ISSN 2321 – 9378

IMI Konnect

Volume 7, Issue 4, 2018

An IMI Kolkata Publication

Highlights

Virtual Market for Agriculture | Social Impact Bond | Social Networks | Artificial Intelligence and Machine Learning |

About *IMI Konnect*

IMI Konnect, published quarterly from International Management Institute Kolkata, is an open access Scholarly Magazine in Management. It started its journey in December 2012, and publishes original research articles (non-technical) by scholars in the field of management and firsthand perspectives from business thinkers and practitioners on contemporary issues. ***IMI Konnect*** provides an intellectual platform for the national and international scholars and the industry experts to discuss and debate their opinions and thus contribute to the knowledge of management. It also publishes interviews with eminent personalities in the field of business.

The articles will go through a review process before publication. The issues are themed on Marketing, Finance, Organisational Behaviour & Human Resources (OB & HR), Information Technology & Operations (IT & Operations), Strategy, Economics and Management. The publication caters to academicians and practitioners in corporate and government organizations and departments.

Editorial Team

Manuscript Submission Guidelines

The article should be non-technical and should be of around 2500 - 4000 words. The research articles may be upto 7000 words. But no mathematical expressions or technicalities of methods should be contained in the main text. It should be typed in MS Word in Times New Roman 12 with paragraph spacing 1.5. Figures and simple, small tables can be incorporated. There should not be any notations or equations, at least in the main text. If required, it may be put in Appendix. The article should also contain a short abstract of 150 – 200 words. Full forms of each abbreviation should be mentioned at first instance. All figures and diagrams should be in black and white. Send your manuscript along with your name, institutional affiliation, email ID and contact number to the editorial office at imikonnect@imi-k.edu.in mentioning the area viz. Marketing, Finance, OB & HR, Economics, Strategy, IT & Operations, Management Education, Others or Themed Issue.

For copies/queries and submission, please contact *IMI Konnect* editorial team at imikonnect@imi-k.edu.in or call +91 33 6652 9664

Contents

Virtual Market for Agricultural Commodities

Madhusudan Ghosh*

Abstract

The Indian government has embarked on liberalizing the agricultural commodity markets, characterized by poor competitiveness, fragmentation, inefficiency, presence of excessive middlemen and frequent price manipulations. The National Agricultural Market (NAM) as an all-India electronic trading portal (eNAM) has been designed to create a common national market for agricultural commodities unifying the existing APMC markets and to overcome the challenges posed by the present agricultural marketing system. This article evaluates whether eNAM can really make a difference to agriculture in general and farmers in particular. Trading in the electronic platform is expected to benefit the farmers as well as buyers, as they can undertake online trading from anywhere in the country in a transparent manner. It would ensure right prices to farmers and benefit the ultimate consumers, giving them the opportunity to get the agricultural commodities at competitive prices. However, in reality, it may not be as simple with farmers in view of the fact that more than 80 per cent of them are marginal and small farmers, who may not be able to participate in the online trading process. As agricultural marketing is a state subject, the extent to which farmers can derive benefit from eNAM depends crucially on the magnitude of reforms in the APMC Act in the states. The states have to speed up reforms in the APMC Act and play a proactive role in providing necessary infrastructure and related services to facilitate online trading to the benefit of farmers and buyers.

The National Agricultural Market (NAM) as an all-India electronic trading portal (eNAM) has been designed to create a common national market for agricultural commodities, unifying the existing Agricultural Produce Market Committee (APMC) *mandis* (markets). The portal is a single-window network providing all APMC related information and services to facilitate farmers, buyers, traders, exporters and processors with a common electronic platform for trading agricultural commodities. This includes

**Professor of Economics, Department of Economics & Politics, Visva Bharati University, Santiniketan, WB*

commodity arrivals & prices, buy & sell offers, provisions to respond to trade offers, among other services.

While the physical flow of commodities continues to take place through *mandis,* an online market (virtual market) reduces transaction costs and information asymmetry. eNAM integrates the existing 585 APMCs, presently conducting agricultural trade in the country. The online trading (i) promotes uniformity, streamlining procedures across the integrated markets, (ii) removes information asymmetry between buyers and sellers and promotes real time price discovery, based on actual demand and supply, (iii) promotes transparency in auction process and access to a nationwide market for the farmers, with prices commensurate with quality of their produce and online payment, (iv) provides facilities for grading and standardization of agricultural produce, and (v) ensures availability of better quality produce at more reasonable prices to the consumer.

eNAM, launched on 14thApril 2016, utilizes the opportunities of technology for agricultural marketing, as it is a techno-infrastructure platform to be promoted through Agri-Tech Infrastructure Fund (ATIF). Farmers can sell their produce directly using electronic auction system. Selling of the produce through online auction beyond the traditional borders of the regional market may give them higher prices. Small Farmers Agribusiness Consortium (SFAC) is supposed to implement it in association with the strategic partner (Nagarjuna Fertilizers & Chemicals Ltd.) in 3 phases covering 250, 200 and 135 *mandis* during 2015-16, 2016-17 and 2017-18, respectively. The central government has allocated ₹ 200 crore for the establishment of eNAM in the budget 2016. Each APMC will get ₹ 30 lakh as a subsidy to establish the necessary infrastructure facilities. eNAM is expected to serve the interest of the agricultural sector in general and the farmers in particular, by generating greater agricultural GDP and higher incomes to farmers.

Objective of eNAM

eNAM is expected to ensure remunerative prices to farmers from the open market and reduce the demand for price support mechanism. This e-marketing platform is expected to help farmers market their produce in a better way, get market related information and facilitate better price discovery through efficient, transparent and competitive marketing platform with access to large number of buyers from within and outside state through transparent auction processes. It would also increase farmers' access to markets through warehouse based sales, obviating the need to transport such produce to the *mandis*. It would facilitate the emergence of integrated value chains in agricultural commodities and help movement of the commodities across the country. However, there are serious concerns over the issues such as: (i) Can eNAM really make a difference to agriculture in general and farmers in particular? (ii) Can it help the

farmers to get adequate *enam* (reward) they deserve from farming and contribute towards doubling their incomes by 2022?

Necessity of eNAM

Integration of Regional Markets

The agricultural marketing system in India was excessively regulated with various restrictions. The APMC Act, passed in 1963 with the intentions to regulate agricultural commodity markets and to protect the farmers from market shocks and help them to get the justified price for their produce, has, however, yielded inefficiencies in the agricultural markets over the past several years. The Act has prevented development of a competitive marketing system in the country due to the monopoly of regulated markets, providing no assistance to farmers in direct marketing, organizing retailing, supplying raw material to agro-processing industries and adopting innovative marketing system and technologies. By mandating the selling of agricultural commodities through regulated markets, the farmers are prohibited from direct selling of commodities to consumers. The bureaucrats exercise absolute power in the management of APMCs, and market fees are charged for each transaction, raising the transaction costs. The statutory levies and other charges have been a major source of market distortion with cascading effects on commodity prices passing through the supply-chain. These interventions distort price signals in spatially separated markets because of which agricultural prices do not converge efficiently, and regional markets remain segmented. Such interventions insulate regional markets from each other and act as barriers to spatial market integration.

On the other hand, liberalization of agricultural commodity markets, minimizing government interventions, can enhance efficiency in agricultural marketing by strengthening spatial integration of the markets, removing barriers to movement of commodities across markets and allowing price signals and information to be transmitted smoothly and the market forces to determine agricultural prices. An efficient agricultural marketing is considered to be essential for the development of the agriculture sector, since it provides outlets and incentives for production, and contributes greatly to the commercialization of agriculture. Recognizing the importance of liberalized agriculture markets, the Indian government has embarked on liberalizing the agricultural commodity markets as a part of the comprehensive economic reforms involving structural adjustment and liberalization programmes since the early 1990s. It has been argued that liberalization of agricultural commodity markets can lead to allocative efficiency and long term growth in agriculture.

Liberalization of Agricultural Markets

As a step towards liberalization of agricultural markets, the APMC Act was amended, and a Model APMC Act was introduced in 2003 in order to protect the interests of farmers and to

promote private sector's participation in agricultural marketing, removing the monopoly of brokers and barriers in the prevailing marketing system. The Model Act 2003 provides for (i) improved regulation in marketing of agricultural produce, (ii) development of efficient marketing system, (iii) promotion of agricultural processing and export, (iv) establishment and proper administration of markets, and (v) adequate infrastructure for marketing.

Agricultural marketing is administered by the states as per their marketing regulations under which each state is divided into several market areas, each of which is administered by a separate APMC imposing its own marketing regulation. This fragmentation of markets even within the state hinders free flow of agricultural commodities from one market area to another while multiple handling of agricultural produce and multiple levels of *mandi* charges end up escalating the prices for the consumers without commensurate benefit to the farmers. The regulated marketing system suffers from ineffective laws, lack of information flows and quality check, high transaction costs for farmers, lack of options other than broker system, dual role of broker and wholesaler, etc. Due to the deficiencies in the traditional supply-chain, the farm–market linkages have become weak and imperfect (Pachouri, 2012). Agricultural markets are thus characterized by poor competitiveness, fragmentation, inefficiency, presence of excessive middlemen, and frequent price manipulations with no connection between prices paid by consumers and those received by producers (Banerji & Meenakshi, 2004; Chand, 2012, 2016). Thus, the APMC Act, introduced to promote fair trade in agricultural commodities, has become a major impediment to the development of agricultural markets. The move towards a common National Agricultural Market was taken for overcoming the challenges posed by the present agricultural marketing system.

Functioning of eNAM in Reality

Under the existing state-level APMC laws, farmers can sell their crops after harvesting only in the regulated market yards or *mandis*, restricting them to sell their crops to the traders licensed to operate in the *mandi* under the concerned APMC's jurisdiction. On the other hand, trading in the electronic platform would benefit the farmers, as they can sell their crops to buyers anywhere in the country. Similarly, buyers including large traders, processors and exporters would also be benefited, as they can undertake online trading from anywhere in the country. They do not need to depend on middlemen for trading to take place. Under this condition, the market forces, rather than the monopoly power of traders, would determine the prices of the crops. It would ensure right prices to farmers for their crops, and also benefit the ultimate consumers, giving them the opportunity to get the agricultural commodities at competitive prices.

