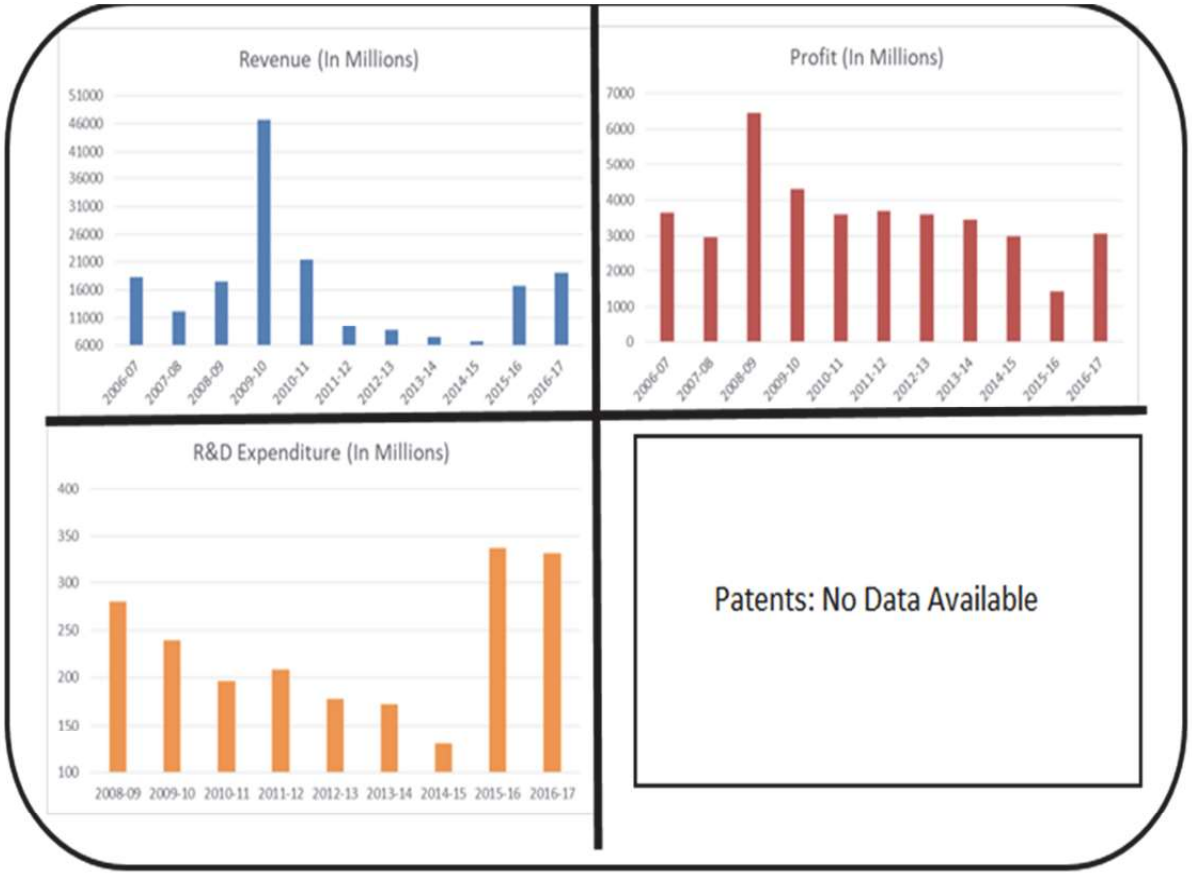


(Source; Prepared by author on the basis of information contained in HMT Annual Reports http://www.hmtindia.com/ and MoneyControl.com)

Indian Telephone Industries Limited (ITI)

Government of India set up Indian Telephone Industries in 1948 as a state owned enterprise to manufacture telecommunication equipment. It has its corporate office in Bangalore, India with six manufacturing plants spread across India. ITI originally commenced its operations with manual strowger and crossbar exchanges. This company struggled to keep pace with technology tsunami that hit telecommunication Industry and market competition from multinational units that could penetrate into Indian markets post liberalization in 1991. Revenues of ITI had, at one time peaked to INR 46 BN (0.8 BN USD) in 2009-10 and then had gradually plummeted to around INR 500 MN (8 MN USD) in 2014-15. Thereafter, the company showed signs of recovery with revenues in 2016-17 at approx. INR 18 BN (0.28 BN USD) in 2016-17. An interesting correlation that could be observed is its R&D expenditure which was at INR 125 MN (approx. 2 MN USD) in 2014-15, gradually increased to INR 325 MN (5 MN USD) in 2016-17 which shows that its emphasis on R&D has been given a fresh lease of life.

