

## Modeling Role of ICT in Business Startups and Incubation

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**Abstract**— Ubiquitous Information Communication Technologies are contributing to further the cause of the startups and incubation process in numerous ways. All starts ups are expected to leverage ICT for understanding the ‘market and cultures’ of various geographies. ICT facilitates the production, transmission, and processing of information. Initial investigation shows that even to work the system (all kind of licenses and permissions from various statutory bodies), ICT driven practices are going to be effective. The paper investigate the areas in which ICT practices can be employed for building efficiencies in the processes of concept to servicing the market.

This paper seeks to contribute to the ongoing research in the field of Information & Communication Technology, its impact on the Economic growth & how ICT tools can be used to foster the fast growth of entrepreneurship. Detailed analysis of ICT tools to evaluate the risk capital involved and mitigation of risk in project implementation is done. How modeling and simulation tools be used for projecting the future of a business process is also analyzed. The impact of business analytics/business intelligence techniques for forecasting market behavior is also done thoroughly. Evidence has been collected through a literature search, questionnaires, entrepreneur’s reports and interviews. The detailed study of the challenges faced by startups and the best solutions for them is also done. This paper also analyzes how ICT driven practices & procedures act as a ready reference for Entrepreneurs. This paper also focuses on how ICT plays an important role in fostering innovation leading to enhance firm productivity and economic growth.

**Keywords**— Information Communication Technology (ICT), Enterprise Resource Planning (ERP), Big data analytics (BDA)

### I. INTRODUCTION

Entrepreneurship is defined as the process of carrying out new combinations of firm organization – new products, new services, new sources of raw material, and new methods of production, new markets, and new forms of organization. The entrepreneur should have creativity, innovation and resource gathering.

The knowledge economy is characterized by global competition based on an efficient and high quality information infrastructure with no geographical boundaries. The information and communication technology (ICT) revolution is sweeping the world, the ICT industry has grown to be the principal driving force behind the world economy.

### II. ICT AND ENTREPREUNERSHIP

Effective utilization of ICT requires more horizontal organizational structures with greater levels of responsibility for the overall coordination of work placed on the individual employee. The firms are going through a period of rapid modernization, emphasizing improved production processes

and flexible organizations that can address the needs of the market, as part of transformations of the socio-economic fabric to a market-driven economy.

### III. EFFECT OF ICT ON ENTREPRENEURSHIP

Information communication technology has a very high impact on entrepreneurship. The ICT has remained a very special and has been holding a key focus. As most of the industries are converging due to digitalization the ICT sector will grow at a very high pace. This fast pace growth in ICT sector and ICT services has created a platform for economic growth, job creation, and greater competitiveness. It is observed that the ICT-enabled business sectors have a very high positive impact on productivity, GDP contribution and also on job creation [2].

ICT has enabled the economic growth, productivity and welfare enhancement. There is a need to increase the productivity, adapt the structure of economy to global competition in an increasingly knowledge-intensive global economy, foster innovation and new business creation, and

develop new goods and services that respond to changing domestic and international demand [1].

ICT helps to respond quickly to changing domestic and international markets, also helps in facilitating innovation in products and services, and new business creation. It also helps in increasing the skills and adaptability of the work force.

#### IV. ICT and STARTUPS

A decade ago, the condition of Indian start-up ecosystem was very pitiable due to poor infrastructure, lack of support from the government and unavailability of funds from investors. Earlier, Indian entrepreneurs were not used to receiving enough attention they needed from other stakeholders to sustain the start-up eco-system. But today, the scenario has changed dramatically and reflects the fact that how corporate giants and the government have come forward to boost the start-up ecosystem in India via mentoring, acquisition, funding, acceleration programmes and setting up of incubation centres [3].

Indian start-ups today are building global digital solutions to capitalize on this rapid growth. Hyper-growth, capital availability and acquisitions are the leading drivers of the growing start-up ecosystem in India.

As per the NASSCOM report India is said to be third largest host for start-up-ecosystems globally. India houses around 4200 start-ups, creating more than 85000 employment opportunities. Over \$5 billion worth of investment is done. Everyday three to four start-ups emerge. The number of Start-Ups in India will increase to more than 11,500 by 2020, with job creation from these entrepreneurs reaching 250-300k by 2020.