However, in reality, it may not be as simple with farmers. In view of the fact that the

marginal and small farmers with an average landholding size of less than two hectares constitute more than 80 per cent of farmers, the possibilities for better price discovery through a widened universe of buyers, both local and online, are quite limited for them, as most of them do not take their crops to the *mandis* but sell off to the local traders even before that. Even the farmers who would like to carry their crops to the *mandis*, due to transportation and other costs, distant farmers may not be able to go for bidding online.

Due to resource constraints, the marginal and small farmers are often involved in contract with trader-cum-moneylender, who offers credit/inputs to farmers on condition that they would sell their crops to him at some predetermined price immediately after harvest. Under the linked contract, the farmers do not have any choice for bidding online but to sell their produce to the concerned trader-cum-moneylender. Government interventions in the credit market may not be enough to change this practice. Farmers can benefit from e-trading, if they can find ways for aggregating their produce to volumes large enough to allow them to effectively participate in the online trading process. Farmers' organizations and cooperatives can play an important role by facilitating aggregation bypassing the local traders and even the local *mandis* in the process that is fundamental to the success of any ambitious virtual market experiment like eNAM.

eNAM and Reforms in APMC Act

The extent to which farmers can derive benefit from eNAM depends crucially on the magnitude of reforms in the APMC Act in the states. Karnataka is the forerunner in market reforms and in devising innovative practices to improve the functioning of agricultural markets and bring competitiveness. The unified online agricultural market initiative, under which every farmer who brings produce to the APMC market has a choice to use the common online trading platform or the platform of commission agent for auction of the produce after getting an identification number for the lot, was launched in Karnataka on 22nd February 2014. The unified market platform (UMP) was designed to facilitate transparent, integrated e-trading mechanism and to provide facilities for grading and standardization of agricultural commodities for seamless trading across *mandis*. This marketing model has received overwhelming response from farmers in the state and has shown impressive results in a short period. Looking at the success of the Karnataka model, some states such as Andhra Pradesh, Gujarat, Maharashtra and Telangana have started adopting the model (Chand, 2016). The model can be adopted in other states to take advantage of modern technology to improve agricultural marketing, making it more efficient and competitive. The extent of reforms in the APMC Act was reported to have varied widely across states; while some are most reform-oriented, others are either

intermediate or lagging reformers (Government of India, 2013). In view of this fact, it is imperative for the states to speed up reforms in the APMC Act and play a proactive role in providing necessary infrastructure and related services to facilitate online trading in agricultural commodities to the benefit of the agricultural sector in general and farmers in particular.

References

Banerji, A. & Meenakshi, J. V. (2004). Buyer collusion and efficiency of government intervention in wheat markets in northern India: An asymmetrical structural auction analysis. *American Journal of Agricultural Economics,* 86(1): 236–253.

Chand, R. (2012). Development policies and agricultural markets. *Economic & Political Weekly,* 47(52): 53-63.

Chand, R. (2016). e-platform for national agricultural market, *Economic & Political Weekly,* 51(28): 15-18.

Government of India (2013). State of Indian agriculture 2012-13. Ministry of Agriculture, Department of Agriculture & Cooperation, Directorate of Economics & Statistics, New Delhi.

Pachouri, A. (2012). *Economic inefficiencies in farm-market linkages in agriculture value chain in India: Problems and solutions,* ISAS Working Paper No. 163, Institute of South Asian Studies, National University of Singapore, Singapore.

Socialising Market Risk – A Case of Social Impact Bond

Abhijit Roy*

Abstract

The allocation of finance capital to fight social ills, is traditionally regarded as a misallocation and diversion of capital from where it should be. The emergence of impact investing in the form of Social Impact Bonds (SIBs) addresses this issue by extending economic rationalities of a so-called non-economic policy paradigm. Funding developmental needs with the private capital and rewarding that in an outcome-based pay-for-success model remains at the core of SIBs. A case from India shows promise to scale up interventions through SIBs with more intensities in days to come.

Introduction

The allocation of finance capital to address the social and environmental problems has been in the spotlight for more than a decade now (Nicholls and Emerson, 2015; Calderini et al., 2018). The inefficiency of public spending, insufficiency of the charitable model along with the growing social inequalities and environmental degradation called for a more proactive capital allocation to address these problems. But, the very nature of finance capital is the component of return on investment which social and developmental sectors have traditionally failed to deliver. The social impact investment (SII) is an innovation in this context. SII is simply a strategy of asset allocation on the projects that have positive social and environmental impacts along with economic sustainability and financial returns (Clarkin and Cangioni, 2015). Social impact investment has found its space in the broad spectrum of social finance with three distinctive natures. First, its social and environmental outcomes are not incidental rather defined a-priori and measured ex-post (Calderini et al., 2018); second, the search for social impact is pro-active (Ngaosong et al. 2015) and third, the expectation of repayment with a mark-up makes it different from philanthropy (Nicholls and Emerson, 2015). The word 'impact' is added with investment to stress upon the social and environmental objectives over the financial returns. In particular, the

**Assistant Professor, International Management Institute Kolkata*

present study focuses on a special instrument of social impact investment known as social impact bond (SIB). The present study uses a case of Development Impact Bond (DIB) which may be regarded as a subset of SIB. In DIBs the term 'development' defines an area of intervention from the context of an underdeveloped or poor country. SIBs on the other hand are broad based and more flexible towards financing a project if the objectives of positive social and environmental impacts are met. The present paper examines the rationalities of impact bonds and synthesises how it works in the Indian context.

SIBs are regarded as the next step of marketization of public service delivery (Cooper et al., 2016). They have been initiated in United Kingdom and executed in United States, Australia, Canada, New Zealand and a few other countries (Social Finance, 2012). SIBs have been used to initiate the market mechanism and provide financial incentives in the social policy that are traditionally governed by bureaucratic governmental structure and considered to be inappropriate for the marketization (Cooper and Taylor, 2005). The emergence of SIBs can be theorised as a connection between neoliberal[1] or ordo-liberal[2] era and changing social and environmental practices of people. In traditional investment paradigm the private capital serves social cause when it is backed by government with a guaranteed payment. Instead in SIBs the returns are tied in a 'pay-for-success' mechanism. If the pre-defined result is attained, then the payment is made from the funding body making the investment mechanism more result oriented and market driven. In the later part of this article we have discussed it with more detail, but before going into that we use certain theoretical framework to understand the rationality behind shifting the boundary between private, public and non-profit sectors (Broadbent and Guthrie, 2008).

Social Market Economy and SIB

In our attempt to rationalise SIBs in the marketization context we have drawn heavily on the 'social market economy' which is also known as Rhine Capitalism or the German model. Social market economy is a model that combines free market capitalism along with social policies that establishes a fairly competitive market in a welfare state. In contrast to the Anglo-Saxon model, social market economy falls in the ordo-liberal school of thought that considers state to have a strong role to play in the social policy paradigm maintaining a fair competitiveness in the market. The neoliberal or Anglo-Saxon model is more prominent among English speaking countries like, United States, United

[1]Neoliberalism is a 19th century idea that includes economic liberalization policies and advocates reduced government control to increase the role of private sector.

[2]Ordoliberalism is a German model of social market economy that considers state to have a strong role to play even in the free market scenario to ensure its full potential to deliver desired social value.

Kingdom, Canada, New Zealand, Australia and Ireland, whereas the social capital model is prevalent in continental Europe. To put this in the context of SIBs, the risk that is inherent in the free market economy is socialised by government interventions but following the market based principles of risk and returns of the finance capital. Cooper et al. (2015) have explained the phenomena following Foucault's conception of 'biopolitics'; it rationalises that, the governmental practices are guided by the population and that cannot be dissociated from the framework of the political rationality (Foucault, 2008). SIBs are the extensions of economic rationalities that were not explored earlier. They are the vehicle of interventions in the areas which earlier were regarded as non-economic. In the mechanism of impact investing, the investment of private capital is made on specific areas having social and/or environmental impacts and carries the risk of losing money for not fulfilling the requirements according to the predefined outcome metrics. After the project, the services delivered are assessed and compared with the predefined goals and the investment of the private capital is rewarded with returns accordingly. Thus the SIBs and its close variants may be regarded as a new extension of ordoliberalism that introduced free market mechanism in the so called non-economic policy paradigm of governments.

Social Impact Bonds

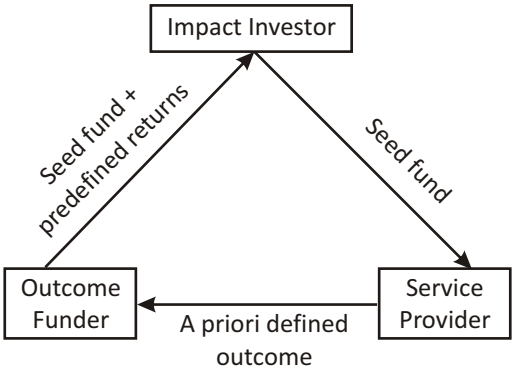
In spite of the progress in the human development indicators worldwide, the significant global challenges remain. Over 800 million people around the world live on less than $ 1.25 a day (UNDP Report, 2017), about 263 million children are out of school (Education Commission[3], 2016). United Nations' ambitious Sustainable Development Goals (SDGs) to eradicate poverty, reduce inequality, ensure quality education, improve healthcare, promote gender equity, promote peace and harmony and ensure environmental sustainability through climate consciousness, are regarded as the most important dimensions of development. But, to attain these goals there is a huge funding gap between the funds mobilised for these purposes and the funds required. According to an estimation of Education Commission in 2016, in only education sector alone there is a funding gap of $1.7 trillion if we consider quality education for all by 2030. So, for advancing SDGs, governments and multilateral organisations require innovative financing. Social Impact Bonds are the recent innovation in the area of social finance that may be regarded as an effective tool to move towards SDGs.

Impact bonds blend result-based financing and impact investing. In an impact bond

[3]The Education Commission is a global initiative to encourage progress on Sustainable Development Goal which focuses on inclusive and quality education for all. It published its first report "The Learning Generation: Investing in Education for a Changing World", covering 105 countries, that puts forward an action plan for the expansion of educational opportunity.

private investors provide an upfront seed capital and on fulfilment of the predefined goals the seed capital along with a return component is given back to the private investor. Alternatively, the outcome funder may issue a deep discount bond whose redemption is contingent upon the achievement of predefined results. Social impact bonds (SIBs) are also called pay-for-success (PFS) in United States, social benefit bonds (SBBs) in Australia and development impact bonds (DIBs) in the developing country context. Though the impact bonds are called using different names or structured in different ways, their basic mechanism remains the same. An impact bond primarily involves three actors, namely, investors, service providers and outcome funders (Figure 1).

