

FINANCING INNOVATIONS FOR THE BOTTOM OF THE PYRAMID MARKET

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With economists discovering direct relation between technology change and economy growth, management gurus basing their theories of competitive advantage on innovations and world bank spreading the gospel of social development driven by knowledge adoption, the perceived importance of innovations in a national economy is snow balling at an accelerated pace. This article looks at a segment of innovations; those that are aimed at meeting the needs of the bottom of the pyramid and challenges in financing those innovations. The cases cited are drawn from innovations funded by Government of India under the Technopreneur Promotion Programme (TePP).

1. Preponderance of Socio-Economic Goals

Science and Technology is now much more concerned with development, as an instrument to improve the lot of the poorer people. This type of concern has not been always so- great astronomers of past and scientist discoverers of industrialization era had not alluded their work to improvements in the living standards of their society. But, now it is increasingly realised that progress in S&T need to be related to the twin objectives of '*eradication of poverty*' and '*promotion of rapid socio-economic development*'.

Attempts to relate S&T to development started after World war, when United Nations has institutionalised the causes of development, especially through its specialised agencies like UNIDO, UNESCO. Of more recent origin is the Millennium Development Goals adoption at the United Nations Millennium Summit in 2000. They have become the international standard of reference for measuring and tracking improvements in the human condition in developing countries. Echoing this concern on realization of socio-economic goals, India launched *Bharat Nirman* program with the objective to *unlock potential, equalise opportunity and make rural India the new growth opportunity*.

The challenge is to relate scientific and technological knowledge to meet the socio- economic goals set by the nation. This involves a shift in the relationship technological innovation has with society. **Technological innovation is not simply a matter of installing devices, but of transforming society and its value systems.** Table 1 below lists the policy issues and policy instruments used by GOI (Government of India) in the past.

Table 1 : Policy instruments (GOI)

Period	Policy issues	Policy instruments
60's	Foundation for science	Science policy
80's	Self reliance in technology	Technology policy
90's	Competitiveness	Funds for commercial innovations
New millennium	Innovation for global leadership	Targeted NPD (New Product Development)

2. Source of funds for innovations

Funding can be related to stages in the development of new technology as shown in table 2

Table 2: source of funds for innovation

Stage of development	Activities	Source of funds
R&D	-literature study -patent search -proving at prototype stage -proving at pilot plant level -patent registration -market feasibility study	-own funds -Angel funds -Government grants
Start-up (starting from proven technology to business break-even)	--establishing production facilities -product launch	Venture Capital (private and public)
Initial growth	Product expansion , developing 2 nd generation of products	Joint funding by several VCs
Take-off	Consolidation Achieving economies of scale in production and sales.	Development Financial Institutions like IDBI
Maturity	Broadening technology base and management capabilities.	Stock market

Support to national flag bearers

Following the example set by Triad nations (USA, EC, Japan) most of developing countries too initiated programs to support local innovations to meet global competition. The Research and Technical institutes were provided grants to carry out basic & applied research, public private partnerships were established to transfer the lab work to commercial firms and commercial firms were further supported to upscale the technology at pre-commercial stage and at times even commercial stage. In India several programs are currently in force, one of it is TDDP (Technology Development and Demonstrated Programme) of DSIR (Department of Scientific and Industrial Research).

Development of High Speed Auto Clinical Analyser was one such an example. Transasia Bio-Medicals Ltd. (TBM) was started in 1985 to market Bio-Medical Instruments and in the process developed a strong service team. Manufacturing started with low cost affordable blood cell counters of Japanese origin to small and medium pathology laboratories in Mumbai and other metro cities in 1980's. The firm made a mark on the international scene by developing XL 600 a COMPLETELY AUTOMATED COMPUTER CONTROLLED BIOCHEMISTRY ANALYZER. XL600 is available in Spanish, Italian and French. XL600 is now sold in 28 countries like Portugal, Spain, France, Germany, Hungary, Italy, Russia, Greece, China, Syria, Egypt, Turkey.

The firm was supported by government to develop XL 1000, a larger capacity equipment with a surfeit of product features. It was a successful catch-up effort by the Indian firm following the late entry strategy of innovative imitators. The firm is now firmly poised to move to fast second innovation strategy.