FIGURE 5
IMPORTANT R & D RELATED OUTCOMES OF ITI



Source; Prepared by author on the basis of information contained in ITI Annual Reports from http://www.itiltd-india.com/

RESEARCH QUESTIONS

During the interviews, the emphasis of the discussions was to understand facilitators and challenges to innovation effectiveness in SOEs. So, the research questions were framed to cover influence of the following factors on Innovation in SOEs.

1. Impact of Innovation Organisation and Infrastructure
2. Idea management system
3. Innovation ecosystem in the companies
4. Research expenditure as a percentage of revenue
5. Role of collaboration
6. Role of owners (state) and bureaucracy
7. Handling success and failure
8. HR Issues like –rewards, recognition, motivation
9. Role of board in promoting Innovation
10. Emphasis on Patents and IPRs
11. Knowledge management system

DISCUSSIONS

Impact of Mandate Set by the Respective States on Innovation in SOEs

SOE leaders interviewed mentioned that the mandate set by their owners (State) had a strategic influence on the type of innovation in their organisations. SOEs in all developing economies were setup to develop some niche competencies within the country so that these nations can become self-reliant in these competencies, without depending on imports. Such a self-reliance will be possible only through continuous research and development and innovation. However, most of the SOEs concentrated on applied research and not on fundamental research. These enterprises started acquiring equipment from developed countries and improved upon what they acquired through channels like transfer of technology from the partners. Such adaptations and customizations to suit to the needs of local conditions and customer demands constituted first phase of innovation for the SOEs of many developing countries.

In contrast, SOEs in countries like Israel, Singapore, etc., had a different mandate from their governments. For them, capturing markets outside their country was the goal. So their emphasis was more on fundamental research leading to innovating new products and earning revenue for their respective economies.

For those countries where self-reliance was the mandate, vision, mission and goals were all aligned with this mandate set by their owners.