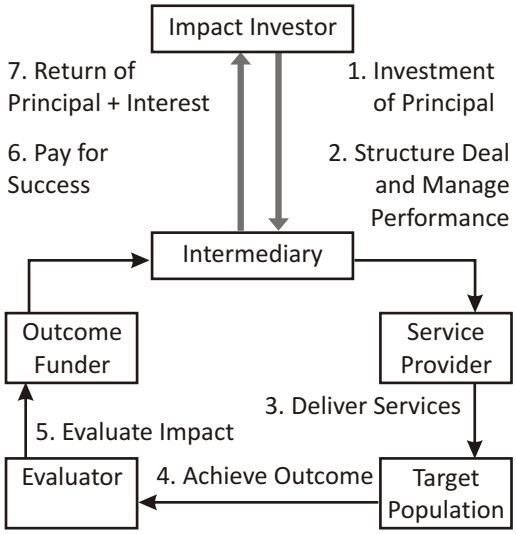
Figure 1: Actors of Impact Bond



Source: Author's own Compilation

An investor provides upfront seed capital to the service provider. Service provider delivers to the target population to attain a predefined goal. Upon attaining the desired outcomes, the outcome-funder payback the seed capital along with returns to the impact investor. Apart from these three primary players there are other key players like evaluator, intermediary and entities for technical assistance. An evaluator is usually a third party that validates the performance of the service providers in comparison to the desired outcome. An intermediary usually arranges capital and handles negotiations among investors, service providers and funders. Intermediary often helps service providers in attaining the desired outcomes. Sometimes there are entities in an SIB that provide the technical assistance in defining the outcome metrics and designing payment terms. Figure 2 reports a more comprehensive mechanism of SIBs.

Figure 2: Mechanism of SIBs



Source: Gustafsson-Wright, E., Gardiner, S. and Putcha, V., (2015)

Performance of SIBs

In a report on 'The Potential and Limitations of Impact Bonds', published by Brookings Institution in the year 2015, that includes the study of 38 SIBs, it was mentioned that they have the potential to deliver positive social and environmental impacts though the authors point out that there is a wide range of variations in the deal structure which at times become complex and highly expertise intensive. Centre for universal education at Brookings Institution along with 'Convergence'[4] studied the impact bonds in developing country context. Their report on 'impact bond in developing countries: early learnings from the field' in 2016 captures design, development and implementation phase of impact bonds in addressing the social needs in the poor and developing countries. The report shows that the returns from the social impact bonds are quite competitive. Table 1 presents the return of impact bonds from some low and middle income countries. Another important aspect is transaction costs and this is beyond the investment amount. These transaction costs are not incidental but very much the part of an SIB contract. These costs include the margin for intermediary services, legal fees, cost of technical assistance and cost of evaluation. Out of these, evaluation may attract higher chunk of such costs. It may include collection of baseline data, execution of techniques like randomised control trials (RCT) that are resource

Table 1: Returns of Select Impact Bonds

Impact Bond Name	Maximum Returns (IRR)
Cameroon Cataract DIB (2017-22)	8%
Columbia Workforce Development SIB (2017-18)	8%
India Educate Girls DIB (2015-18)	15%
India (Rajasthan) Maternal and Newborn Health DIB (2017-20)	8%
India Education DIB (2017-22)	7%
Mozambique Malaria DIB (2017-20)	0.05%
Peru Sustainable Cocoa and Coffee Production DIB (2018-21)	$ 110,000 (return of principal)
South Africa ECD Innovation Fund – Health (2017-21)	16%
South Africa ECD Innovation Fund – Social Development (2017-20)	16%
Tajikisthan WASH SIB(yet to be started, duration 5 yrs)	10% (estimated)
Uganda Empowering Women and Youth in the Coffee Value Chain DIB(yet to be started, duration 3 yrs)	$110,000

Source: Report of Centre for Universal Education, Brookings Institution, 2017

[4]Convergence is an institution that mobilizes, supports and educates investors to design and execute blended financial deals to increase private sector investments in the emerging markets.

intensive and time consuming. Following the basic rule of finance with the increase in time frame for return, the Internal Rate of Return (IRR)[5] of the project decreases. Table 2 states some of the evaluation metrics of an SIB contract from the perspective of the outcome funders.

Finally, a very important aspect of SIB is performance management. It is of high importance to investors whose capital is at risk. So the performance management is primarily investor/intermediary led or sometimes is done by third parties. Moreover, the efficiency in service delivery and performance management is a key result area of SIBs as these are associated with financial incentives.

Table 2: Evaluation Metrics of SIBs

Goal of the outcome funders	Methodology of Evaluation	Pros and Cons
To pay only for success by achieving a set of outcomes (the risk is shifted)	Independent validation of performance data	Relatively low cost; Attribution of impact not possible
To achieve a set of outcome at the least possible cost	Independent validation of performance data	Relatively low cost; Attribution of impact not possible
To determine if an intervention is better than its counterfactual	RCT and Quasi experimental design	Attribution of impact is possible; Potentially more costly
To compare outcome among interventions	RCT and Cost effectiveness analysis	Attribution of impact is possible; Potentially more costly

Source: Author's compilation

The Spread of SIBs in Global Context

The presence of SIBs around the world particularly in OECD countries are gaining momentum. To be precise, they have been taken more enthusiastically in countries like the US, the UK and Australia where a significant part of welfare needs is already privatised. According to OECD report "SIBs: State of Play and Lessons Learned" (2016), by mid 2015 there are 43 SIBs launched around the world and at least 30 more are in the development phase. UK has initiated more than half the SIBs that exist worldwide. Cities and other sub-national authorities like states or provinces are playing a major role in the development and delivery of SIBs or sometimes exclusively as delivery partner where central governments act as

[5]Internal Rate of Return is a metric used to estimate the profitability of a potential investment. If the cost of the fund is less than the IRR, the investor finds the investment potential to be attractive.

the funders. Chicago Pre-School Education SIB is an example where a city is involved in development of an SIB. We have mentioned earlier that SIBs in the developing country context are called DIBs. DIBs on education have already been implemented in India. DIBs are planned in Brazil, Mexico, Columbia, Uganda and Pakistan. There are plans to initiate DIBs in Mozambique and India to reduce the incidence of Malaria. Planning to launch DIBs are going on in Rwanda to fight against adolescent HIV. But in every case the essence of DIBs over the traditional public funding for the welfare state depends on the design of the instrument. For example, National Audit Office (NAO) of Mozambique could not use a pay for success method as the number of bed nets has been used as the outcome indicator. NAO correctly believes that number of bed nets are an output and not an outcome.

The social issue areas that are covered in SIB transactions are social welfare, employment, criminal justice and education. Capital size of bonds differ extensively based on the deal structure. For example, funds in the UK has a common practice of low upfront capital and recycling the fund throughout the programme by reinvesting the early payments. Contrary to this, US model of SIBs are based on large upfront capital commitments. Most of the deals in the UK has the characteristics of more of an equity where the repayment is risky and varies with the performance of the recipients. Successful examples of SIBs are there from both developed as well as developing countries. Some of the successful SIBs in developed country contexts are, One Service in the UK that focuses on the social issue of prison recidivism, Utah high quality preschool programme in the USA, that targets the problem of limited access to early childhood education, Newpin social benefit bond in Australia, that covers children who are in unhealthy family environment, social impact bond Rotterdam in Netherlands, that works on unemployment and Eleven Augsburg in Germany that also focuses on the employment. In the following section we discuss a case from India and elaborate SIBs with more insights in the developing country context.

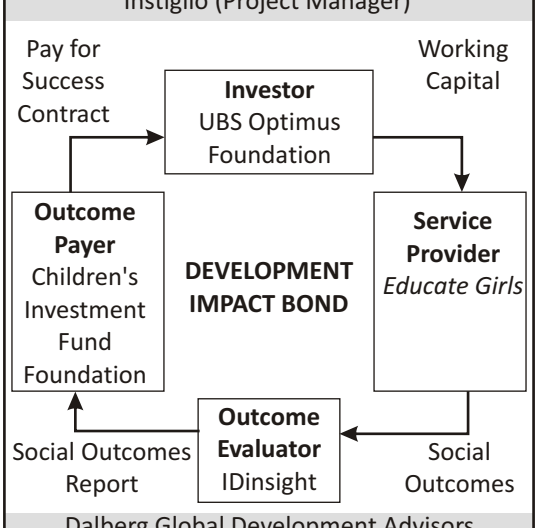
Case Study – *India Educate Girls DIB*

'India Educate Girls Development Impact Bond' is the world's first DIB in education implemented in the state of Rajasthan, India in May 2015 for 36 months. The release of Gender Vulnerability Index (GVI) by Plan International 2017 re-establishes the fact that the life of a girl child has been tough in Rajasthan. GVI covers four aspects to assess gender vulnerability, viz. poverty, protection, education and health. The overall rank of the state in GVI (22nd) is well below others, and if we look into the individual components, the state is suffering the most in poverty (24th) and education (20th). The state has fared slightly better in terms of providing protection to girl child securing 16th rank out of 29 states. 35.4 per cent of girls in Rajasthan are getting married before the legal age and 25.1

per cent women have experienced spousal violence. In the education front the report outlines that only 25 per cent of women have 10 or more years of schooling indicating a high dropout rate. Women literacy in Rajasthan is 86.7 per cent that is above the national average but the learning in terms of basic reading ability and basic numeracy has been poor. High percentage of schools reported separate toilet for boys and girls but about 30 per cent of the students reported that toilets are not usable. Inadequate toilets for girls have always proved to be one of the prominent factors for dropout of girl students. In this backdrop, *'educate girls'* project was launched in Bhilwara district of Rajasthan through a development impact bond (DIB) - a variant of SIB that addresses the developmental needs of the society - to enrol the out-of-school/dropout girls and improve the learning component of both boys and girls in the remote and marginalized communities in Rajasthan.