Photo of XL 600
(<http://www.transasia.co.in/instruments.htm>)

3. Technologies for the bottom of the Pyramid (BOP) market

Globalization is changing the ways which companies can create value. For developing countries it is not an extrapolation of the past experiences of developed countries, nor is it just about low costs and outsourcing. The real opportunities lie in the proliferation of ways to design a better business. Management Guru Prahalad laying the framework for the bottom of the pyramid market argued that *sustainable product innovations initiated in Tier 4, and promoted through consumer education, will not only positively influence the choices of people at the bottom of the pyramid, but may ultimately reshape the way Americans and others in Tier 1 live.*

Prahalad outlined 12 principles of innovation for the BOP markets:

- Create a new –price performance envelope.
- Creatively blend existing technologies with the new technologies.

- Solutions developed must be scalable and transferable across countries.
- Use minimum resources.
- Product development based on functionality and not just form.
- Process innovations to address logistics constraints.
- Deskill the work content.
- Educate customers.
- Products must work in hostile environments.
- Research on interfaces is critical.
- Design methods to make innovation reach the user.
- Focus on the broad architecture of the system.

Price-performance curve

Affordability is a critical factor for low income people and generally they were saddled with low price but poor quality products/ services. Recently, it was noticed that in chip based products prices were driven down with volumes and in few other areas like telecom prices for products/ services could be drastically reduced by social and policy innovations. With the awareness that low income peoples market is not just a discount market or seconds market but could be offspring of sustainable innovations, the focus shifted to state-of-market technologies for producing low price- high performance products/ services.