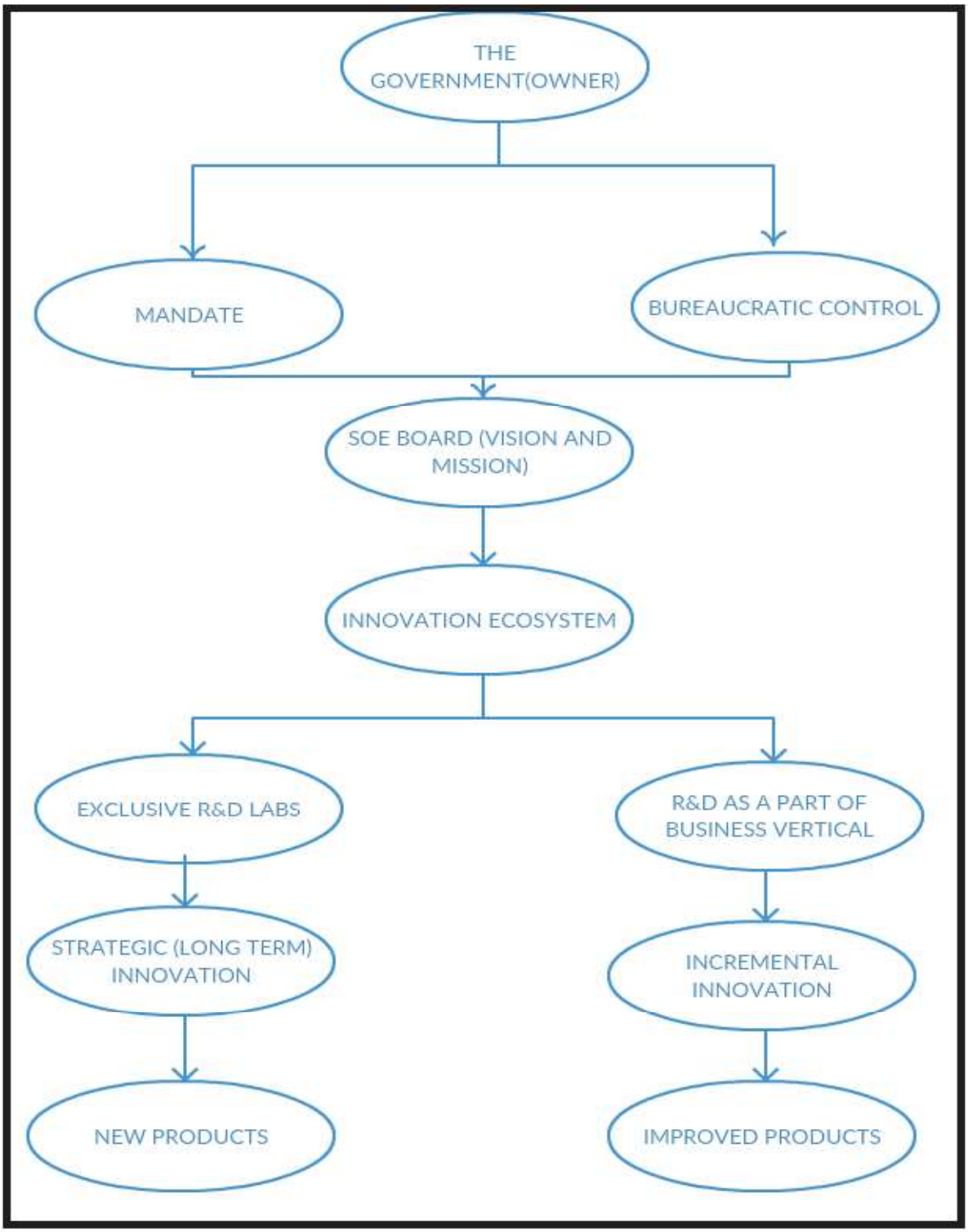
Impact of Political Affiliations on Innovation in SOEs

SOE leaders also stated that political affiliations of the owner countries of the SOEs also played a major role for success of innovations in SOEs. For example, for countries like India, China, etc. they never opened up or collaborated with any other country in technology in a big way. This had put a serious limitation on developing new technologies. Countries like Israel, Europe, US had a high degree of collaboration with joint budgets leading to joint research. This had helped them to have a higher uptake point leading to better products.

Innovation Organization in SOEs

Another aspect dwelled upon the interviews was related to innovation organisation in the SOEs. The research question was should there be a separate research wing in the SOE with exclusively concentrates on innovation or should innovation be inculcated into the DNA of the complete organisation. Out of the companies surveyed, different companies had different approaches. Hindustan Aeronautics, Bharat Electronics and Bharat Heavy Electricals all three had separate well established R&D laboratories which focused on emerging technologies and worked on research that would yield products in a long run (5 years later or so). For these laboratories, technology was the focus area. However, in addition to these research laboratories, manufacturing units (Strategic Business Units) had their own research setup but their research was limited to incremental innovations in the products that they were already manufacturing. While the research labs enjoyed a greater degree of freedom and financial powers to research in areas whatever they felt could be of use for the strategic needs of the organisation. They had more flexibility with regard to HR and procurement policies. Research in the business verticals was limited and resulted in improved versions of their existing products. General Innovation System followed by the SOEs surveyed is on the following lines though there were some minor changes specific to the organization.

