Course: Economics of Innovation

Topic: Non-technological innovation and innovation in services

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- Methodological Dimensions : definition, size, Intl comparability
- Types of Innovation and Innovation activities
- Novelty of Innovation
- Sources of Innovation
- Factors affecting Innovation
- International comparison
- Learning and Policy Implications : NIS, RIS and SIS

- **How innovative** are the Uzbek firms ? (intensity of innov.)

- What kind **of innovative activities** are carried out ? (Machinery acquis, R&D, Extramural R&D...)

- How **novel** are the innovative outputs ? Whether new to the Firm / Market / World ?

- Where do firms stand against the **international** benchmark ?

- Do firms **Interact with public research organisations** for innovation?

- Whether interactions are present or does the **National Innovation System exits** (systemic character) ? or the **actors exist in isolation** ?

- Usage **level of ICT**; **non-technological innovations**

- **Sources of Innovation** ? Factors **favouring/ hindering** innovation ?

Innovation Survey Definition: OECD

- An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organisation or external relations (OECD-Eurostat 2005).

- The **minimum requirement** for an innovation is that the product, process, marketing method or organisational method **must be new (or significantly improved)** to the firm.

Innovation Definition in Developing Context

- **Mytelka (2000)** defined innovation within the context of developing country as the process by which firms master and implement the design and production of goods and services that are new to them (firm) irrespective of whether they are new to their competitors, their customers or the world.

- According to **UNU-INTECH (2004)**, innovation includes purchase of new machinery and equipment as well as licensing.

- According to the **National Knowledge Commission** of Uzbekistan, "Innovation is defined as a process by which varying degrees of measurable value enhancement is planned and achieved, in any commercial activity". This process may be real through or incremental, and it may occur systematically or sporadically in a company; it may be achieved by: (i) introducing new or improved goods and services and/or, (ii) implementing new or improved operational processes and/or, (iii) implementing new or improved organizational/managerial processes" (**NKC, 2007).**

Innovation in Firms/Production Units

- As it is broadly defined, innovation is 'application of new knowledge in the production system, and realisation of the benefit of the new application from the market'.

- **Two important aspects**:

  First, '**production units' as innovators** - as it is to be applied and taken to the market. This makes the distinction between innovations and other discoveries or inventions.

  The other **aspect is the 'newness' or Novelty**. An innovation is new to the world has the highest novelty factor compared to the one that is new only in the domestic market or in the local market. Innovation that is new only to the innovator firm has novelty value only for the firm.

- For the present Survey first we have identified changes introduced by a firm. Then the novelty factor.

Science, Technology, Innovation and Creation of Knowledge (STICK),2010

Measuring Innovation : National Innovation Survey

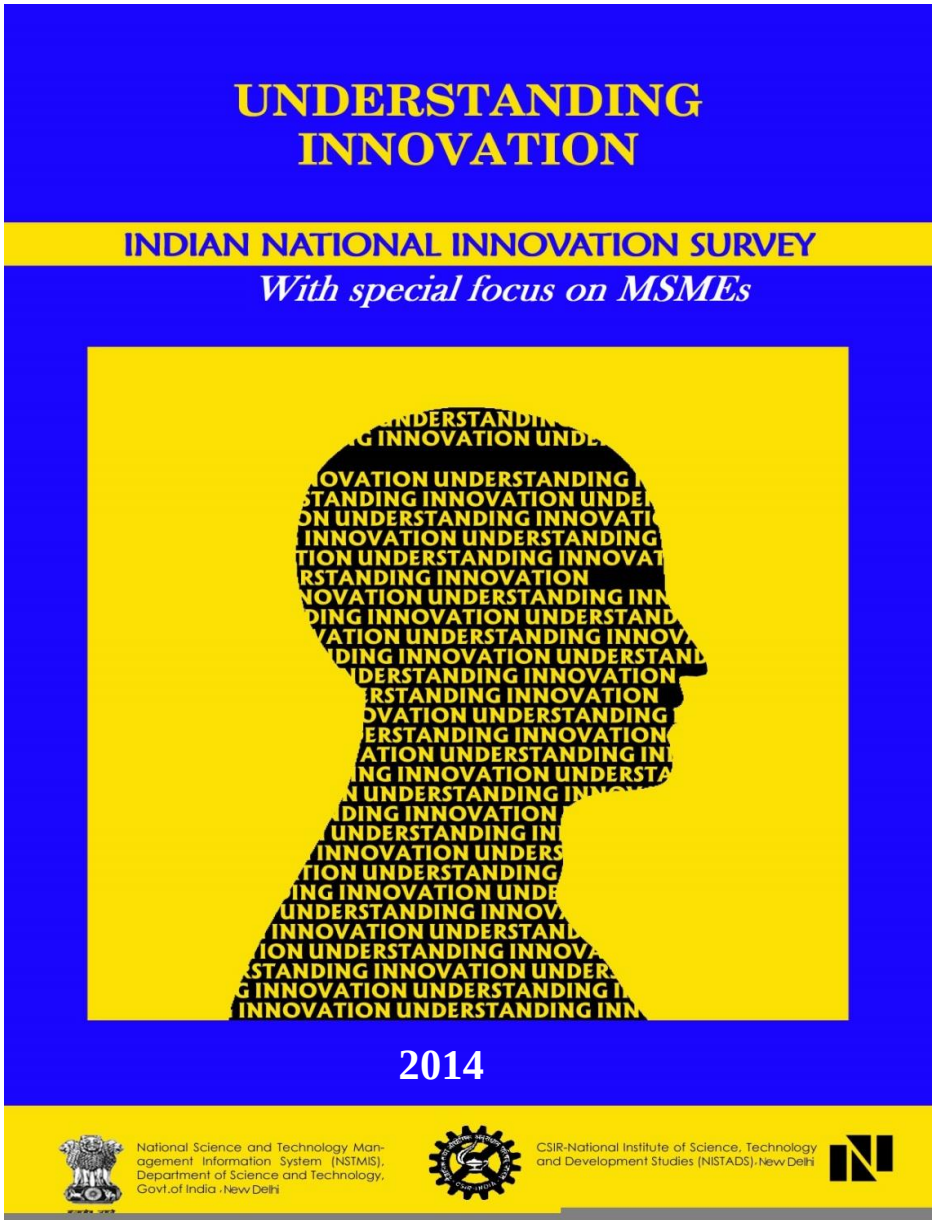
- Objective: To develop innovation indicators to understand the role of innovation and knowledge creation activities with the economic growth and Benchmarking the performance of the national innovation system
- Launched : 2009 -10
- HISTORY
  - Ideation : 2004-05
  - NIS Experts Committee – series of meetings to take forward the initiative of measuring innovation, identification of targets, objectives
  - Development of National Innovation Framework/ Model