As Internet penetration in India is on the rise, the Ecommerce sector in the country is likely to witness a growth of over 50 per cent in the next 5 years. The software products market in India is expected to cross the \$100-billion mark by 2025, from a mere \$2.2 billion in 2013. The industry would then grow at a rapid pace of 58.5% to reach the \$100-billion mark [4],[5].

#### V. MAJOR CHALLENGES FACED BY STARTUPS

Starting a new business is a herculean task. The entrepreneur may face lot of problems and challenges. Some of the major challenges which a Startup can face are listed below:

##### A. Startup Capital

Whenever an Entrepreneur wants to start a new business the first problem he will face is the Start-up capital. He may have some start-up cost, but he may need extensive capital,

infrastructure, equipment, permits & licenses, or a minimum number of employees [8].

The entrepreneur will have to get a venture capitalist or angel investors to fund his business. But getting a venture capitalist or Angel investor is a very tough task. Venture capitalists fund less than 1% of the deals they look at. Angel investors do fund many more.

As per the analysis it is observed that the venture capitalist always invest in those start-ups which has rapid growth or has a highly scalable idea. The VCs need big winners. The VCs never invest in a small business. The size of the market also plays a important role to get the VCs nod. The VCs are interested only in those start-ups whose target size of the market is very large, because if a start-up manages to capture even a small share of that market, it will be large enough to give a venture capital fund the quantum of returns it needs for its investors [12].

If a start-up is funded by VC then it will have to go through several rounds of funding, and the founders will have to part with large chunks of stock in the process. The VCs invest large sums of money, and in order to generate returns on those, they want a significant percentage from the start-ups. The Start-ups can take help of cloud services to shave off overhead costs by simplifying IT management processes. Cloud technologies have really taken off in a big way, and they can help one save a lot of money from the monthly/annual hosting fee. They can also bring the power of massive supercomputers at fraction of cost, if needed. Latest trends show that the cloud is in demand these days, with more and more companies replacing On-Premise services with cloud computing. Solutions for CRM, ERP, and more are now available through the cloud, though some companies still favour On-Premise software and storage. The start-up should use open source technologies to reduce the cost. Lot of open source software's are available. With the help of open source technology the start-up can cut down cost of software licensing of proprietary items [14].

##### B. Competition

The biggest challenge faced by any start-up is competition. There will always be cut throat competition. If start-ups can find a niche market and prove themselves compared to their competitors, the reward is great. Start-ups will always face tough competition from its rivals. There will always be new companies who will try to deliver the same product cheaper than yours.

If the entrepreneur wants to succeed then he should know the performance of his competitor. Depending on the nature of the business one can get a comparison report indicating number of outlets, product quantity sold, revenues, etc. These reports help in analyzing trends of performance vis-à-

vis competitors. It helps the start-up to compare the strategy outcome with competitor strategy outcome. Using Business Intelligence (BI) or Tableau software the entrepreneur can analyse their strategies to create new strategic business opportunities [6].

Using cloud computing technology one can generate weekly, quarterly, half-yearly, or even yearly reports to track the sales. Through the sales report one can know about how many sales were realized, how many customers came and at various stages of the process left before closing a sale. Cloud computing and mobile application technology can help start-ups to accelerate research and add value to new as well as existing products.

The entrepreneur can acquire big data analytics for carrying out sentimental analysis to understand the market and cultures of various geographies. There is lot of risk involved in the start-up business. As it is a new business and the market is also new there are lot of chances that the customer response may be poor or there may be shortage of raw material etc. so, there is lot of risk capital involved in the start-up business. The risk can be mitigated by using the Information communication tools used for project implementation and project management [10].

### C. Recruiting the right talent

Hiring a right person is a difficult process, but hiring for start-ups is very hard. For a young company which has a limited cash flow, hiring the wrong employee can potentially break start-up. Recruiting the right or talented people is important for any business, but start-ups in particular can't afford to make hiring mistakes. If a start-up has not yet established credibility and has less money, then a wrong hire can set the start-up back for months or keep the business from taking off altogether.