FIGURE 6
INNOVATION ORGANISATION IN SOES



(Source: Prepared by Author)

Disconnect of SOEs with Changing Technologies and Market Preferences

SOE leaders felt that disconnect with emerging technologies and market preferences cost them heavily. Companies like BEL, BHEL, and HAL were relatively safe as state itself was their majority customer. In contrast, Indian Telephone Industries (ITI) and Hindustan Machine Tools (HMT) which operated in open markets had a big hit due to their disconnect with changing technologies and market needs. Both ITI, HMT were at the peak of their business at some point of time but they couldn't sustain their market position due to insufficient innovation in the areas of technology and business models. For example, Hindustan Machine Tools was a leading manufacturer of watches and machine tools and enjoyed close to 90% of the market share at one point of time, up to late 70s. But when the watch technology moved to quartz movements and digital watches or when the machine tools technology moved to computer operated or CNC tools, HMT couldn't keep pace with this technology leap and private operators invaded the markets which has led to their watches division almost closing down and market share in machine tools falling to single digits. In the same way, ITI ruled the market in manual and strowger exchanges. But as the technology moved to digital and later to cellular exchanges, which ITI couldn't keep pace with. Inability to manage technology transitions effectively costed heavily for both ITI and HMT. They had complete disconnect with the market and only sat in a lab and created new products which market no longer needed.

Technology Partnerships

Another critical aspect which emerged during interviews was that we shouldn't lose track tie- ups of technology partnerships. Both HMT and ITI had option to go for tie-ups in the new technologies. But since every decision that they took was to be approved by various levels of bureaucracy, they couldn't get necessary approvals on time. Therefore freeing SOEs from bureaucratic control and giving them necessary freedom and flexibility to operate is a key factor for growth of innovation in these organisations.

Role of Board in Promoting Innovation in SOEs

Coming to the role of the board in promoting innovation in SOEs, it came out clearly that vision of the board plays a crucial role. Board must ensure that an organisation structure supportive of innovation is available in the SOE and the people are enabled to innovate through flexible policies encouraging research and strategic management vision. The board must realise that it isn't the business of the government to run a business and responsibility lies squarely with the board.

Influence of People Related Issues in Innovation Promotion in SOEs

SOE leaders unanimously echoed that while HR issues do impact the innovation Eco system in their organisations, there were many ways of working around these people issues. It is true that employees in State Owned Enterprises enjoy a high degree of job security. Further, a good percentage of jobs are reserved for socially backward groups in their country of origin, who aren't academically and technically at the same level as the other employees. Quality of employees depends upon the paying capacity of the SOEs which are comparatively lower than the private sector. So most of the employees join an SOE first and after acquiring a reasonable degree of competence, they transition for higher compensation. Interestingly, most of the SOE leaders felt that it is not the compensation that motivates an employee to innovate. It is the challenge at work that makes them emotionally engaged with the company. If the Eco System in the SOEs is successful in providing a challenging assignment with good Rewards and recognition framework and adequate protection from fear of failure, Innovation would flourish in spite of all people related challenges.

Rigid Procurement and Approval Procedures in SOEs

The SOE leaders opined that rigid procedures dictated by governmental regulations is a major hindrance in promoting innovation in SOEs. These procedures hamper empowerment to the required extent and do not allow people to go out of the box. But since public money was involved, these

procedures could not be circumvented. Though certain concessions were granted under the powers of the top management and the board, they were grossly insufficient. Sometimes these procedures could be frustrating and could even be illogical.

Fear of Failure

Fear of failure was considered as another major obstacle for the people in SOEs to take up challenging innovations. It rides very high as their career depends on success of the project. In many SOEs even rewards and recognition were getting affected if the innovators failed. So people generally avoided challenges. SOE leaders had indicated a slew of measures that were initiated by them helped people overcome the fear of failure. Firstly, they did not punish anyone for any failure, any financial losses arising out of failures were not recovered from the individuals responsible and also no incentives were withheld because of failure. Inspite of all this, in teamwork, successful men did get an edge over the others. So people continued to be worried about failure.s

SOE leaders pointed out another important angle about failure which was based on emotional issues. People got emotionally impacted when they failed. Though they did not have any issue from the organisation, emotional healing of people took a long time. Many people who failed, felt very low and lost motivation to work. But unfortunately emotional healing is not considered important in developing countries. Leaders felt that there should be adequate emphasis on Emotional Quotient (EQ) of the employees at the entry level itself and frequent training programmes to make them emotionally stronger, would help.