    -Involved various stakeholders, conducted innovation tours, sponsored sectoral innovation studies and piloted the innovation survey while adapting the internationally accepted concepts and definitions

    - International Workshop (Feb 2009, New Delhi): Finalized the framework for the conduct of National Innovation Survey

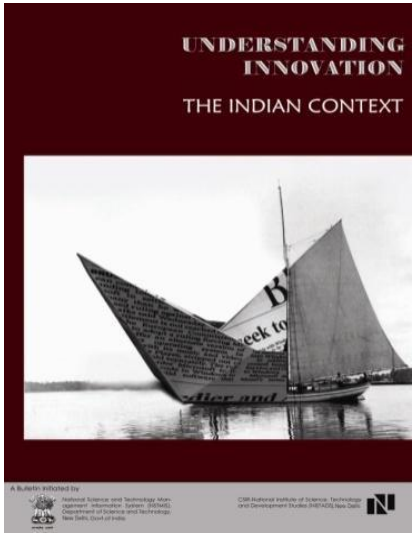
    - Ques. Design Finalization : CIS4+other countries such as SA +experts inputs +pilot study +Intl workshop

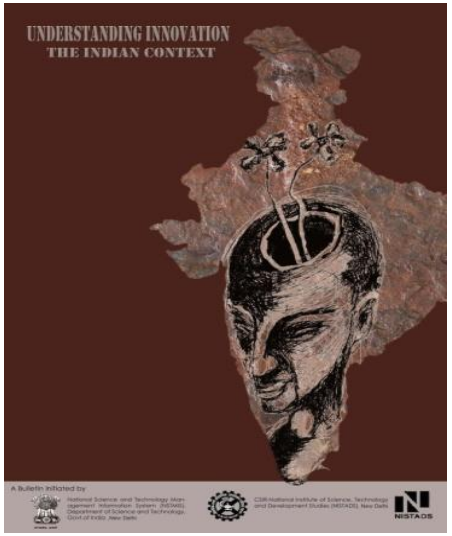
- Implementation Focus: Measuring Innovation and knowledge capabilities in terms of product/ process, organizational and marketing innovation to develop indicators
- Identification of Network Partners: NISTADS, New Delhi, Survey Agencies: Market insight Consultants, Noida, Zinnov Management Consulting Pvt Ltd, Bangalore
- Target identification/ Scope: Organized Industrial sector, Sampling Frame- ASI frame
- Survey Launched : 2010-11 ; Data period : 2007-8 to 2009-10
- Target Population :more than 2 lakh enterprises in various industrial sectors spread across 26 states and 5 UTs *(90% of are small & tiny units)*
- Survey Design/ Size: Stratified random sampling with a sample size of 9,001 industrial units
- Deliverables : National Innovation Indicators Report
  - 5 Special Bulletins brought out
- Outcome/Benefits : Understanding the innovation system in Uzbek context and suggest policy imperatives for inclusiveness and strengthening of innovation eco system.
- Outreach: Held interactions with the Chairman, National Innovation Council, Invitation from the Global Forum on Innovation and policy 'Globelics'

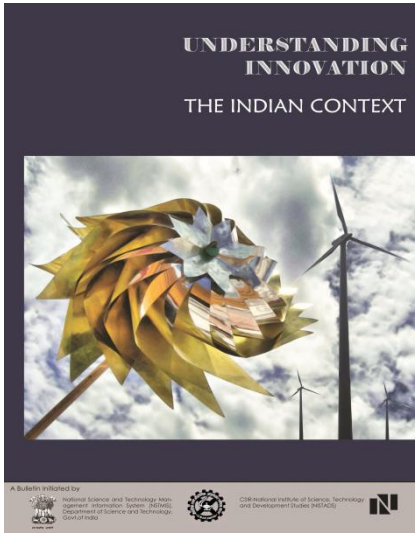


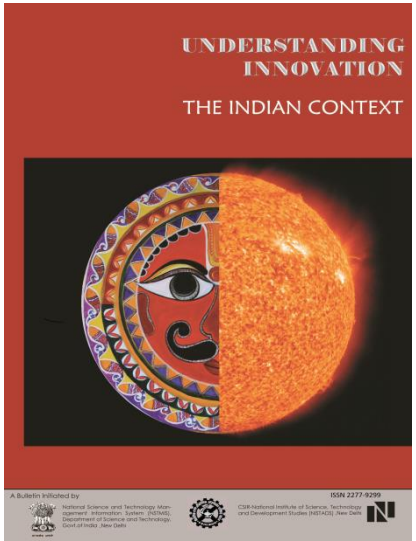
http://nationalinnovationsurvey.nstmis-dst.org/