The start-ups should always focus a lot on becoming a constant recruiter of top talent, and this doesn't happen overnight. As the market looks for the same type of technology skills it becomes very difficult to hire good people. Hiring great talent not only transforms a start-up, but helps them to reach their goals. Mistakes in hiring results in a start-up's cash burn and also affects the culture of the company largely. The entrepreneur should build a company with a great mission and vision so that the top talent can get excited to join their start-up. He should be able to convince the top talent to come and work for his start-up. The entrepreneur should have a long-term vision for his company and he should share the same with his potential employees and present his company in the best way.

### D. Rapid growth

When a start-up find's a niche market, then the demand for its products and services will be very high, and the growth of

the company may be exponential. It will be very difficult for the start-up to adapt to such situations. Expanding at a very fast rate is a big challenge for a start-up. Though the demand of the product of a start-up skyrockets the entrepreneur should always try to get customers, deliver the product or service and reach the break-even point as quickly as possible. The start-up can start earning profit only after the break-even point is achieved.

In order to make the operational processes flow smoothly the entrepreneur should always adhere to the perfect business plan. He may have to hire more people and hiring the right people in a small period of time becomes very difficult. If the demand for the product is very high the start-up will hire more employees the employees need to be trained properly. If the customer service is not up-to-par then the Entrepreneur will receive a lot of negative feedback which is not good for a growing company.

To face the above challenges the entrepreneur should use ICT tools. He can use the Enterprise Resource Planning (ERP) to focus on customers and end results. It will remove the geographical boundaries in terms of hiring, placing orders, and running operations in a same style as per the business needs.

The entrepreneur should use Human Resource Management System (HRMS) to overcome the challenge of sustainability, such as taking immediate action to introduce, orientate, prepare guideline, provide high quality products and services; and especially use the right person in the right position and provide on-job training to gain staff capacity.

### E. Fast-paced market

Another biggest challenge for a start-up is to match its speed with the changing technology. The technology is changing at an incredible speed, and keeping up with the changes is a very difficult challenge for the start-ups. The Start-ups should always strive for innovation. The entrepreneur should not get distracted by new projects; in that case he may lose his market that had made him so valuable [18].

The Entrepreneur can use SAP Business One, an Enterprise Resource Planning (ERP) solution, which is designed especially for small or midsize businesses that manages and automates all the accounting and financial processes of a growing company.

The software takes care of all your financial transactions, such as general ledger, journal entries, and budgeting, and reports. Customize dashboards to meet the business requirements. Set up alerts/reminders to notify you for key information, such as pending payments, tracking customers who have unpaid invoices, etc.

### F. Customer Cost of Switching

The business environment is characterized by intense competition in such an environment building customer satisfaction has become a key area of focus for all the financial institutions. At the end the customer should be satisfied and the start-up should always strive its best to make the customer happy. The market place is very competitive and all businesses compete for customers. The customer satisfaction is a key differentiator and increasingly has become a key element of business strategy.

The Entrepreneur should build a strong customer feedback loop. The start-up should invest in customer success. If the customer is not satisfied the customer will very easily switch to another service provider as lot of options are available for him. The start-up should deliver significant real value, encouraging daily active usage, and on-going user satisfaction so the user has no reason to shift. The start-up should acquire new customers at a greater rate than those heading out the door.

### G. Access to Materials and Distribution Channels

Distribution refers to an organization, or set of organizations, that is involved in the process of making a product or service available for use or consumption by a consumer or business user. Distribution is necessary for getting the company's product into their customer's hands. A smart distribution strategy is necessary for success and can be a source of competitive advantage.

Distribution is about more than finding a channel to the customer. It is important to find a distribution channel that makes it convenient for the buyer to purchase and consume the product.

Start-ups should select a channel of distribution that takes care of the immediate factors associated with the product, such as quality and type of product. Depending on what the start-up is offering, it might need a long, small, or direct distribution channel. The distribution channel may provide access to direct target customer, but it may also open up the opportunity to reach a new customer base. The start-up should look for distributors with current products similar to their own, so that the customer base can be increased which may help in business growth [17].