Impact of Open Market Competition on Innovation in SOEs (Absence of Business Model or Customer Experience Innovation Concepts)

SOEs which catered for open markets did not have much of a competition from private manufacturers for a long time. However, many developing countries had gone in for liberalization of markets in the last 3-4 decades which brought in tough competition to the SOEs. SOEs like HMT, ITI, etc., while they were good in producing good products, they didn't understand the value of the business model or customer experience innovation. This had resulted in private manufacturers superseding these SOEs with excellent business models (like Financing Schemes, EMI payment systems, exchange schemes, free gifts, etc.). Since SOEs didn't have flexibility and freedom or the managerial acumen to come up with competing business models, they lost out on markets and eventually had to close down several of the production lines. HMT closing down their watches and fluorescent bulbs business, ITI closing down their telephone instruments and exchange equipment manufacture are examples of the same.

Concept of business model innovation is equally absent in other SOEs too. But they could survive because their customer was essentially the government itself. Customer and owner being the same, brought an interesting dichotomy in the business of these SOEs. Companies like BEL, BHEL and HAL agreed that this had also set in a degree of complacence and impacted the innovation ecosystem up to the last decade. However, the situation changed soon after as the government had changed its procurement procedures and brought in an open procurement policy wide which SOEs had to compete with their civilian counterparts for selling their produce even to their respective governments. This had helped in creating better innovative spirit in these SOEs.

But many of the SOE leaders disagreed with their respective government policy in making them compete with private manufacturers. Their contention was that there were many fundamental differences between SOEs and private operators. Private operators did not have any job reservations for the socially disadvantaged sectors. They did not have any hire and fire policy, their procurements were more business driven than policy or regulation driven. They could spend huge amounts on marketing, lobbying and other business promotion related expenses. All these options were not available with the SOEs since they were owned by the public exchequer. Hence, making SOEs compete with private sector did not meet fair practices of competition. If SOEs are required to compete with Private Industries, they should have the same launch pad with same facilitating eco system for innovation.

But the SOE leaders agreed that one derivative advantage of such competition was to drive more innovation among their people not just in the field of technology but also in better business models and customer experience as they could no longer take their customers for granted.

Innovation Platforms in SOEs

Availability of suitable innovation platforms was quoted as a key driver for promoting innovation in SOEs. Practices like Quality circles, Kaizen, innovation/ week functions, Periodic lectures by luminaries, opportunity to attend technology seminar / workshops etc. were being followed by HAL, BEL and BHEL, which helped them in taking innovation to the next level. "The more freely knowledge flows in the organisation, the higher will be the level of innovation." Felt the leaders of these SOEs.

Knowledge Management Systems in SOEs

An interesting point brought out was that the people in developing economies felt highly insecure in sharing their knowledge with their peers. Almost all leaders interviewed informed that the Knowledge Management platforms created in their respective organisations were grossly under-utilized. Trying to motivate employees with attractive rewards schemes for using Knowledge Management platforms also did not help to the expected level. This calls for a major change in people's mind set and might take a long time to bear fruits.

Idea management Platforms in SOEs

Coming to the idea management, SOEs initially practiced a Bottoms-up approach but felt that this wasn't working as most of the ideas received were not aligned to Organisational vision or customer needs. Apart from that, since all these SOEs were huge with several Business Units geographically separated, a lot of repetition of innovations were going on in different units of the organisation. Hence a need was felt to bring synergies among innovations across the organisations. Now these organisations have moved to top-down approach, the central organisation inviting ideas in the fields of interest of contemporary customer / market needs or in the field of future technologies aligned with the Organisational strategy. This has started showing good results.

Rewards & Recognitions

Rewards and recognitions have been playing a very vital role in promoting innovation in the SOEs in developing countries. These recognitions are in the form of prioritised promotions, Star of the Organisation Award, additional increments in salary, etc. More than the financial rewards, receiving the same in front of the rest of the organisation worked very well.

Patents and IPR

In the initial years, SOEs didn't realise the importance of filing for patents and IPR. But as they observed the trends in developing countries, they were motivated to file for patents in the last one decade. As a result, they scored very low on this count.