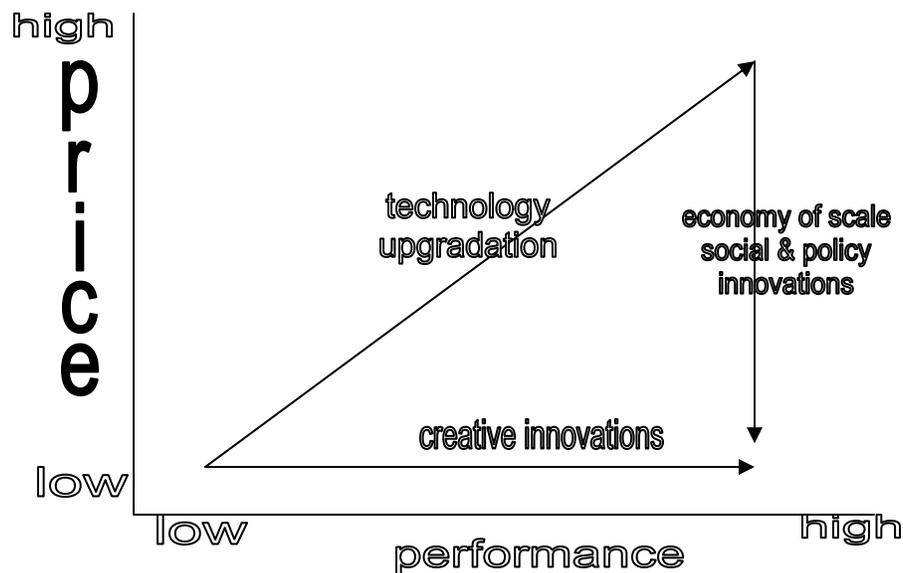


Fig 1: Price-performance envelope

4. Technopreneur program (TePP)

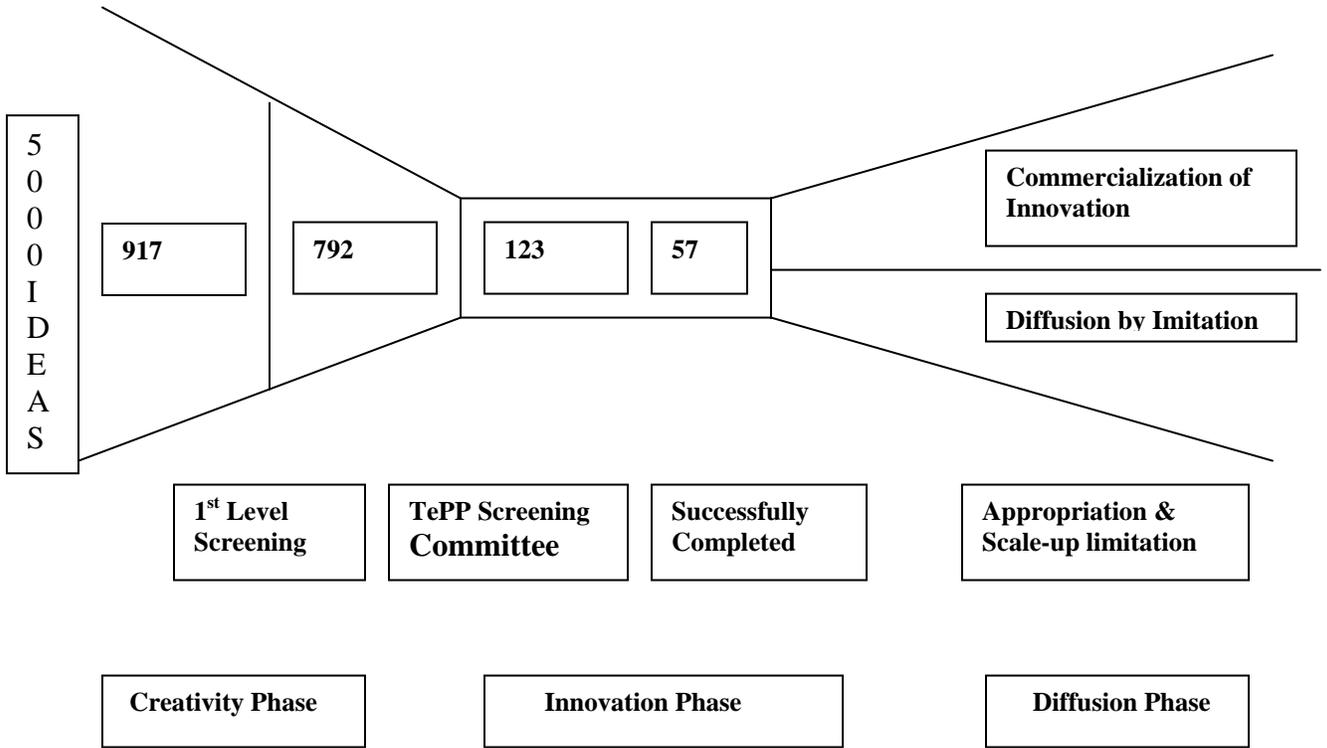
Markets under invest in developing innovations for the BOP markets as the market size and penetration is unattractive. Whilst the gains to the society from the availability of low cost high quality products are enormous, the private industry finds gains illusory and slippery. Private investor needs to appropriate knowledge to make it pay, but government is more interested in diffusion of knowledge. India does not offer protection to utility patents.

TePP program of GOI supports individual innovators at Ideation stage to work to prove their concepts as the first prototypes. Over 5000 ideas have been accessed and over 100 supported under this program. See TePP funnel in Figure 2.

Illustrative examples

- In the 1950s, Professor Gavril Abramovich Ilizarov devised and developed his revolutionary method for treating fractures, deformities and other bone defects. Using a circular external fixator he was able to show that controlled, mechanically applied tension stress produced reliable and reproducible regeneration of bone and soft tissue. Prasad Narayan Kulkarni of Sangli was determined to bring this technology to Indian masses and with limited support under TePP developed *motorized Auto-distractor*. Clinical trials showed promising results of bone regeneration, a boon to correct birth defects of short or deformed legs.
- Innovative farmer Bhanji Bhai Mathukia of Junagadh developed a small 3 wheeled *10 HP tractor*. TePP supported him to develop an engineered product by networking with ARAI, Pune and CFMT&TI, Budni. The technology was licensed to M/S Pramal Farmatics (P) Ltd, Anand.
- Entrepreneur Ramesh Nibhoria developed environment friendly *solid biomass Furnace*, installed it at Jawahar Navodaya Vidyalaya, Nafajgarh and demonstrated the savings in fuel (LPG) consumption. More installations are underway in various schools.
- Teacher innovator Dr Jagadeesh of Kavaraiputtai developed an unique vertical cylindrical solar water heater with lotus flower shaped reflector. Retired DRDO scientist RA Yadav has taken up redesign of Surgical bandage cloth making machine. Loving mother Smt Pragnya Dilip Bhatt, determined to make her visually challenged son feel the shape of flowers, is perfecting a sketching device for use by visually challenged.

Fig 2: TePP Innovation Funnel





Picture of an innovation funded under TePP.