Educate Girls, that served as the service provider in the project, is an NGO established in 2007 that works on 'Right to Education' with a special focus on mobilizing communities and resources for girls' education. In this programme UBS Optimus Foundation (UBSOF) served as the impact investor and Children's Investment Fund Foundation (CHIFF) played the role of outcome funder. The social issue addressed in the project was to enrol out-of-school girls and to improve literacy in English, Hindi along with improvement of numeracy among the children in Rajasthan. Various blocks in the Bhilwara district were identified as the location of implementation. The target was to reach 166 public schools from 144 villages in the district and to reach out to 15,000 children of which 9,000 are girls. Project cost for the service provider (NGO) *Educate Girls* was $ 2,77,915 which is regarded as the upfront capital requirement of the bond. An organisation called Instiglio acted as the intermediary of the DIB mechanism and coordinated between all the actors and designed the scheme. The maximum outcome fund is decided to be $ 4,22,000 that leads to an IRR of 15 per cent to the impact investor UBSOF. The flow of function and the mechanism of DIB is presented in Figure 3:

Figure 3: Mechanism of *Educate Girls* DIB

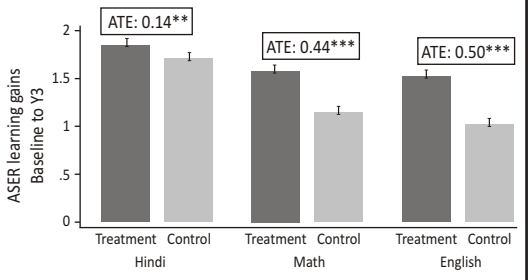


Source: https://www.educategirls.ngo/.
Date of access: 28.08.2018

The outcome metrics of the DIB is objectively defined where the 20 per cent of the outcome payment was allocated for the enrolment based outcomes and remaining 80 per cent was allocated to the learning based outcomes. IDinsight worked as the outcome evaluator of the DIB. As the project is first of its kind in the education sector, the outcome of the project is important to scale up such investments in future. IDinsight has evaluated the project and the final evaluation results are available now. The outcome is truly encouraging for Indian policy and developmental sector. Pre-post comparison was done for the enrolment outcome that reports performance of 116 per cent of the target is achieved. The learning outcomes are assessed based on Annual Status of Education Report[6] (ASER) tools using RCT as the evaluation method.

Randomized Control Trial (RCT) is a scientific methodology which is increasingly used in social science to understand the effect of a social intervention. The subjects participating in the trial are randomly allocated to either treatment group where the interventions are made, or to the control group that does not get the interventions. In the present case schools are randomly allocated to the treatment group that receives the programme interventions through *Educate Girls* and to the control group where no interventions are made. After the interventions, the Average Training Effect (ATE) is measured with the mean difference in learning gains between students in treatment schools and students in control schools. The study reports the learning improvement of 160 per cent of the target. The evaluation outcome is reported in Figures 4 and 5. Table 3 presents the overall snapshot of the *Educate Girls* DIB

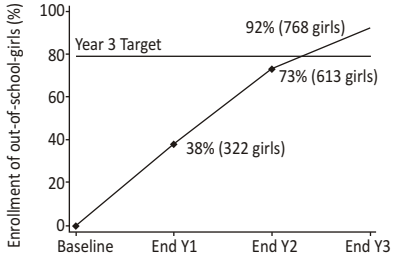
Figure 4: Average Learning Gain



(*, **, *** denotes that average treatment effect (ATE) is statistically significant at 10 per cent ($p<0.1$), 5 per cent ($p<0.05$) and 1 per cent ($p<0.01$) level of significance respectively)

Source: IDinsight (2018), Educate Girls Development Impact Bond Final Evaluation Report

Figure 5: Enrolment of Out-of-School Girls by Year



Source: IDinsight (2018), Educate Girls Development Impact Bond Final Evaluation Report

[6] ASER is an annual survey that estimates childrens' basic learning and schooling status across states and rural districts in India. The survey is conducted every year since 2005.

Table 4: India *Educate Girls* DIB Factsheet

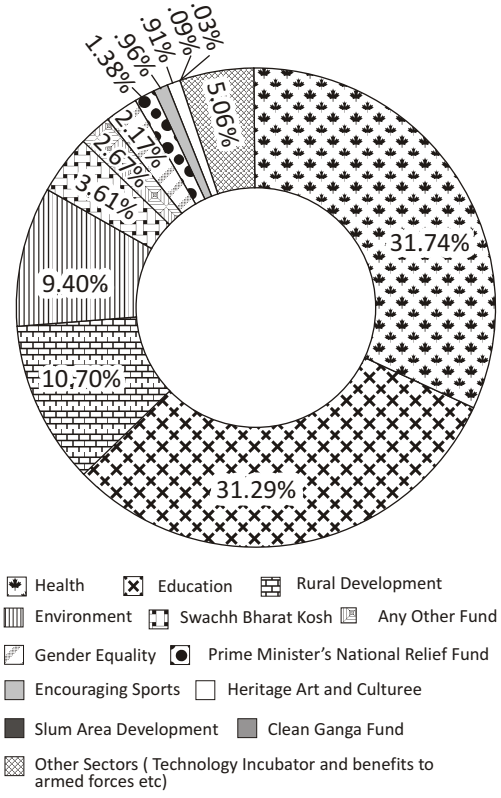
Impact Bond name: India *Educate Girls* DIB				
Intervention	*Enrolment:* Identification of out-of school girls through door-to-door surveys, explanation of the value of schooling, multi-channel engagement with households, multiple interventions to improve attendance and prevent drop-outs *Learning:* Young volunteers deliver a child-centric curriculum 3 times weekly to boys and girls in grades 3-5.			
Stakeholders				
Investor	Intermediary	Outcome Funder	Service Provider	Outcome Evaluator
The UBS Optimus Foundation (UBSOF)	Instiglio (project management, performance management)	The Children's Investment Fund Foundation (CIFF)	*Educate Girls*	IDinsight
Financing				
Outcome Fund (US$)	$ 4,22,000 (Maximum IRR of 15%) $ 3,67,000 (Maximum IRR of 10%)			
Upfront Capital Commitment (US$)	$ 2,77,915			
Maximum potential loss (% of principal)	100%			
Outcome Metric	Enrolment outcome [allocated 20% of outcome payment]: number of girls on the school roster in grades 3 – 8 in the treatment group over the contract period Learning outcome [allocated 80% of outcome payment]: ASER based measure of literacy in Hindi, English and basic numeracy			
Outcome Evaluation Method	Baseline study for enrolment and ASER measures for learning outcome			
Payment Threshold	Payment is based on each additional unit of outcome and not based on any threshold			
Fund disbursement by investor (UBSOF)	50% of upfront capital in 2015 50% of the rest amount in 2016			
Fund disbursement by outcome funder (CIFF)	CIFF will disburse one outcome payment to UBSOF ranging from $0 - $4,22,000 in 2018			

Source: Data compiled from the report of Centre for Universal Education, Brookings Institution, (2017)

Conclusion

The success story of India Educate Girls DIB is encouraging. At present two other DIBs are in progress. One is India Educate DIB in Gujarat, Rajasthan and Delhi which is scheduled to get over by May, 2022. The other one is India (Rajasthan) Maternal and Newborn Health DIB, scheduled to be completed by December, 2020 (US Agency for International Development, 2017).

Figure 6: CSR Expenditure by Sector in 2015



Source: Data compiled from the Ministry of Corporate Affairs

Results to date from these SIBs are not available but the increasing trend of financing social policy issues by private capital and earning a decent return - both in terms of finance and social impact - is very encouraging. This will lead to the standardisation of SIBs which is essential for the growth of SIBs and formal participation of the private players. In Indian context, the Companies Act 2013 mandates a class of companies to contribute 2 per cent of last three years' average profit to be spent on CSR activities. This is a handful of fund as the Ministry of Corporate Affairs put forth in 2015 that total 5097 corporates reported CSR expenditure of ₹9,822 crores. Governments have limited control on how these funds are utilised. Moreover, corporate houses are not always specialised in handling the issues in development sector. The interest of Indian corporate houses regarding CSR expenditure seems to be diverse (Figure 6). The figure is compiled from 2015 CSR expenditure data published by the Ministry of Corporate Affairs.

The way these funds are spent and the impact of these interventions are not known. On the other hand, SIBs are objectively designed where the accountability of the actor is high because of the financial incentives associated with the project. If the market of the social impact bonds become well-defined and standardised then corporates may act as outcome funders. Alternatively, corporates may be regarded as SPVs where the successful

SIBs may be liquidated by the outcome funders which may be government or any multilateral organization. If the SIBs across the world are studied and evidences of positive impacts are found, then government may come out with set of regulations about the corporate participation as the outcome funders/SPVs. The initial evidences suggest that SIBs have the potential for a paradigm shift in how the policy decisions are made and the way, so called non-economic developmental sector performs.

References:

Broadbent, J. and Guthrie, J. (2008), "Public sector to public services: 20 years of "contextual" accounting research", *Accounting, Auditing & Accountability Journal,* Vol. 21, No. 2, pp: 129-169.

Calderini, M., Chiodo, V. and Michelucci, F. V., (2018), "The social impact investment race: toward an interpretative framework", *European Business Review,* Vol. 30 No. 1, pp. 66-81.

Centre for Universal Education, Brookings Institution, (2017), "*Impact bonds in developing countries: early learnings from the field*", Report retrieved from: https://www.brookings.edu/research/impact-bonds-in-developing-countries-early-learnings-from-the-field/. Date of Access: 05.08.2018.

Clarkin, J.E. and Cangioni, C.L., (2015), "Impact investing: a primer and review of the literature", *Entrepreneurship Research Journal*, Vol. 6 No. 2, pp. 135-173.

Cooper, C. and Taylor, P. (2005), "Independently verified reductionism: Prison privatization in Scotland", *Human Relations,* Vol. 58, No. 4, pp: 497-522.

Cooper, C., Graham, C. and Himic, D., (2016), "Social impact bonds: the securitization of homeless", *Accounting, Organization and Society*, Vol 55, pp 63 – 82.

CSR Expenditure Data: Ministry of Corporate Affairs

Accessed from: http://www.mca.gov.in/MinistryV2/csrdatasummary.html

Education Commission (International Commission on Financing Global Education Opportunity), (2016), "*The learning generation: Investing in education for a changing world*". Retrieved from http://report.educationcommission.org/wpcontent/uploads/2016/09/Learning_ Generation_Full_Report.pdf

Foucault, M. (2008). The Birth of Biopolitics: Lectures at the College de France, 1978-79 (G. Burchell, Trans.). Houndmills, UK: Palgrave Macmillan.