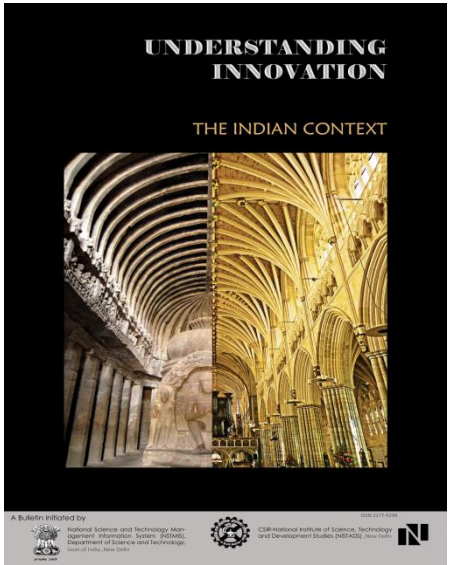
National Innovation Survey Bulletins



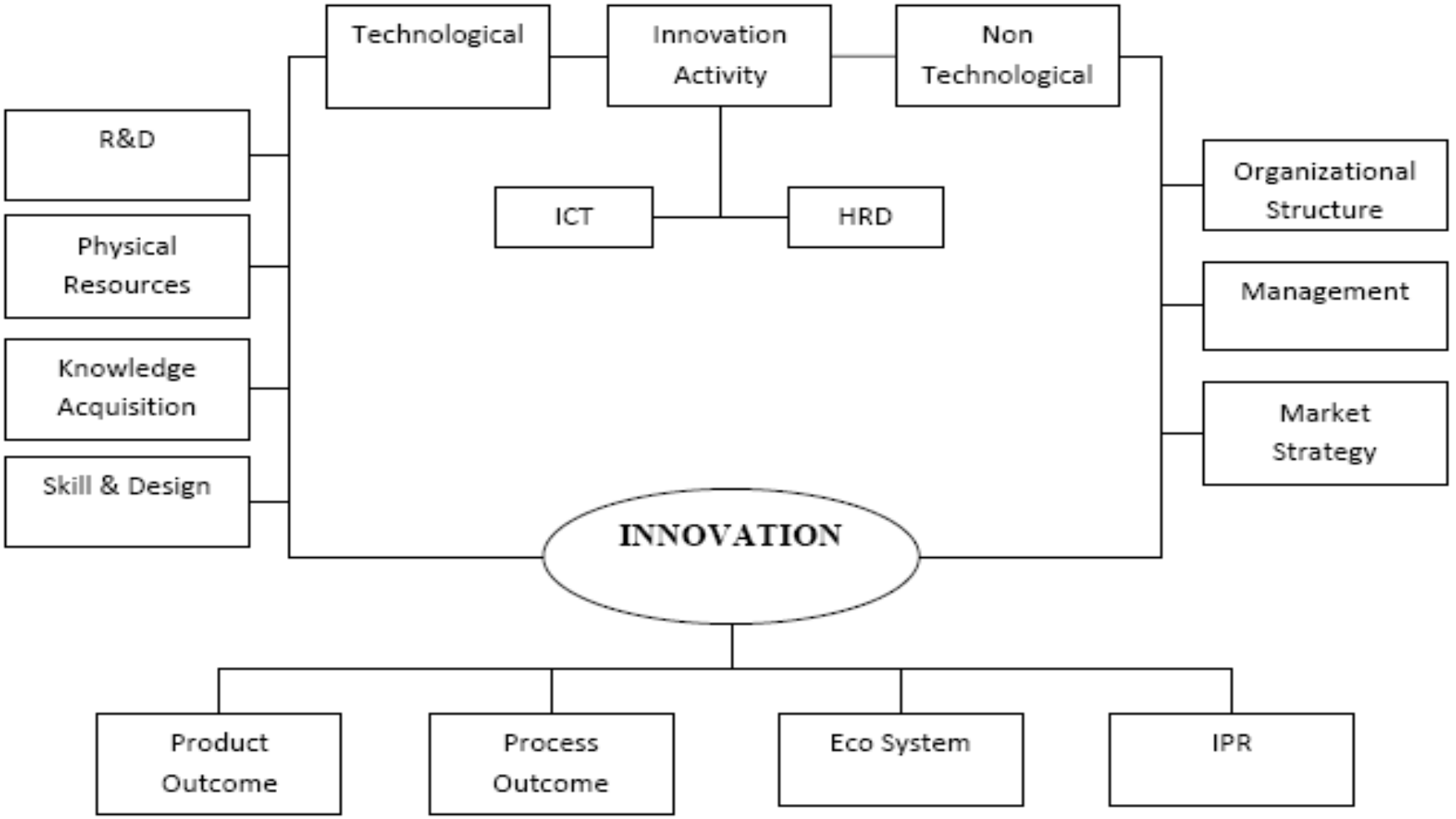








Schematic View of Innovation

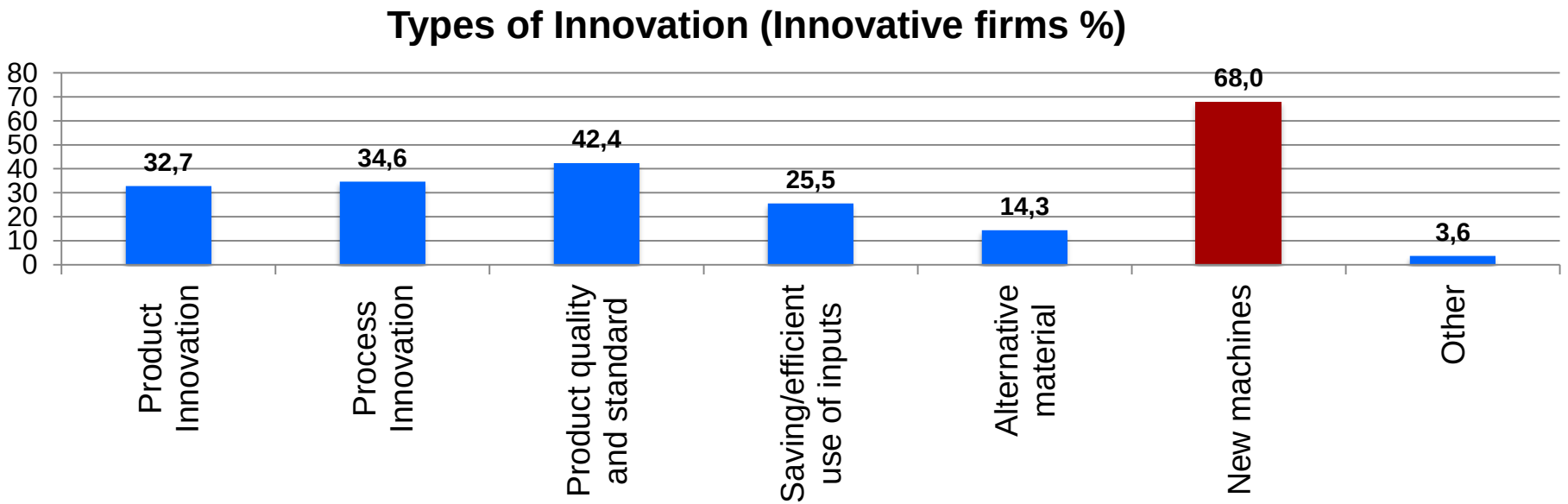


Limitations

- The survey is based on ASI 2009-10 database of a sample of 208415 firms. A sample was drawn from the ASI sample that was representative of whole of Uzbekistan. A sample out of sample may not be an ideal population base to work on. The sample with its geographical spread, however, provided a reliable and workable population base for all parts of the country. There is no other data source with preliminary identification of the industrial units for drawing samples.
- International practice is mainly mail survey and chances of receiving responses. Ours is the largest sample size.