CONCLUSIONS AND RECOMMENDATIONS

From the findings of the research, we can conclude that in spite of several organizational constraints, State Owned Enterprises (SOEs) have done well in the field of research and innovation. In countries where government mandate was limited to creating self-sufficiency and meeting its own internal needs innovation was limited to applied research in the areas of their interest. As a whole, fundamental research was limited to state owned labs whose primary objective was proving a technology. These labs were not engaged in any commercial activity.

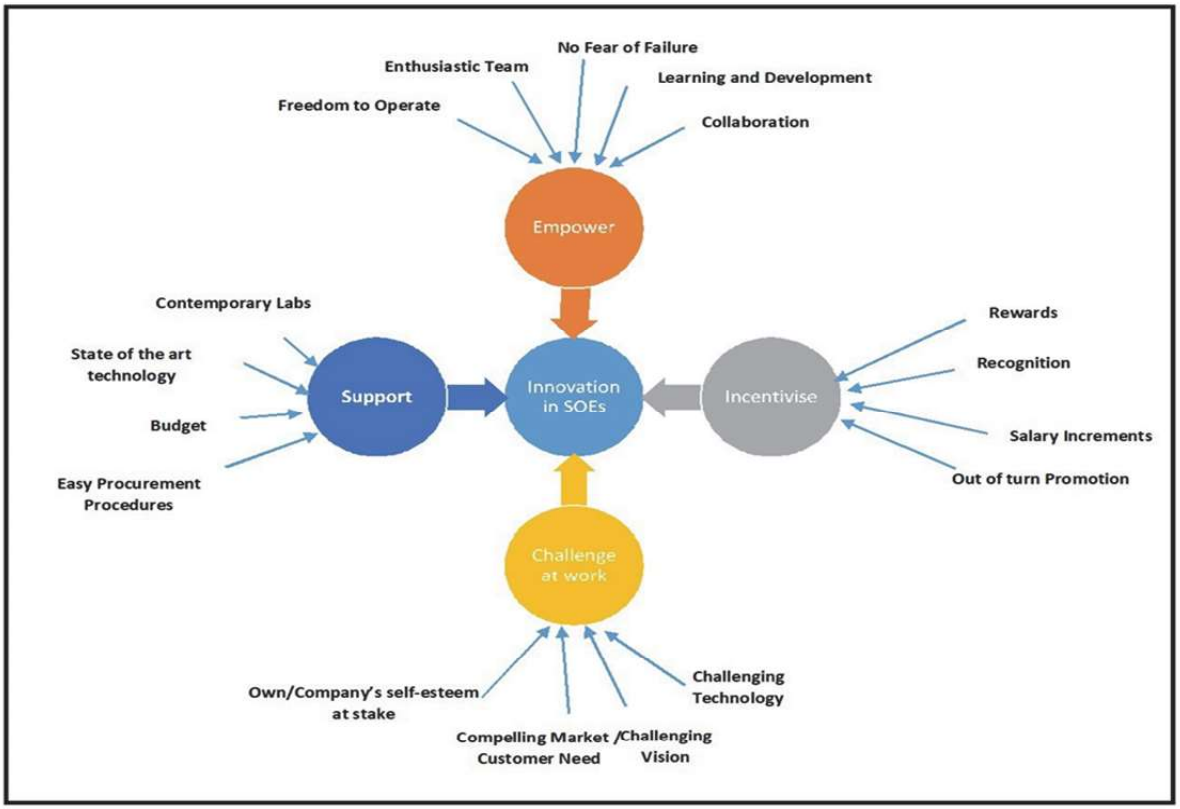
So issues like competition, profit and loss, etc were not of their concern. Study of such labs was out of the scope of this research paper as we concentrated only on commercial SOEs.

Another interesting output of this research was while the SOEs were quite successful in technology research they were less savvy about creating new business models and improving customer experience. As such most of their research was limited to products which were proven and certified but couldn't breach into markets.

Challenge, Empower, Support, and Incentivize Model of Innovation in SOEs

On the basis of research, author has proposed an innovation model which will be suitable for promoting innovation in SOEs in developing economies, named as challenge, empower, support and incentivize model (CESI Model).