### H. Patents and Government Regulations

Every inventor should have a patent it is of utmost importance. There is a heavy risk of infringement and if a new idea or a product of any start-up gets infringed then the entrepreneur will have to bear a huge loss. To avoid the patent infringement the start-up should innovate by creating its own version of the product or part. A patent for an invention is a must so that the start-up can be protected from its competitors.

To build a strong eco-system for nurturing innovation the Government of India launched the Startup India on January 16, 2016. The main motive is to generate large scale employment opportunities by establishing a chain of start-ups in the country. It is observed that the gestation period of a start-up is very long. Taking that into account the government of India will now consider an entity as a Start-up up to seven years from the date of its incorporation. Previously it was five years only. As per the new policy decisions the letter of recommendation from an incubator/industry association is not necessary for either recognition or tax benefits.

## VI. RESEARCH METHODOLOGY

### A. The Survey Questions

This study utilizes a survey (online as well as off-line) that was conducted between 2016, 2017 and 2018. The survey explored various aspects of startups and covered a large set of questions.

### B. Data Cleaning and Validation

To ensure the quality and validity of the survey data, we went through a careful data cleaning and validation process on the original dataset. The process was mainly automatized using R software package. We have removed suspicious data entries manually. To start with the data cleaning process, we have removed duplicate entries that might have been introduced during the data exporting process. We also fixed various obvious errors that may be attributed to the survey design or data exporting process.

After this preliminary step, we did manual data cleaning question by question. After the initial cleaning, we checked the validity of the data using a set of validation cases that we discovered based on a close inspection of all the survey questions. The validation cases detected a set of unrealistic, impossible, invalid combinations of answers which rendered certain data entries invalid, which in turn were removed from the dataset.

### C. Data Analysis

The data analysis process was conducted using R software environment. Hypotheses were tested using Chi square test.

Hypothesis 1: Can information communication technology (ICT) tools be used to evaluate the risk capital involved and mitigation of risk in project implementation.

Test Statistic: - Chi-square test is applied with 1 degree of freedom at 5% level of Significance.

$H_0$  Null Hypothesis: less than 70% startups have a high level of acceptance towards the use of information communication technology (ICT) tools be used to evaluate the risk capital involved and mitigation of risk in project implementation. ( $H_0: p < .70$ )

H<sub>1</sub> Alternate Hypothesis: 70% or more startups have a high level of acceptance towards the use of information communication technology (ICT) tools be used to evaluate the risk capital involved and mitigation of risk in project implementation. (H<sub>1</sub>: p=.70)

This hypothesis has been tested by using the acceptance of startup founders and senior managers associated with startups. It is seen that 87.9 % of them have agreed to use the risk analysis methods to evaluate the risk capital involved in the new project as shown in figure 1.

$\chi^2$  value is found out to be 25.01 which is greater than the table value 3.84 at 5% level of significance. Hence, Null hypothesis is rejected and alternate hypothesis is accepted.

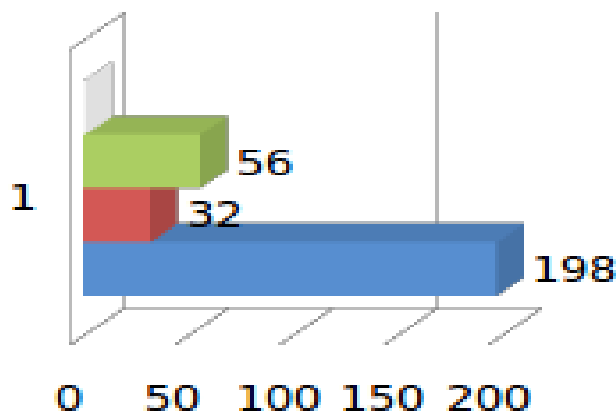


Figure 1: Evaluation of risk

Hypothesis 2: Can modeling and simulation tools be used for projecting the future of a business process.

Test Statistic: - Chi-square test is applied with 1 degree of freedom at 5% level of Significance.