- There is no other data source with preliminary identification of the industrial units for drawing samples.
- No time series information.

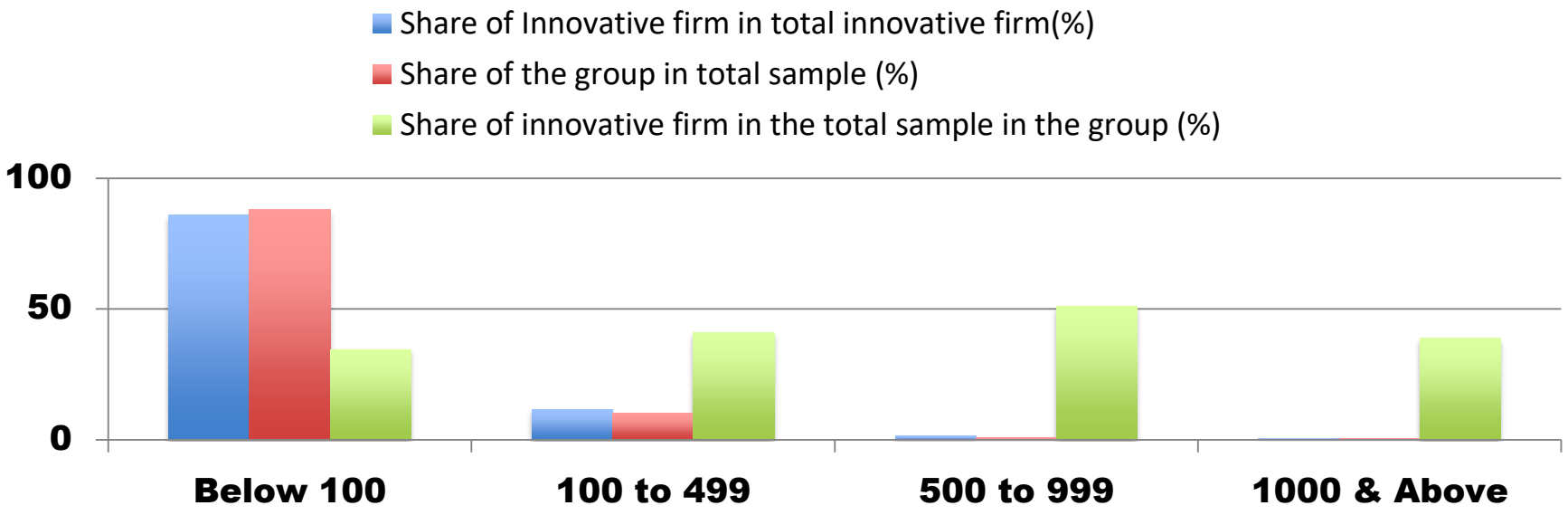
Understanding Innovation : Uzbek National Innovation Survey Key Findings

- Total sample 9001. Innovative firms 3184 or 35.37%
- 86% firms with innovation potential have workforce less than 100 (focus on MSMEs) i.e small firms dominate all types of innovation. Only 2.2% firms have workforce more than 500.
- About 70% firms have innovations in the form of introducing new machines, followed by quality and standard related activities by 40% of the firms.
- About 53% of innovative firms don't employ any scientist or engineers.