FIGURE 7
CESI MODEL FOR PROMOTING INNOVATION IN SOES



Source: Prepared by Author

CESI model looks at a 360 degrees view of innovation in SOEs. The main elements of the model are:

Challenge

Challenge the employees both technologically and emotionally .Most employees take it as a matter of self-esteem and go beyond boundaries to prove themselves. Challenge includes compelling customer or market needs or a vision that binds the employees and challenges them. An excellent example of challenge can be seen from the fact that when several developed countries including United States imposed sanctions against India post nuclear test in the early 2000, Indian scientists were challenged to create their own technologies to continue their ongoing research. While the initial impact of the sanctions was very high, the scientists and engineers in India had overcome these challenges and brought their research back on to the track within a short time. Had they not been challenged by sanctions, they would have continued to import technology from other developed countries

Empower the Innovation Teams

The next step in promotion of innovation is to empower the teams. Empowerment could be in terms of creating the platforms for collaboration with other national and international innovation teams, create an enthusiastic team which is self-motivated, give the team ample opportunities to learn new technologies and allow them to innovate in a free and unrestricted environment. Empowerment also includes eliminating any fear of failure in people and also helping them to overcome emotional impact of failure through counselling techniques.

Support

The third step to make innovation happen in SOEs will be to provide necessary support infrastructure. Providing high quality labs with state-of-the-art technology, sanctioning required financial budgets and easing the government procurement procedures to ensure that the innovators get access to material required easily and in time.

Incentivize

The fourth element of the CESI model is to provide adequate incentives not only for successful innovations but also for "daring to try" projects which had a high probability to fail. TATA group in India has set an example by instituting "Dare-to-Try" awards along with awards for successful innovations. The most important prerequisite for good incentives system is its transparency. Lack of transparency in incentives could in-fact be counterproductive. Otherwise every organization may design its own incentivization mechanism suitable to its eco-system.

Recommendation for the State

The author recommends that states, as owners of SOEs, should provide a clear and unambiguous mandate to the SOEs which should not be confusing to the people working in them. Thereafter, all KPIs should be aligned to the same mandate and so should be the measurement systems for effectiveness. An ideal system would be, if states can set up the SOEs, set clear targets and completely withdraw from managing it and free from all bureaucratic and governmental control. This level of empowerment will help SOEs not only compete with their private counterparts but also overtake them in all respects.

Innovation can't flourish in the confines of the boundaries of any one country. It is the state's responsibility to ensure that political system of the countries where SOEs operate should create an environment conducive for global collaboration. To a large extent Israeli model has proven to be quite effective and countries must look at adapting similar models after customizing as per their prevailing geo-political conditions. This of course needs robust legal infrastructure and sharing of intellectual properties and ownership of patents.

Other Recommendations

Coming to the innovation organization, the two-tier structure as explained in figure 6 above seems to be quite effective and the author recommends adopting the same in SOEs of other developing countries after necessary customization.

The author also recommends that the SOE leaders need greater coaching and guidance in handling market dynamics and customer perception. For a long time, SOEs had isolated themselves from innovation in managerial areas aimed at creating better business models or customer experience and concentrated purely technology related research. It is the time that the SOEs understand the importance of these areas to derive more effective results.

During the field research, the author also observed that many SOEs lack requisite knowledge on patent and IPR filing. Therefore results related to this area were not up to the mark. Author recommends that SOEs organize special periodic workshops on patents and IPRs for their innovators to help them understand how they can file patents even for smaller innovations in areas of product, process or business models.

The other areas like innovation platforms, knowledge management systems described above are self-explanatory and author recommends that emphasis be placed in these areas as well.

LIMITATIONS/ SCOPE FOR FUTURE RESEARCH:

This research is exploratory in nature and limited to study of innovation parameters and results of State Owned Enterprises in India. All the enterprises selected were more than 50 years old and had gone through several rounds of technological, political, institutional and market related turmoil and had a deep history of innovation related experiences. However, the research suffers from a limitation of a small sample and in one developing economy only. Information regarding SOEs in China and Russia was purely based on public information and author couldn't carry out any direct field research in those areas.
Future researchers may look at larger samples in one or two more countries and validate the CESI model recommended by the author.

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