Gustafsson-Wright, E., Gardiner, S. and Putcha, V., (2015), "*The potential and limitations of impact bonds: Lessons from the first five years of experience worldwide*", Washington, D.C.: The Brookings Institution. Retrieved from: https://www.brookings.edu/research/the-potential-and-limitations-ofimpact-bonds-lessons-from-the-firstfive-years-of-experience-worldwide/. Date of Access: 05.08.2018

IDinsight (2018), "*Educate Girls Development Impact Bond Final Evaluation Report*", Report Retrieved from: http://idinsight.org/wp-content/uploads/2018/07/Educate-Girls-DIB-Final-Evaluation-Report_2018-06-10.pdf. Date of Access: 12.08.2018

Ngoasong, M., Paton, R. and Korda, A., (2015), *"Impact investing and inclusive business development in Africa: a research agenda",* IKD Working Paper No 76, The Open University, Milton Keynes.

Nicholls, A. and Emerson, J., (2015), "Social finance: capitalizing social impact", in Nicholls, A., Paton, R. and Emerson, J. (Eds), *Social Finance, Oxford University Press,* Oxford, pp. 207-249.

OECD (2016), "Social impact bonds: state of play and lessons learnt", Report Retrieved from: https://www.oecd.org/cfe/leed/SIBs-State-Play-Lessons-Final.pdf. Date of Access: 13.11.2018.

Plan International (2017), "Plan for Every Child Gender Vulnerability Index Report - I", Retrieved From: https://www.planindia.org/sites/all/themes/plan_india

/images/pdf/gender-vulnerability-index.pdf. Date of Access: 10.08.2018

Social Finance (2012), Press release: social impact bond to go international. Retrieved from: http://www.socialfinance.org.uk/sites/default/files/international_working_group_and_director.pdf. Date of access: 25.08.2018

United Nations Development Programme. (2017). "Sustainable development goals". Retrieved from: http://www.undp.org/content/undp/en/home/sustainable-developmentgoals/goal-1-no-poverty.html

US Agency for International Development (2017), "*World's first healthcare development impact bond aims to reduce mother and baby deaths in Rajasthan, India*", Report Retrieved form: https://reliefweb.int/report/india/worlds-first-healthcare-development-impact-bond-aims-reduce-mother-and-baby-deaths. Date of access: 25.08.2018

A Concept Analysis of Social Networks

Baidyanath Biswas*

Abstract

Social Networks are omnipresent in our daily lives and connect the actors in all spheres, including politics, financial markets, knowledge, relationships, and even hobbies. However, the overarching presence of specific software-enabled Online Social Networks has led to an insular view about them. In this article, we track the origins of social networks, through toy examples, in an attempt to philosophically generalize the realm of social networks. Next, we study their evolution through the examination of theoretical, empirical, and analytical motivations. Next, we visualize a social network from publicly available data on the choice of dining-table partners in a dormitory. Finally, we conclude our article with a caveat on the generalizability of the concept of social networks.

Introduction

Social Networks can be seen as the relationships among different actor(s) in the context of a possible area of activity such as trade, financial exchange, procurement, politics, markets, friendship, recreation, beliefs, and knowledge (Moreno, 1934). Historically speaking, social networks had existed since the primitive ages when humans had just begun to build settlements and started living as a community. According to the Greek philosopher Aristotle, *man is by nature a social animal;* and society is something that precedes the individual human being (Arendt, 1958). One might find it astonishing to know that the concept of social networks, such as the idea of information and knowledge sharing across the community members, did exist since the early days of civilization. And all of these online applications that we see today such as Facebook, Twitter, Orkut, Myspace and YouTube among others, are merely their digitized formats. In the early 1st century B.C. in Rome, the famous statesman, Cicero began exchanging of political information through letters and documents, when appointed the Governor of a Roman Province near Turkey. He carefully allowed the interchanging of letters among his fellow statesmen and members of Roman elite families who were interconnected through marital ties (Standage, 2013). Let us now take the example of a forest ecosystem, where every organism, be it the small algae or the mighty

**Assistant Professor, International Management Institute Kolkata*

lion, is a part of the many invisible ties that bind the animals together in the daily cycle of food-chain and survival. In day-to-day life, we are awestruck by the cab services provided by Uber and Ola who are digitally transforming the taxi services of urban areas in India. In actuality, they are nothing but tech-enablers who are extracting the business value from the implicit and existent network of taxi cab drivers, and surprisingly we have been using them for decades. Therefore, apart from the very obvious "social networks" that we see around us, it has gradually become so profound that we are using technology to harness the invisible web of social networks that has always existed around us.

Origin of Social Networks

The term social network was first coined by the British anthropologist J. A. Barnes (Barnes, 1954) in his classic study of the inhabitants of Bremnes, a small parish island in Western Norway. He studied the social structure of the villages in Bremnes and identified the relationships among each other. These connections were significant because Barnes noted that the socio-economic conditions of the entire island of Bremnes were dependent on them. Sometimes, the economic system would operate as it was a single entity. He also identified the *social community,* as the group of individuals in a specific society who talked among themselves, did business together, and attended church masses in similar groups. Such observations were highly contextual to the study he conducted. Barnes also identified three kinds of social interactions at Bremnes, namely, *territory-based, industry-based and friendship-based.* While the former two types were naturally derived, it was this third type that inspired Barnes to examine more closely and finally coin the term *social networks.* For example, in other European countries such as the United Kingdom, the residents staying in the houses on a particular street did not talk to each other because they did not consider themselves equal in social status, and occupation. In contrast, due to the concept of Norwegian equality, the villagers at Bremnes considered themselves of almost identical status even though all of them did not belong to the same social status. Hence, the bond between these persons who recognized each other as *social equals* approximately aggregated to form an invisible *social class* or the *social network.*

Can We Call Our Family Be Mapped as a Social Network?

The network of our familial relations that include father, mother, siblings, spouse, and children is an individual's social network that s/he has inherited. If we attempt to trace the ancient history of human race, we observe that the aggregation of families led to tribes and the combination of tribes led to the modern-day nations. Therefore, a typical family can work as a sample social network. If we add the list of our relatives on all sides of the family, the

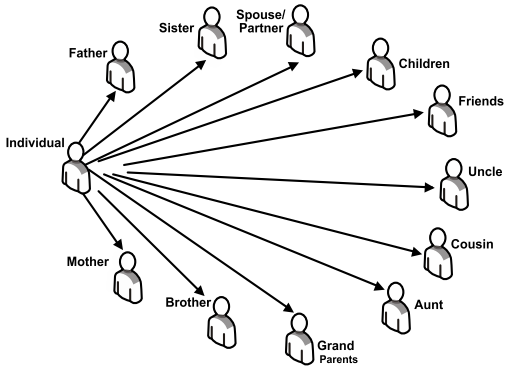
modest social network now looks bigger.

Figure 1 illustrates the social ties of an individual such as father, mother, siblings, grandparents, spouse/partner, children, cousins, uncles, aunts and friends. We have purposefully omitted the inter-relationships among these actors in Figure 1. We also realize that if the individual does not maintain relations with one or more member(s), the stability of the social network does not hold good for him/her. Therefore, a social network does not keep well, if there exists no interplay of relationships among the participating actor(s).

The Distinctiveness of Social Network Theory

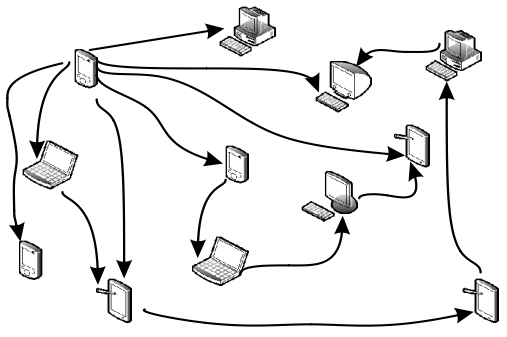
Social network theory helps researchers to look into a particular problem in a fundamentally different way than the conventional lens of problem-solving. Traditional perspective of social sciences often does not consider the relationships among entities during analysis while social network analysis (SNA) does (Granovetter 1983). The distinctiveness of such a network with pre-defined social perspectives accounts for the *strength of weak ties* among two or more individuals in the society. Past research shows that some popular and effective SNA methodologies include, path analysis, empirical observations, qualitative surveys, and interviews, that were undertaken to realize these ties. These SNA techniques have philosophically helped researchers to identify and analyze the actual experiences by the subjects of an experiment. For example, strong relationships exist among the relatives and close friends, whereas weak and insignificant relationships exist among acquaintances and friends of friends.

Figure 1. – An Elementary Social Network of an Individual With A Network of Familial Ties



Source: Author's Compilation

Figure 2. – A Modern-Day Social Network Showing The Relationships Among Individuals Through The Computer and Mobile Devices



Source: Author's Compilation

An Evolutionary Shift of Social Networks

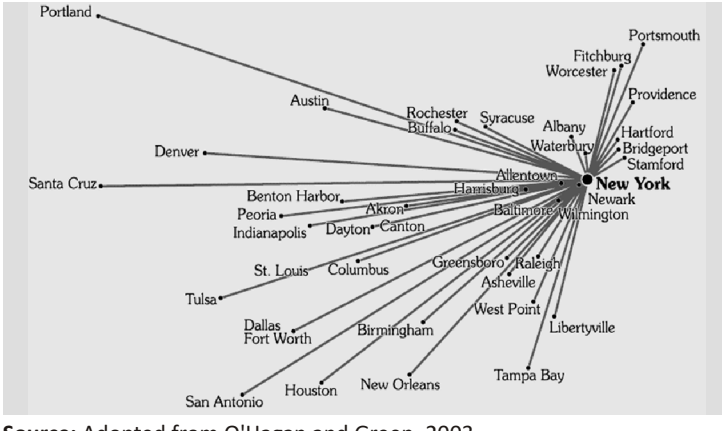
As research advanced, the idea of Social Networks has evolved since its coinage. Social scientists have drawn inspiration from the fields of Computer Science (i.e., Graph Theoretical models), apart from sociology and psychology. The application of SNA Theory has significantly evolved into the technological aspects, and thus it can be said that the boundary of the SNA concept has confined itself into a *niche* application area today (Figure. 2). In comparison with Figure 1, this technology-based network seems to exist among inanimate machines and devices. But the crux of SNA theory and philosophy lies in the fact that the *social network* is embedded in the society, its participating actor(s) and not in the machines (Freeman, 2004).