Firm size and innovation

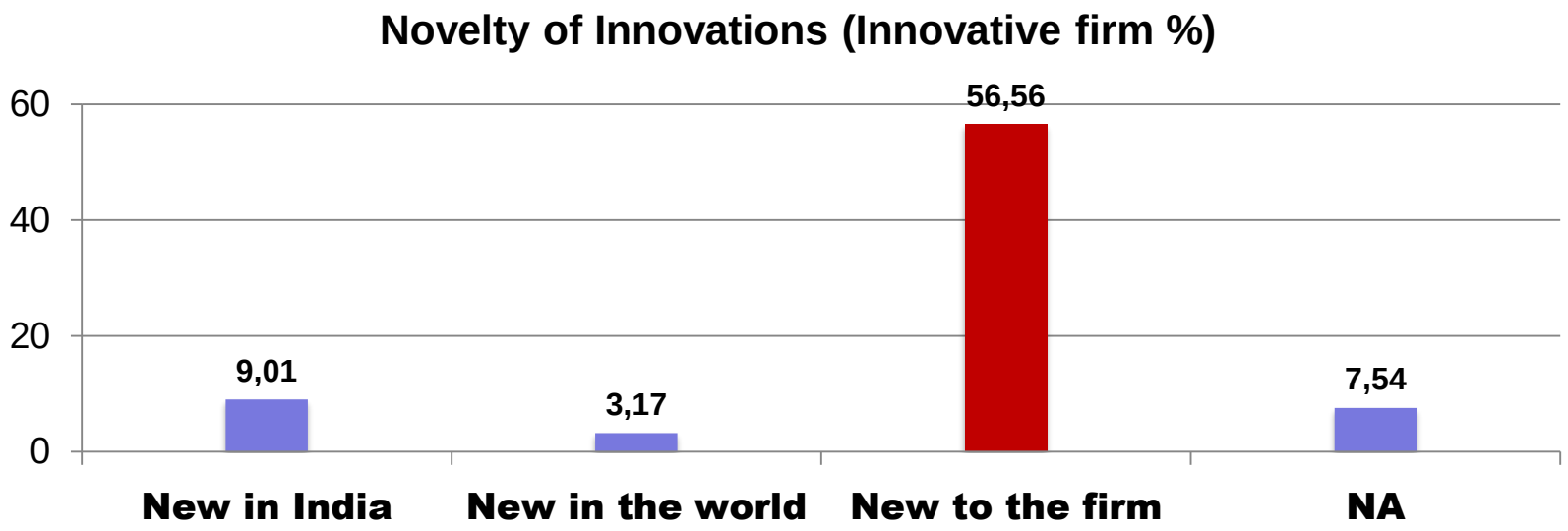
- **Firms within larger size categories show more propensity to innovate**.



- **Larger firms are more active in R&D activities**, technology in-licensing, employing qualified manpower, organisational and marketing practices than their smaller counterparts.
- Product innovations by the **small firms are mainly minor innovations and 'new to the firm' type**. Large firms engaged in product innovation have gained increased market share.
- Involvement in R&D activities increases with size and most of these activities are in-house activities. Extramural R&D activities are rare and even rarer for the small size firms.
- Innovations by the **small firms are mostly by using their own sources**. Accessing external source for knowledge and information is mostly practiced by the large firms.

Novelty of Innovations

- Predominant types of innovation are ‘new to the firm’ category. ‘Use of alternative material’ has about 20% innovative firms claiming ‘new to the Uzbek market’ and about 10% claiming innovations ‘new to the world market’.

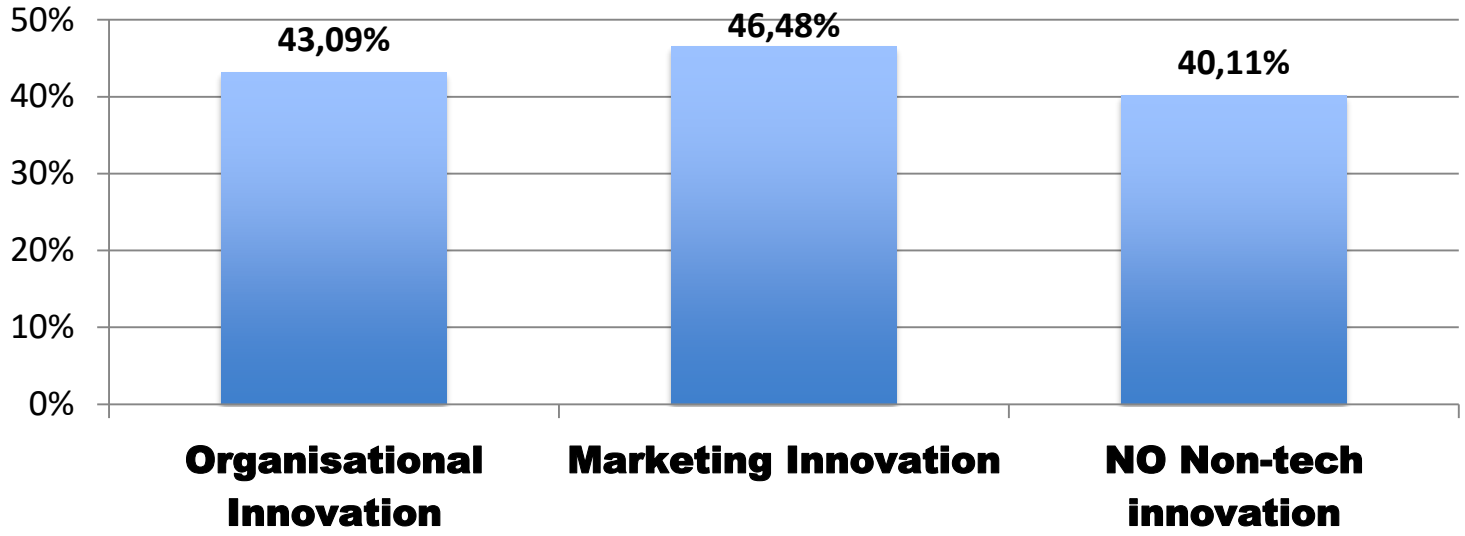


- In terms of novelty aspect of innovations, R&D firms have higher percentage of firms claiming their innovations to be ‘new to market’ than Non-R&D firms.