H<sub>0</sub> Null Hypothesis: less than 70% startups have a high level of acceptance towards the use of modeling and simulation tools for projecting the future of a business process. (H<sub>0</sub>: p < .70)

H<sub>1</sub> Alternate Hypothesis: 70% or more startups have a high level of acceptance towards the use of modeling and simulation tools for projecting the future of a business process. (H<sub>1</sub>: p=.70)

This hypothesis has been tested by using the acceptance of startup owners and senior managers associated with startups. It is seen that 91.7 % of them have agreed that they are using modeling and simulation tools for projecting the future of their business as shown in figure 2.

$\chi^2$  value is found out to be 26.46 which is greater than the table value 3.84 at 5% level of significance.

Hence, Null hypothesis is rejected and alternate hypothesis is accepted.

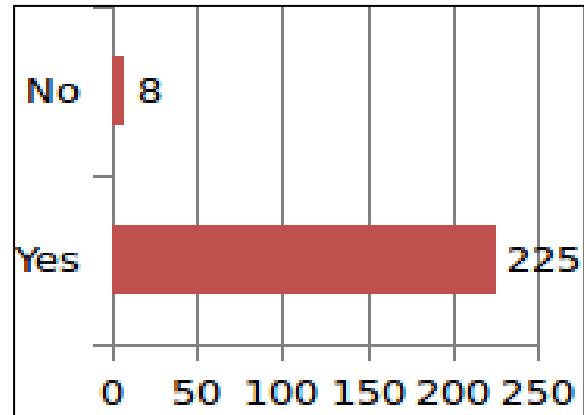


Figure 2: Future of business process

Hypothesis 3: Can business analytics/business intelligence techniques be used for forecasting market behavior.

Test Statistic: - Chi-square test is applied with 1 degree of freedom at 5% level of Significance.

H<sub>0</sub> Null Hypothesis: less than 70% startups have a high level of acceptance towards the use of business analytics/business intelligence techniques for forecasting market behavior. (H<sub>0</sub>: p < .70)

H<sub>1</sub> Alternate Hypothesis: 70% or more startups have a high level of acceptance towards the use of business analytics/business intelligence techniques for forecasting market behavior. (H<sub>1</sub>: p=.70)

This hypothesis has been tested by using the acceptance of startup founders and senior managers associated with startups. It is seen that 92.95 % of them have agreed to use the business analytics/business intelligence techniques for forecasting market behavior as shown in figure 3.

$\chi^2$  value is found out to be 23.68 which is greater than the table value 3.84 at 5% level of significance. Hence, Null hypothesis is rejected and alternate hypothesis is accepted.

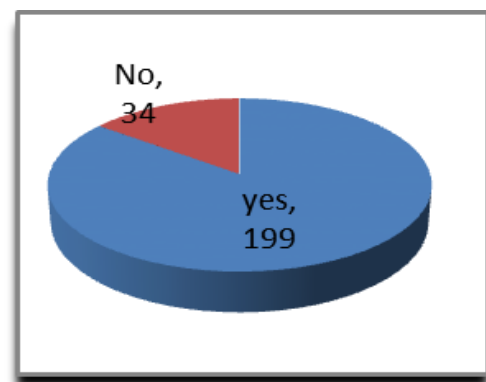


Figure 3: Forecasting of market behavior

Table 1. Testing of hypotheses-Chi-square test results  
(N=233, df=1,  $\alpha=5\%$  and  $\chi^2=3.84$ )

Hypothesis	Chi-square (calculated)	Result
1. Risk capital and mitigation of risk.	25.01	H <sub>0</sub> rejected and H <sub>1</sub> accepted
2. Modelling and simulation tools for projecting the future.	26.46	H <sub>0</sub> rejected and H <sub>1</sub> accepted.
3. BA/BI techniques for forecasting market.	23.68	H <sub>0</sub> rejected and H <sub>1</sub> accepted.

## VII. CONCLUSION

It is observed that emerging countries with stronger infrastructures attract significantly more business from out sourcing, increase in sales, employment generation & profitability. In the research it is found that ICT helps smaller entrepreneurial companies to compete in global markets, faster access to regional and international markets.

ICT enhances the ability of entrepreneurs to develop new business models, product, processes & services. This paper has proved that there is a positive correlation between economic growth and investment in ICT.

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