Past research has also identified the presence of social networks among business firms, such as the cases of interlocking directorates. This phenomenon was revealed in a study involving the mining corporations of South Africa, namely, De Beers, Rand Mines, Goldfields, Premier, and Chartered Co. The five firms were linked among each other by six board members who were common to each of them (Hobson, 1954). In another study by O'Hagan and Green (2003), the authors found the existence of a corporate knowledge-transfer network that was connected by interlocking directorates among American corporations. Additionally, there existed a hierarchical pattern among the cities, and New York, the superior among them all, behaved as the central node with international firms and experts. (see Figure 3(a) and 3(b)).

Evolution of the Social Network Theory

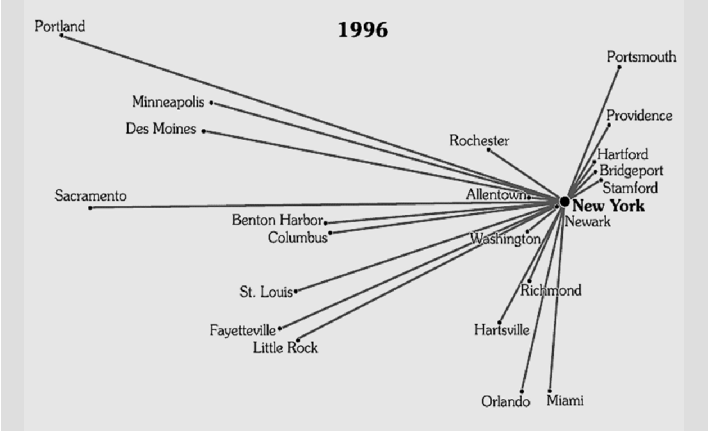
Social Network Theory evolved from the disciplines of Sociology, Social Psychology and later took elements of graph theory and Computer Sciences. The origin of the subject of Social Networks can be delineated into three significant lines of research according to Scott (1991), namely (i) Social Groups and Structure; (ii) Study of Social Bonds, and (iii) Graph Theoretic Models. In the following sub-sections, we connect each of these dimensions to a theoretical, empirical, and

Figure 3(a). Interlocks With New York City As A Central Node (Year 1976)



Source: Adopted from O'Hagan and Green, 2003

Figure 3(b). Interlocks With New York City As A Central Node (Year 1996)



Source: Adopted from O'Hagan and Green, 2003

mathematical motivation and explain them.

Theoretical Motivation: Sociological View of Social Groups and Structures

In the 1890's, Emile Durkheim argued that the social phenomena which occurred in human contexts could no longer be contributed toward the individual actor(s) and perhaps was a socially influenced perspective. This philosophical change prompted a completely non-individualistic approach that Durkheim proposed while explaining the phenomena of SNA. Next, Georg Simmel was fascinated with the different forms of association among these social networks but was not interested with the individual consciousness of the participant in an SNA. He also noted that these associative social structures were organic, had a life of their own, and could affect the natural growth and creativity of an individual. In his seminal work, *The Metropolis and Mental Life* (Simmel, 1903), Simmel hinted towards the problems that an individual could face due to the opposition from society and external culture that could finally outweigh his existential individualism. Anthony Giddens presented the Structuration Theory through his seminal work, *The Constitution of Society* (Giddens, 1984), where he also hinted towards *Social Networks*. He identified that social actions were logically responsible for the formation of social structures and did not entirely depend on an individual.

Empirical Motivation: Anthropological View and Study of Social Bonds

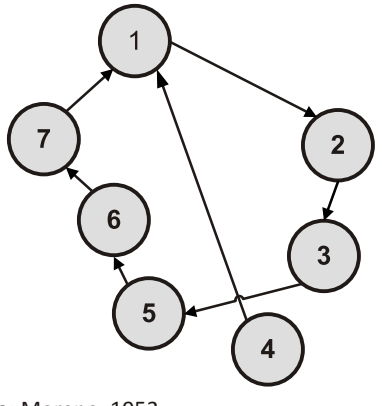
In the mid-1950's, British anthropologists found philosophical inspiration for their unexplained empirical studies through a re-examination of social and organizational ties among the actors. They found that the traditional methodologies borrowed from economics, political science and psychology were unable to fully explain the behaviour of individuals in complex societies (Barnes, 1954; Mitchell 1969). Hence, they began to shift their attention to the study of social groups and theorized the concepts of problem-solving at group-level, and the impact of individual structures embedded in them.

Social scientists W. Lloyd Warner and Elton Mayo developed sociograms to analyze social networks. Jacob Moreno designed the famous social graphs during the study of the formation of groups and sub-groups (Moreno, 1953). He termed these artifacts as *sociograms*, and the discipline came to be known as *sociometry*. A *sociogram* aims to graphically represent the group structure between individuals in a two-dimensional space, using the nodes as a person and their relationships as linking lines (see Figure 4(a), 4(b), 4(c).

Van Zelst (1952) identified that at a workplace, employees are expected to work with their buddies at their sides than work with someone imposed by the top management. Later, George Homans unified these theories under a common philosophy and established sociometry as a robust technique for SNA (Homans, 1958).

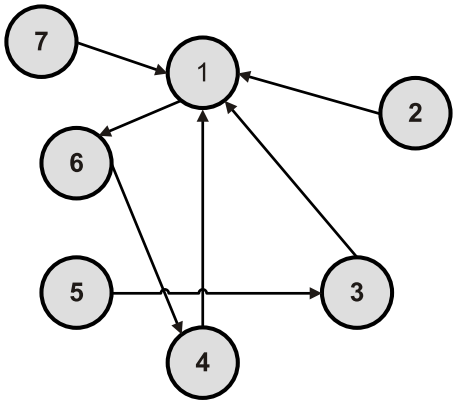
Analytical Motivation: Graph-Theoretic

Figure 4(a) Sociogram of A Cohesive Group



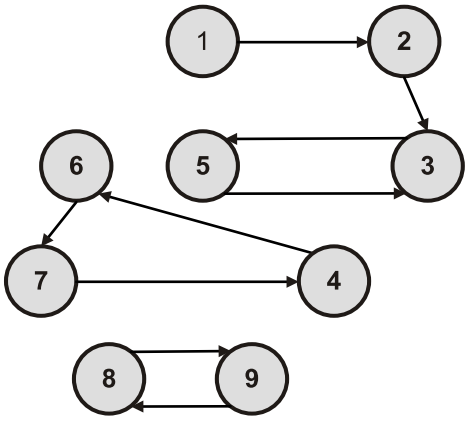
Source: Moreno, 1953

Figure 4(b) Sociogram of A Group With A Strong Leader



Source: Moreno, 1953

Figure 4(c) Sociogram of An Unstructured Group With Cliques, Isolates And Mutual Admiration Societies



Source: Moreno, 1953

Models

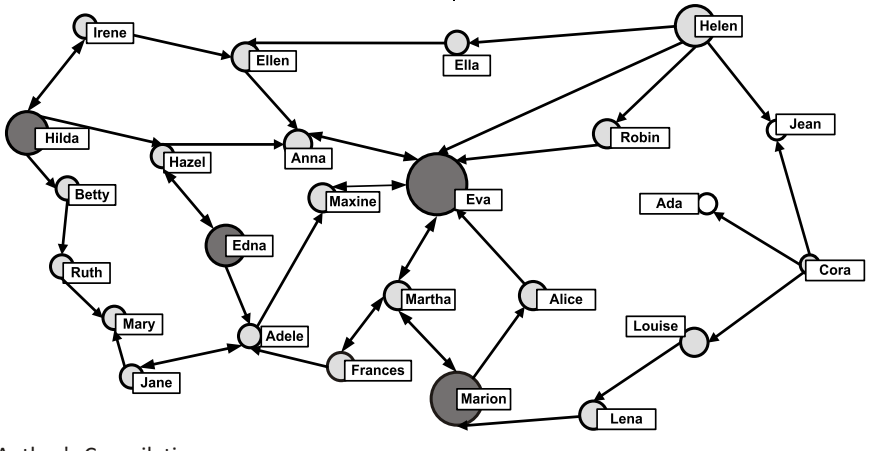
Recent applications of Social Network Theory are observed in the areas of online communities and software applications.

Often a graph is used to represent the relationship(s) between the actors in a social network, with the nodes and the edges of the graph denoting the relationship between them. With the help of graph theory, a social community network, the users and their connections (ties) can be algebraically represented in a 2-by-2 format known as the adjacency matrix. The number of links that converge into a node is known as the in-degree, and the number of nodes diverging out is known as the out-degree. Philosophically, this approach has restricted the concepts of Social Network Theory among online users within the purview of Twitter, Facebook, Myspace, YouTube, and many other applications. For example, the Google PageRank algorithm (Page et al., 1999) also employs social network theory to present the desired webpage(s) to the internet users in a fast and efficient manner.

Experiments with a Social Network

We illustrate the social network of the choice of dining-table partners among 26 girls at a New York State Training School in the 1940's. The data is available from the UC Irvine network data repository (UCI, 2006). The girls are represented by the nodes (or vertices), and the person(s) they would like to sit next (i.e., the first and second choices), are represented by the lines joining them. We used Gephi tool to plot the data in Figure 5 graphically. There are 26 girls (i.e., nodes) and 52 relationships (i.e., edges) in the network. The intensity of the grey colour and size of the node signify the in-degree and out-degree of each node respectively, such that the node (s) with a darker grey (or black) colour and larger diameter, can represent a higher in/out degree. The girl with the highest degree is "Eva" as shown in Figure 6(a) and Marion is the second highest as shown in Figure 6(b).