R&D and Innovation

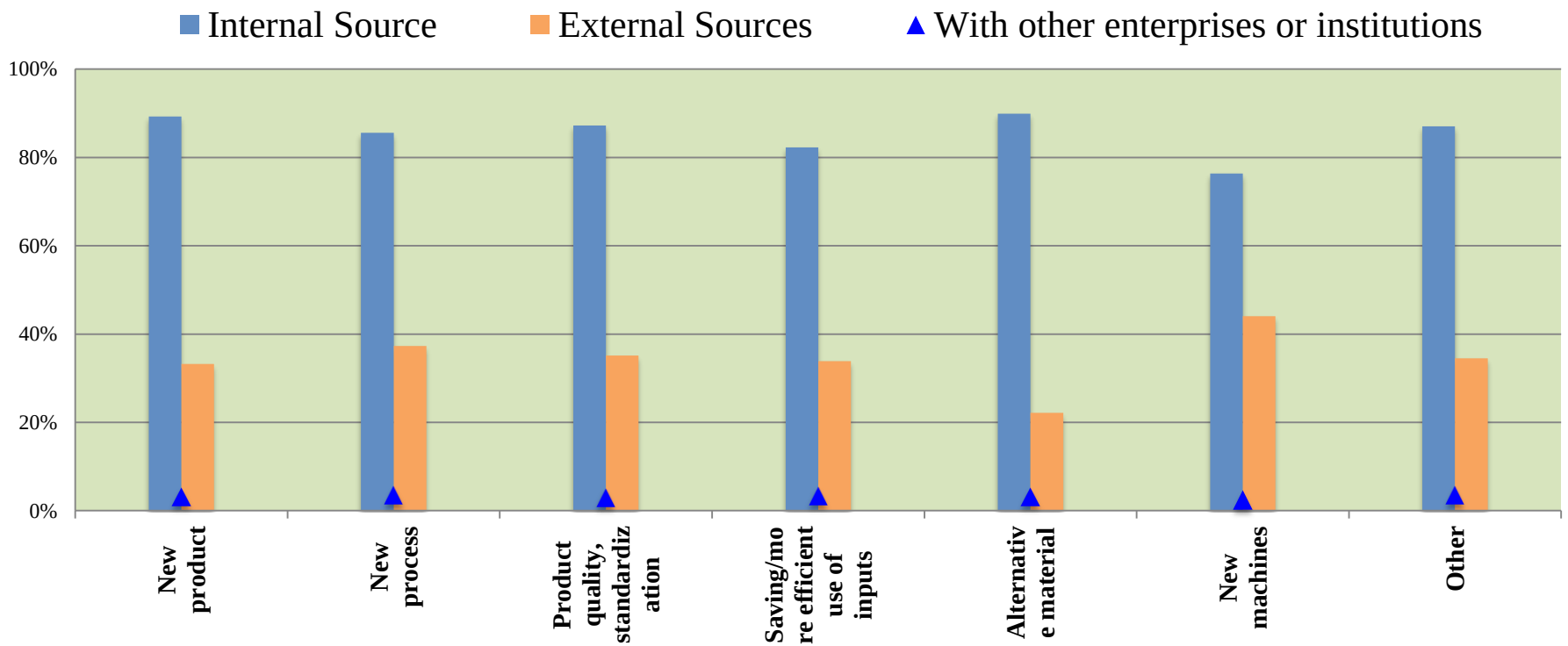
- Out of the total innovative firms 36.90% have formal R&D setup. 35.05% of the total innovative firms have intramural R&D setup whereas 11.43% of them have opted for extramural R&D.
- Firms with formal R&D setup are ahead in product innovation and process innovation whereas firms, which do not have formal R&D setup, (i.e. Non-R&D firms) have more focus on New Machines.
- In terms of novelty aspect of innovations, R&D firms have higher percentage of firms claiming their innovations to be 'new to market' than Non-R&D firms.
- R&D firms have done more of both organisational and marketing innovations than Non-R&D firms.
- R&D firms have more number of firms with higher number of 'scientist & engineers' as compare to Non-R&D firms.