5. Challenges in financing innovations for BOP

Innovation is a risky business is a well documented fact. In spite of rigorous assessment, majority of the projects fail to earn expected return. For example in India, so far only 15-20% of the assisted projects have become successful. In the Guide to Venture Capital in Asia (published by AVCJ holding limited) the common risk factors are identified as follows:

- A change in industry growth via. assumptions
- A change in competitive pricing via. assumptions
- Difficulties in achieving product development schedule
- Difficulties in obtaining parts and raw materials
- A change in market structure (e.g. a new entrant or a new technology)
- A change in the availability of appropriately priced and trained labour

The overall risk factors can be grouped into nine categories as shown in table 3.

Table3 : Category of risk factors

Risk	Component
Promoter Risk	<ul style="list-style-type: none"> • Integrity / honesty of the entrepreneur / promoter • First generation entrepreneur • Lack of experience in related field • Lack of contacts with resource persons • Lack of experience about <ul style="list-style-type: none"> - market - technology
Product Risk	<ul style="list-style-type: none"> • Development stage of product • Product life cycle • Risk of reverse engineering • Manufacturing complexities • Number of constituent technologies
Technological Risk	<ul style="list-style-type: none"> • Availability of superior technology • Unpredictable technology development • Technology life cycle • Investment requirement for assimilation • Lack of organisational capability to assimilate • Source of technology / Goodwill of supplier • Level of technology (high or low)
Market Risk	<ul style="list-style-type: none"> • New users; uncertainty in market acceptance • Market growth rate • Competitors • Substitute products • Potential entrants • Huge marketing expenditure • Unorganised sector • No assured market
Financial Risk	<ul style="list-style-type: none"> • Capital market situation (e.g. lack of exit opportunities) • Current leverage ratio not in par with industry average • Growth prospect of the company • Foreign exchange risk

	<ul style="list-style-type: none"> • Problem with working capital; Liquidity problem • Expected rate of return • Lack of understanding of standard financial procedures
Implementation / Operational Risk	<ul style="list-style-type: none"> • Manufacturing complexities • Capability of producer / organisation • Manufacturing set up • Commitment from manufacturing • Unavailability of skilled work-force • Maintenance problem • Lack of contacts with resource persons • Problem in arranging additional fund
Organisational Risk	<ul style="list-style-type: none"> • Motivation of employees • Employee turnover • Dependence on few workers
Strategy Risk	<ul style="list-style-type: none"> • Loosing competitiveness • Unrelated diversification
Environmental Risk	<ul style="list-style-type: none"> • Changes in Government policy • Lack of understanding about regulations • Pollution / hazard • Availability of raw material • Legal barriers - piracy / patent etc.

All these risks have to be covered with due diligence process by the funding agencies. Venture Capitalists spend an enormous amount of time and money on this due diligence process, which is why they process few cases, *economizing their efforts*. All funding agencies follow similar precautions in funding innovations for Top Of the Pyramid (TOP) market, like that of funding Transasia for development of XL 1000. The problem gets complicated when government agencies are involved in financing BOP innovations like in TePP, the numbers increase dramatically when moved from top of the pyramid market to the bottom of the pyramid. And neither best practices of VCs nor micro finance groups can be adopted, new mechanism and process need to be developed.

In India, in trying to reach out to BOP with value added products & services, new methodologies have been introduced. In place of traditional due diligence process a system of experts, mentors and network partners has been established. Experts help the innovators to chalk out road map for converting their idea into a product, mentors guide them on taking the product to user and network partners assist them on the long march from concept to commercialization. For due diligence of TOP market innovations, the consultants/ rating agencies are paid fully for their services, but is similar system is to be followed for BOP innovations, then the cost of due diligence would exceed support provided to innovators. This problem was solved by building an eco-system supportive of BOP innovators with people committed to the cause. Emotions are not a substitute for expertise and dependence on these type of committed people , while keeping the due diligence costs manageable further

adds to the risks inherent in all new activities. A framework to manage risk in financing BOP market innovations is given below:

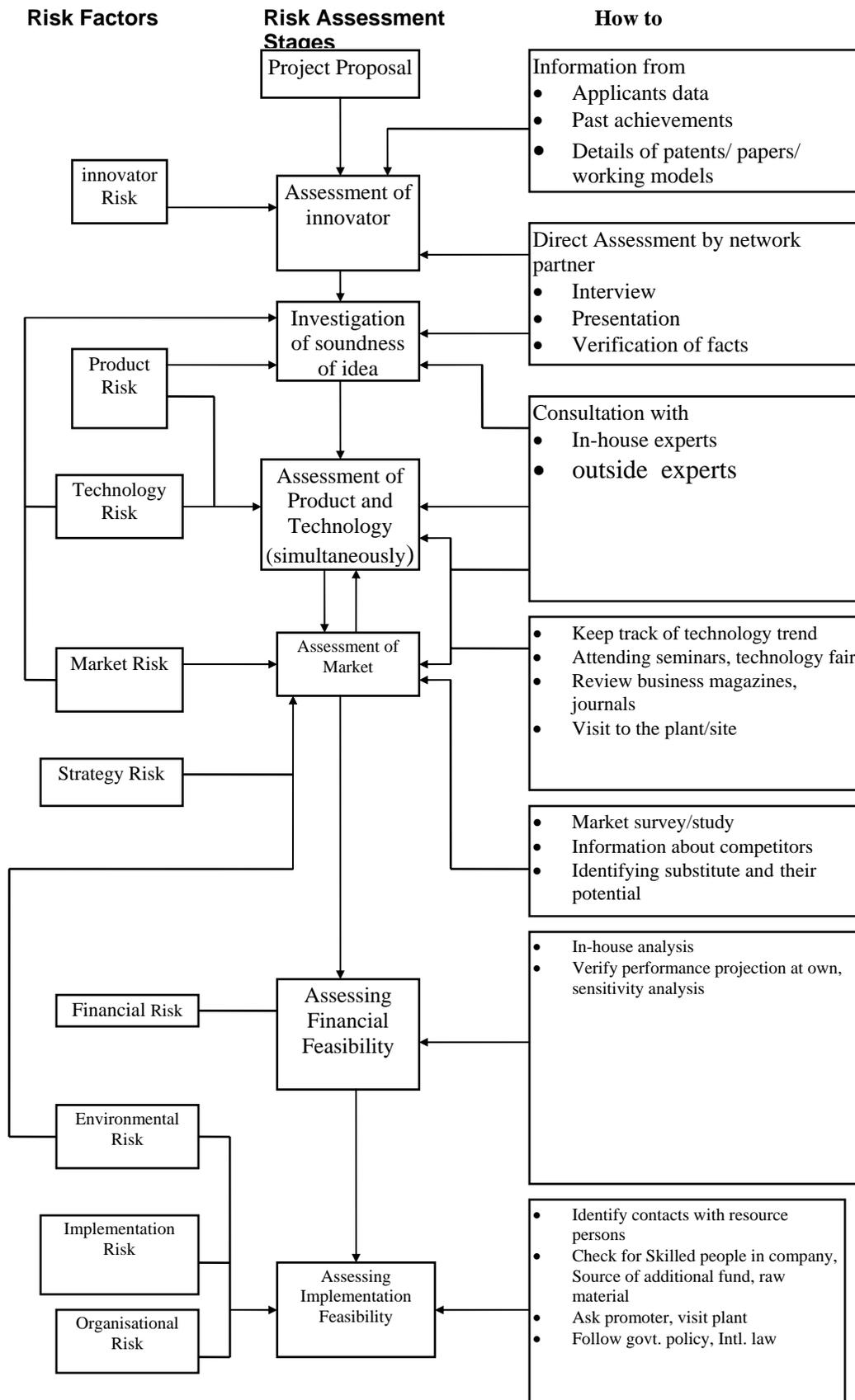


Figure3: Risk Assessment

Conclusion

Many new financing mechanisms tend to create a hype, that is they raise expectations but fail to deliver. This is ascribed to poor management of “chasm” that exists in the numbers (late adopters) to follow the early few adopters. This “Chasm” exists because early adopters of any new system are bubbling enthusiasts that are prepared to take a chance despite the bureaucratic hurdles. But the late adopters, the majority, are pragmatists and they demand to be convinced. The “tipping point” is reached when the critical mass is obtained. The phrase “tipping point” is a sociological term that refers to that dramatic moment when something unique becomes common. The concept has been applied to any process in which beyond a certain point, the rate at which the process (chemical, sociological, etc.) proceeds increases dramatically.

Conditions necessary for tipping are,

- enrolment of network partners who have large connectivity with innovators/ entrepreneurs,
- supporting network partners to improve impact of their service
- and focusing on communication.

Success of any program aimed at addressing the needs of BOP depends largely on the ability to scale-up the model to the extent it tips,

References:

1. C.K.Prahalad, “ The fortune at the bottom of the pyramid”, 2005, Pearson,
2. “Multicriteria Model for Risk Evaluation for Venture Capital Firms in an Emerging Market Context”, Jyoti P. Gupta; Professor ESCP-EAP, Paris, Franc