Figure 5 - Social Network of Dining-Table Partners Among 26 Girls At A US State Dormitory

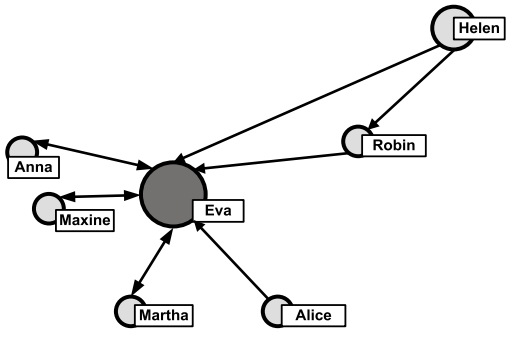


Source: Author's Compilation

Novel Applications of Social Networks

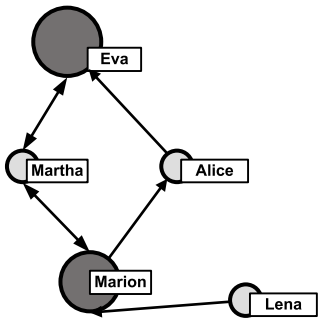
Social network analysis has become a promising technique in marketing, and healthcare, apart from economics, and psychology especially after the modern internet revolution. Recent advances of the Web 2.0 has enabled scientists to mine social network data, messages, and other media sources to gather insights from users. Thus, SNA has become a novel methodology over traditional survey methods, observation studies, and interviews, which were earlier not scalable, lacked generalizability, and faced missing data problems.

Figure 6(a) Social Network Showing the Highest Node Eva



Source: Author's Compilation

Figure 6(b) Social Network Showing the Next Highest Node Marion



Source: Author's Compilation

Application of social networks have cut down on physical sales and marketing campaigns, reduced investments, amplified word-of-mouth endorsements, and made products assortments directly accessible to the clients (Harris and Rae, 2009). They have also increased customer engagement, improved transparency among buyers, promoted cross-selling of products, and provided easy and personalized recommendations to current as well as potential buyers. SNA has helped scientists to deal with public health problems and effective policy-making, such as to analyze the spread of obesity in a community (Christakis and Fowler, 2007), adolescent tobacco use (Ennett and Bauman, 1993), drug intake, and spread of diseases during an epidemic. It also helps healthcare organizations to quickly train medical personnel, communicate in the time of crisis, (such as tweets from people stuck during Bihar and Chennai floods, mark myself safe app in Facebook), and improved services through constant feedback from the patients.

What are not Social Networks?

When we have successfully defined the realms of social networks, then we must be able to distinguish them from other entities (i.e., that are not matching the attributes of social networks). For example, when we strike

conversations with our friends, colleagues, and relatives, these do not constitute social networks. Therefore, conversations (including telephonic, verbal and even email exchanges) do not represent social network behaviour. Even though it may seem trivial not to recognize such phenomena as social networks, we must be careful to accept such instances into the scope of SNA discussion. Additionally, we often use the term networking or social networking loosely, when we meet and interact with new people at a social gathering or a conference.

What are not the only Social Networks?

As we reach towards the end of this study, we must be able to distinguish instances of social networks that we see around us in the day-to-day world and separate the clichés from the more innovative ones. Technology experts also deviate from their original views on SNAs, so much so that they have coined the term SNS (Social Network Services) and PNS (Professional Network Services) to distinctly identify them. For example, Facebook is a typical SNS, whereas LinkedIn can be categorized as a PNS.

Social Network Analysis became a popular field of study and was adopted as a lens to examine social, technological, and economic problems. But at the same time, it should not be confined to the myopic view that only specific online software serves as exemplary social networks. With a keen mind and sharp eye, we can unlock systems with social ties in a variety of application areas, which can become classical instances in the future.

References

Arendt, H. (1958). The Human Condition. *University of Chicago Press.*

Barnes, J. A. (1954). Class and Committees in a Norwegian Island Parish, *Human Relations,* 7, pp. 39-58.

Christakis, N. A., & Fowler, J. H. (2007). The spread of obesity in a large social network over 32 years, *New England Journal of Medicine,* 357(4), pp. 370-379.

Ennett, S. T., & Bauman, K. E. (1993). Peer Group Structure And Adolescent Cigarette Smoking: A Social Network Analysis, *Journal of Health and Social Behavior,* pp. 226-236.

Freeman, L. (2004). The Development of Social Network Analysis. *A Study in the Sociology of Science.*

Giddens, A. (1984). The Constitution of Society: Outline of the Theory of Structuration. *University of California Press.*

Granovetter, M. (1983). The Strength of Weak Ties: A Network Theory Revisited. *Sociological Theory,* 1(1), pp. 201-233.

Harris, L., & Rae, A. (2009). Social Networks: The Future of Marketing for Small Business, *Journal of Business Strategy,* 30(5), pp. 24-31.

Hobson, John A. (1954). The Evolution of Modern Capitalism, A Study of Machine Production. London, New York: *Allen & Unwin, Macmillan.*

Homans, G. C. (1958). Social Behavior as Exchange. *American Journal of Sociology,* 597-606.

Mitchell, J. C. (Ed.). (1969). Social Networks in Urban Situations: Analyses of Personal Relationships in Central African Towns. *Manchester University Press.*

Moreno, J. L. (1934). Who Shall Survive? A New Approach to the Problem of Human Interrelations.

Moreno, J. L. (1953). Who Shall Survive? Foundations of Sociometry, Group Psychotherapy and Socio-Drama.

O'Hagan, S. B., & Green, M. B. (2004). Corporate Knowledge Transfer Via Interlocking Directorates: A Network Analysis Approach. *Geoforum,* 35(1), pp. 127-139.

Page, L., Brin, S., Motwani, R., & Winograd, T. (1999). *The PageRank Citation Ranking: Bringing Order to the Web,* Stanford University

Scott, J. (2012). Social Network Analysis. *Sage Publications.*

Simmel G. (1903). The Metropolis and Mental Life, Oxford and Malden, *MA: Wiley-Blackwell*

Standage, T. (2014). Writing on the Wall: Social Media-The First 2,000 Years. *Bloomsbury Publishing, USA.*

UC Irvine Network Data Repository (2006), Dining-table partners in a girls dormitory at a New York State training school, Available at: https://networkdata.ics.uci.edu/netdata/html/diningTablePartners.html

Van Zelst, R. H., & Kerr, W. A. (1952). A Further Note on Some Correlates of Scientific and Technical Productivity, *The Journal of Abnormal and Social Psychology,* 47(1), pp. 129-138.

HR Issues in Indian Start-ups

Soni Agrawal*

Abstract

Indian economy has witnessed positive sentiments towards technology supported innovative entrepreneurial firms over the last few years. India has become a home to a new breed of young start-ups, and currently is the third largest tech start-up location in the world. In most of the start-ups, employees are treated as partners. Start-ups provide unique and exciting atmosphere to employees. However, attracting right persons and retaining them later, is an all-time challenge. In general, liability of newness and smallness leave new venture firms with fewer resources and greater challenges for the companies. Human resource related matters appear to be rather tricky with these firms. Thus, the article presents a qualitative analysis of such issues and challenges faced by the start-ups.

Key Words: Start-ups, innovative strategies, HR issues and challenges

Introduction

Indian economy has witnessed positive sentiments towards entrepreneurial and technology supported innovative companies over the last few years. These sentiments are supported by Government's key initiatives such as Digital India, Make in India, Start-up India and Skill India, which have generated a lot of excitement in the industry circles. Department of Industrial Policy and Promotion (DIPP), Government of India, issued guidelines and the definition of a start-up, and announced some relaxations for them. The definition of start-up is that it must be working towards innovation, development or improvement of products or processes or services. Or it must have a scalable business model with high potential employment generation or wealth creation capacity. However, if an entity is formed by splitting up or reconstruction of an existing business then it shall not be considered a 'start-up'. In the revised guidelines, a private company till 7 years from the date of its registration will be considered a start-up. However, as per earlier guidelines a company was considered a start-up only up to 5 years from the date of its incorporation. Moreover, in the case of a start-up in biotechnology sector, the period is kept up to 10 years to be considered for being termed as start-up. The start-up's turn over limit is now kept up to ₹25 crores. These start-ups can claim 100 per cent tax exemption on profit for three years since their inception. The

**Associate Professor, International Management Institute Kolkata*

services provided by a number of Indian start-ups are backed with latest technology.

The start-up ecosystem was best developed earlier in the USA, which is home to many start-ups followed by the UK. India is developing fast and emerging as the third largest base for start-ups in the world. India has been one of the fastest growing start-up ecosystems in the world and total number of technology product/digital start-ups are projected to be 11,500 by 2020, employing over 2.5 lakh people from just 65,000-75,000 in 2014 as mentioned by Mr. Ravi Gururaj, Chairman of Nasscom Product Council (NASSCOM, 2016 and NASSCOM 2018). The start-up ecosystem attracted 300 venture capital/private equity and 225 angel investment deals worth over US$2.3 billion since 2010. These figures are quite encouraging and speaks a lot about a developing economy like India.

As per The Hindu (2018), top start-ups from India include the names of OYO Rooms in hospitality sector, headquartered in Gurugram, Cure Fit from Bengaluru in wellness services, Dunzo, a service app company by Google in Gurugram, Rivigo, a delivery service company from Gurugram, Digit Insurance, an online digital insurance company, and Little Black Book, a blog writing on different aspects, etc. More than 880 companies could get the venture capital funding in the first half of 2015 alone. Baron (2004) mentioned that new ventures started by entrepreneurs offer a 'unique and potentially valuable business context for testing the principles and theories of HRM.' Although, there are some signs reflecting a positive scenario in terms of fund-raising by these start-ups, getting and retaining the right talent is an all-time challenge for them.

State of HR in Start-ups

Start-ups have advantages as well as disadvantages. The advantage of smaller size and newness is that they do not need to have stringent policies and structures, thus are more flexible. At the same time, they often tend to neglect alignment between their mission and employee's career aspirations, which leads to disengagement. Also, disruptive and dangerous employee turnover is a critical issue all the time.