Non-technological Innovations



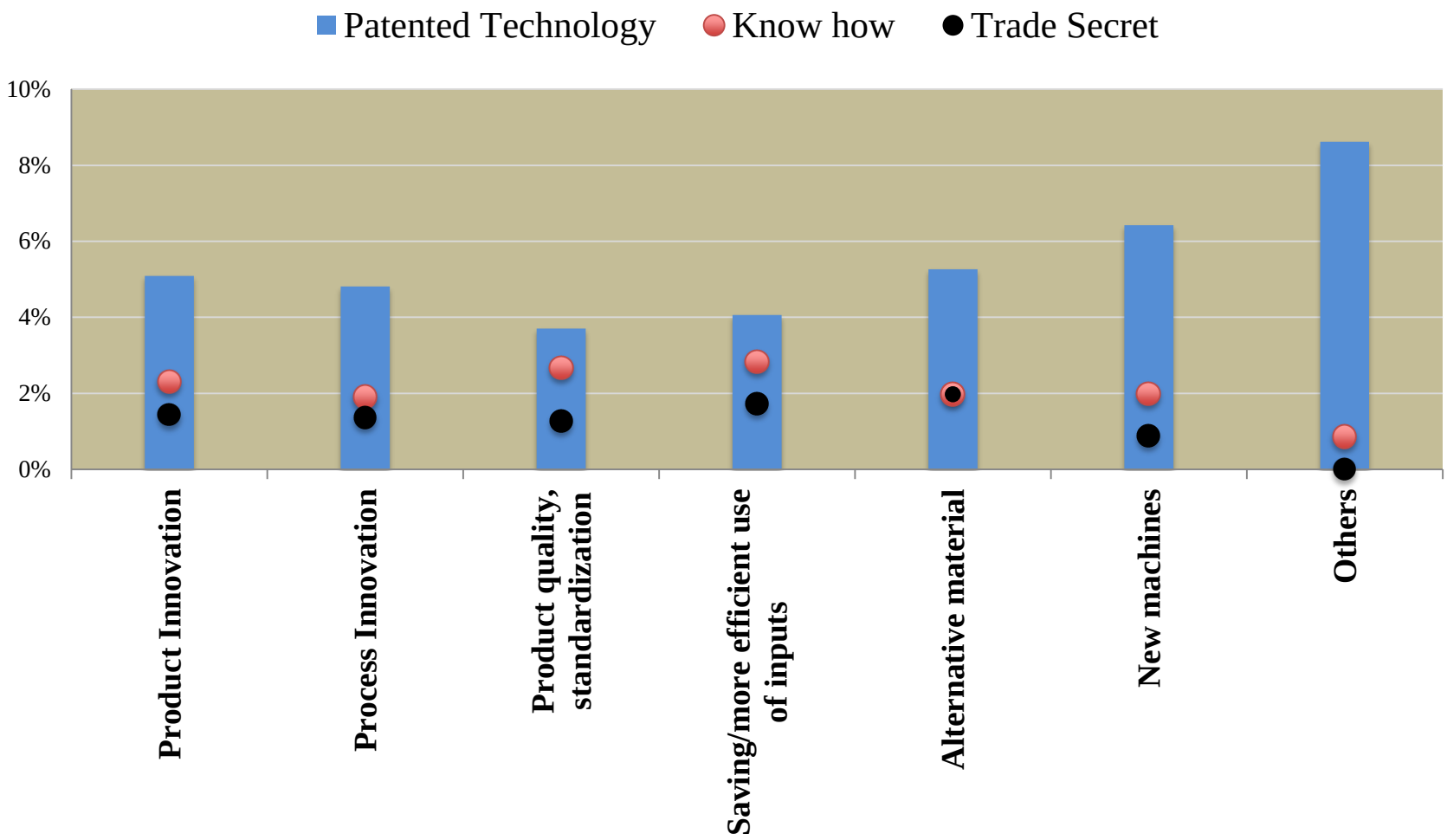
- 59.89% of innovative firms are involved with non-technological innovations, out of which 46.48% of the innovative firms are into marketing innovation and 43.09% are into organizational innovation.
- There are no clear cut relationship between size, age and ownership of the firm with the occurrence of non-technological innovations. Types of innovation also do not seem to vary over firms doing or not doing non-technological innovations.
- Innovative firms that are inclined towards non-technological innovations are slightly ahead of their peers (in their opinion), in gains from innovations in comparison to the innovative firms, which are not into non-technological innovations.

Internal and External mode of Innovation:
technology, human resource training and information

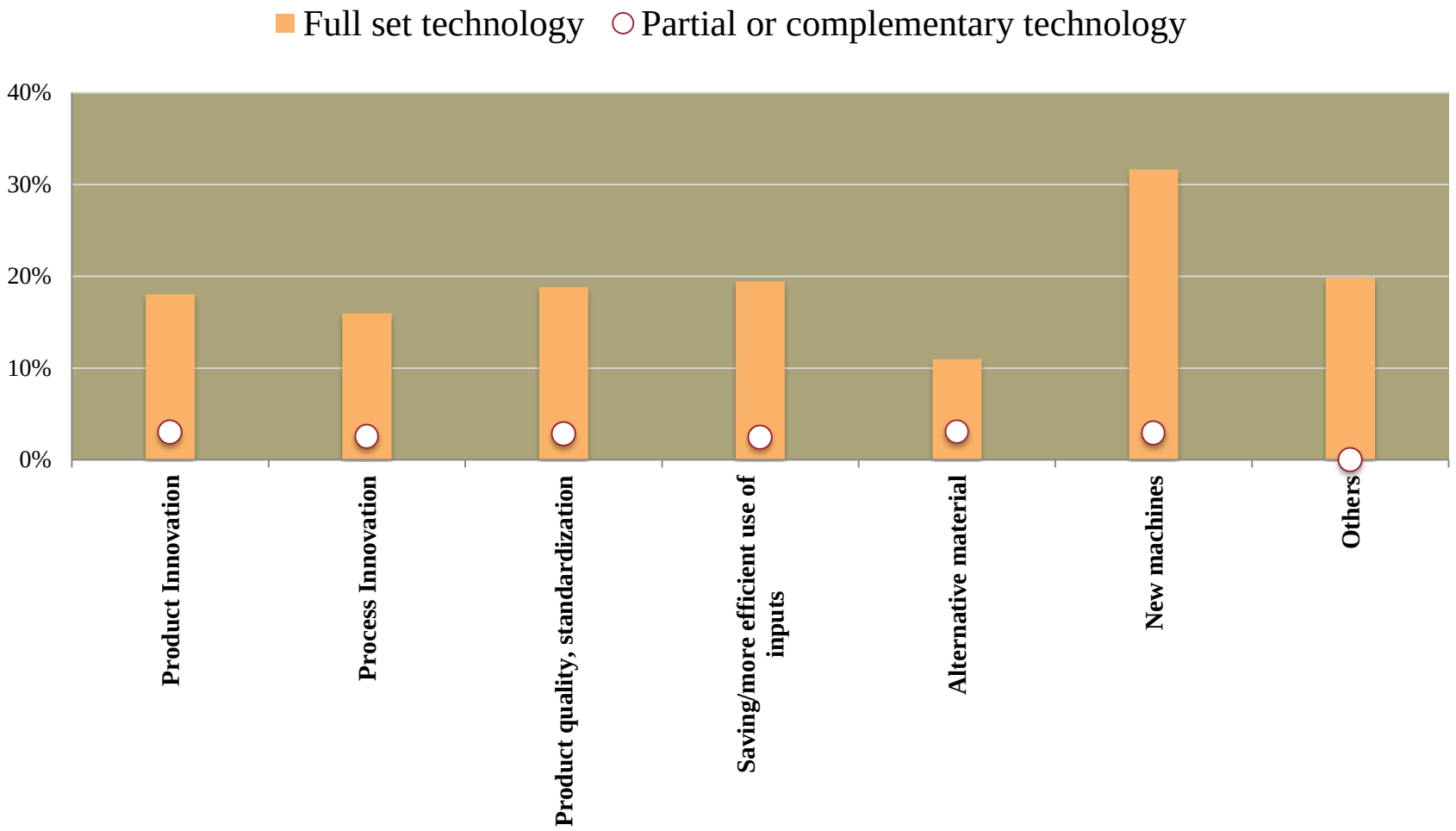


- Internal source appeared as the widely prevalent source of innovation by the firms.
- External sources are important for innovations in introduction of new machines.
- **Highly skilled manpower** is not much in use among innovative firms for augmenting innovation.
- On an average 50% firms provide training to the employees. Even for the training innovative firms hardly access any external institutional facilities.
- More than 80% firms go for internal arrangements for training of their employees.

Using external sources for getting patented technology is most preferred by the innovative firms



Another aspect of external source of innovation strategy is the preference for full set technology while sourcing technology for innovations



ICT usage and Gains from innovation

- R&D and technology management are the areas where ICT is used by about on average 20% of firms by all types of innovation.
- ICT for ERP is strong among the firms engaged in new process and new product technology.
- It is interesting to note that market source has preference over institutional sources for access to information by innovative firms.
- Improvement of quality, cost reduction, environment/health/safety and meeting government regulations remain the **main types of gains** from innovations. Social issues are not the concerns of innovations.

Barriers to Innovation

- Access to knowledge/information has been found most important barrier by about 40% of the innovative firms.
- Availability of skilled manpower is the most important problem for 88% of the innovators. Problem with access to market information and availability of information technology follow closely as Knowledge/information barrier.
- Infrastructure as barrier has been expressed by much less percentage of innovative firms.
- Govt. regulatory requirements have scored highest as market barrier, followed by established players in the market.
- Internal resources or finance remain a strong cost barrier for all types of innovations.
- Accessing institutional sources of finance / training prog. for HRD is rare among innovative firms.
- Innovation cost for 'product', 'process' and 'alternative material' is another cost barrier as expressed by more than 70% of the innovators.

Understanding Innovation : Uzbek National Innovation Survey
Key Findings

- Accessing institutional facilities (NIS) for technological support to innovation, institutional sources of finance, institutional training programme for human resource development is generally very rare or low, indicative of disconnect between innovation infrastructure and the production system.

- Regional Innovation System(RIS) on the other hand has high positive correlation with innovation potentiality of the states. States ranked lower in RIS also have poor innovation potentiality. Weak RIS leads to ineffective innovation eco-system.

- Sectoral Innovation System(SIS) can provide a short-cut route to trigger innovation by initiating high-tech high-innovation led industries at the states. Sustainability would depend on the corresponding responses from RIS and NIS. (*Higher % of firms reporting 'new to Uzbekistan' innovation in Himachal Pradesh is due to the presence of Drugs & Pharma and Electrical goods industry)*

International Comparisons

- Acquisition of machinery equipment and software has been observed as one of the most important innovation activity accessed by many countries including BRICS.
- In innovation related activities Uzbekistan is far behind the developed countries in intra-mural R&D, but compares well with countries like Poland, but compares poorly for extra-mural R&D and acquisition of external knowledge.
- Uzbek firms, compared to innovative firms in other countries, widely use external sources for information and knowledge and have experienced similar level of outcome/ gains from innovation.
- Uzbekistan's position at the bottom in technological innovations is reasoned by the perceived barriers to innovations. Uzbekistan is far ahead of other countries suggesting cost, knowledge, and market factors as major barriers to innovations.

Learning and Policy Issues

Learning and Policy Issues

- The national innovation survey report, first of its kind, benchmarks innovation potentiality of Uzbek firms, largely MSMEs, while corroborating the findings of the pilot innovation study and the developing economies context of innovation in general.

Learning and Policy Issues

- The innovation survey highlights small firms acquiring new machines, striving for quality and standards, and cost reduction are the dominant aspects of innovations.

Learning and Policy Issues

- Most of these changes or innovations are new to firms, or in other words efforts to match the industry peers could be seen as means for development rather than the outcome of the development (*Survival in the Mkt*).

Learning and Policy Issues

- Again, most of the innovative firms do not have adequate strength of qualified scientific and technical manpower. They depend mostly on internal sources for fund, new knowledge, and training of manpower. R&D is quite insignificant among the innovative firms; whereas non-technological innovations have been observed as a wider practice.

Learning and Policy Issues

- Disconnect between the innovation support system and the production system to be bridged. Linkage across lead actors or players of the National Innovation System need to be strengthened.

Learning and Policy Issues

- Sectoral strengths as is evident from the national innovation survey report could be leveraged to attain high innovation potentiality. The same also happens to be the goal of STI 2013 i.e Science, Research and Innovation System for High Technology-led path for Uzbekistan (SRISHTI)
- When seen from the perspective of NIS, RIS and SIS, a macro level scenario emerges where the innovations systems require to be rejigged to be more inclusive to accommodate small firms.

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