These start-up initiatives generally are taken by young persons, who have a lot of enthusiasm and innovative ideas. These young founders do have talent, but not necessarily the required experience. Moreover, it was found that these organizations work differently in comparison to big organizations. HR practices in start-up firms are different from established and big organizations. These firms face difficulty in attracting talented employees and recruiting employees of their choice is always a challenge for them (Williamson et al., 2002). Moreover these companies often lack formal HR policies and procedures (Markman and Baron, 2002). In general, liabilities of newness and smallness leave new ventures with fewer resources and greater challenges than the established

counterparts (Stinchcombe, 2000). These start-up founders face a dilemma of 'head vs. heart', when they have to make a decision. Founders usually like to follow their gut and intuition - the 'heart', which at times lead to incorrect decisions. In addition, in start-ups, the HR department is generally not a separate department, rather HR work is outsourced or left as a part-time job. As a result, integration or building up of unique culture with employees having similar mindset becomes a tricky job. At the same time, when these organizations create a separate HR department, its first priority usually becomes hiring employees as quickly as possible, rather than having a focus on culture and values. The example of Uber demonstrates that ignoring HR issues is a shortcut to increase speed, but there is a risk of creating a culture that ultimately derails business, and costs the company even more with extra time and energy. Key findings from a recent study by Behera[1] (2018) in which he collected data from a number of senior HR and cross-functional executives reflected that around 42 per cent executives thought that employee growth and development are the main challenges for their companies. 48 per cent of employees admitted that they do not feel comfortable voicing issues with their bosses during formal performance reviews. Millennials[2], who are the backbone of many such start-ups are also not comfortable with sharing their concerns with their seniors, as 54 per cent of them expressed their discomfort about talking to their seniors. Further, most of the employees are not motivated and they lack understanding of clear vision and strategy of the firm. They found that the response and the support from HR is generally very slow or it takes a lot of time in processing their applications. In general, processes are either time-consuming or cumbersome and see little hope even in future. The respondents in the study suggested a fast performance review process and an ongoing feedback mechanism on the real time basis. They added that in a start-up scenario, proper and effective communication is must for faster growth. The suggestions as listed above pointed out that there is a need for introspection. Also, the unique culture of start-ups need to be restored for becoming successful in today's competitive environment.

HR Planning and Hiring

Bamberger et al. (2002) found in their research that most of the owners and managers of the high technology start-up firms do not pay much attention on HR Planning (HRP). Also, they do not want to have a long term planning for these firms because of the uncertainty towards survival. That is why HRP literature focuses on Fortune 500 firms or large firms. Butensky and Harris (1983) studied start-up firms with

[1]The study is now available online free in the form of recorded webinar as well

[2]A person who reaches young adulthood in the early 21st century are referred as Millennials

respect to the usage of HRP. In their study they found that out of 27 firms, 12 firms do see the need for HRP and the remaining 15 firms do the routine works that hardly qualify the definition of HRP or succession planning. At the same time, most small businesses do not have formal HR departments (Aldrich and Von Glinow, 1991).

Small firms also extensively consider non-instrumental factors in their hiring including the norms, values, and beliefs of the organization (Williamson, 2000; Williamson et al., 2002). Person–organization fit is often been found to be an important factor in the selection decision (Chatman, 1991). Often the managers focus on the applicant's competencies to match the general organizational needs, rather than specific job requirements (Heneman et al., 2000). At the same time, some companies had mentioned that they are not bureaucratic and are able to successfully recruit employees based on their informal, empowered approach to work.

Organizational Culture

Regarding the culture of the start-ups, it was found that the atmosphere is informal in such organizations and bureaucratic approach is less. At the same time, each organization, whether it is small or big, has clearly defined legally defensible policies and procedures that govern the workplace. A company, which is in its initial stage of set-up, may not have policies and procedures in place, but other companies generally do take the pain or responsibility of developing an employee handbook. This handbook with HR policies and procedures must receive proper legal review to protect the company from liability. According to Rubenstein (2004), HR function is full of complex tasks, which might seem very simple but actually puts together all the things like "organizational puzzle pieces."

The other important role of HR lies in building supervisory structure. This type of understanding is important as it helps in building smooth and cordial relationship between an employee and the immediate supervisor which in turn assists in building and developing employee excellence. This relationship supports and brings optimum employee relations, provides credible and timely feedback to employees, and assists in developing employees' skills. In a start-up mechanism, the role of the leader or the founder becomes very crucial, specifically his or her leadership (Vecchio, 2003), self-efficacy, perseverance, risk-taking ability, and role transitions that they experience during venture emergence (Johnson and Bishop, 2002).

Job Roles

The start-ups treat their employees as partners. These employees are also expected to go beyond their defined roles and responsibilities. These employees end up working on different areas, which not

necessarily is part of their job description or were asked to do at the time of hiring. The work culture is informal, less hierarchical and strict job roles are not practiced. These employees possess a variety of skills or acquire such skills over a period of time. Employers work hard to hire and train these employees as their requirements are niche and keep on changing.

It is seen that in start-ups, a comprehensive description of different tasks is mostly not available. Job descriptions serve as a blueprint for an employee, which give details about job expectations and responsibilities, thereby providing a plan of action. As many start-up organizations do not pay much attention to job descriptions, it is a costly mistake. Lack of clearly defined roles, leads to ambiguity, and it becomes difficult later by the managers to assess the work done by an employee. Thus, there should be some well-defined roles and responsibilities available to each employee before even joining the organization.

Career Development and Retention

The other aspect is related to development, which helps employees in supporting and building their career. The approach leads to coaching and mentoring employees in taking better decisions as how they can proceed in their career. It helps in unleashing employee potential recognizing special talent. This approach is applicable to both the high performers as well as low performers. This also leads to productivity maximization of employees, enhanced satisfaction and better retention.

Retention of human capital is very critical for the success of these startup firms (Deshpande and Golhar, 1994). But attracting talent, remain always a challenge for them. Moreover, with booming economy, many multinational companies require talented employees and they do have the capacity to pay higher salaries. As these infant firms are unable to pay higher salaries, it ends up in shortage of talented employees for their key roles 25 per cent of small businesses view lack of qualified workers as a threat not only to their plans to grow and expand, but more importantly for their survival as well (Mehta, 1996). These employers often lose their employees to competitors or larger corporations. In many a cases, employees see better job security with established companies, and like to work for Fortune 500 companies.

Performance Review and Rewards

The other important aspect is related to performance review, where HR plays a very important role. Performance review of and communication to not only high potential employees but also low performers is very critical. High potential employees expect a lot of recognition and incentives for services provided by them. At the same time, for low performers, it is needed that the message is communicated to them without hurting them along with the detailed and clear objectives for the coming year. Behavioural psychologists

suggest that one should strive for praises before each criticism. Each and every aspect of the performance should be discussed in detail for ensuring an adequate progress.

Typically, it is seen that managers are good in providing support as far as the technical side of the work is concerned; however, it becomes difficult for them when it comes to other areas such as providing constructive feedback, coaching and mentoring, and providing support in terms of development. There are many cases where managers struggle as how to communicate a negative feedback. The role of HR is more appreciated, when it helps employees in their development. Thus, a solid supervisory framework helps in opening the doors for HR to be on the executive table to provide strategic business leadership.

Many companies at their start-up phase struggle for liquidity issues. In the initial stages, these companies work on smaller profit margins. These companies thus, are not able to pay hefty amount as cash components to their employees in comparison to the established ones. Thus, a list of employees finds themselves as under-compensated. Here, the importance of rewards and recognitions play a very important role. These companies can attract and retain highly talented employees if they are able to provide them challenging work and decision making authorities. When these employees realize that they are able to make a substantial difference in the company, they feel motivated for putting extra efforts. Moreover, a kitty of benefit plans which they really value, works well than a fat pay cheque.

Training

One of the core competencies of all HR practitioners is training. Although, not all HR professionals possess the level of skills necessary to provide the required training, HR still plays a pivotal role in ensuring that managers and employees have access to relevant skills and know-how that help them in understanding the present trend and capacity of making wise and timely decisions. Moreover, training schedule should be designed as per the recent requirements of the organization with equal emphasis on soft skills. More focus should be given on effective communication, team building, management skills, interviewing skills, and awareness on laws related to sexual harassment.

Conclusions and Suggestions

It is observed that start-ups in India have a positive environment in terms of Government support, ecosystem, and availability of young, enthusiastic and talented people. Although, these firms do have lots of issues and challenges, including HR issues, the present discussion shows that these challenges seems manageable. Careful attention and understanding of these aspects are very important in the organizational context. With time, experience, and knowledge sharing among industry circles, customized solutions of these unique challenges can make the task

easier and possible. India, being a price sensitive market, cultural issues associated with risks and dealing with failures have prohibited them from venturing out with an entrepreneurial spirit as people are conscious about risks and rewards. In addition, not everyone is flexible enough to work in a start-up. Hence, the role of HR in managing fair employee relations, with consistent, and equitable treatment to employees is vital for their organizations.

References

Aldrich, H., & Von Glinow, M. A. (1991), Business Starts-ups: The HRM Imperative, In S. Subramony (Ed.), *International Perspectives on Entrepreneurship Research,* Vol. 18, pp. 233–253, New York: Elsevier Publications.

Bamberger, P., Dyer, L., & Bacharach, S. B. (2002), "Human Resource Planning in High Technology Entrepreneurial Startups", *Human Resource Planning*, Vol. 13(1), pp. 37–45

Baron, R. A. (2004), "The Cognitive Perspective: A Valuable Tool for Asking Entrepreneurship's Basic "why" Questions", *Journal of Business Venturing,* Vol. 19, pp. 221–239

Behera, R. (2018), *The Growth Divide,* Reflektive, accessed on 29th May 2018 from https://www.reflektive.com/growth-divide/

Butensky, C., & Harris, O. (1983), "Model versus Reality: An Analysis of Twelve", *Human Resource Planning,* Vol. 6, pp. 11–24

Chatman, J. A. (1991), "Matching People and Organizations: Selection and Socialization in Public Accounting Firms", *Administrative Science Quarterly,* Vol. 36(3), pp. 459–484

Deshpande, S. P., & Golhar, D. Y. (1994), "HRM Practices in Large and Small Manufacturing Firms: A Comparative Study", *Journal of Small Business Management,* Vol. 32(2), pp. 49–56

Heneman, R. L., Tansky, J. W., & Camp, S. M. (2000), "Human Resource Management Practices in Small and Medium-sized Enterprises: Unanswered Questions and Future Research Perspectives", *Entrepreneurship Theory and Practice,* Vol. 25(1), pp. 11–26

Johnson, D. E., & Bishop, K. (2002), Performance in Fast-Growth Firms: The Behavior and Role Demands of the Founder throughout the Firm's Development, *Advances in Entrepreneurship, Firm Emergence and Growth,* Vol. 5. Eds. J. A. Katz and T. M. Welbourne. New York: Elsevier, pp. 1–22

Markman, G. D., & Baron, R. A. (2002), Individual Differences and the Pursuit of New Ventures: A Model of Person-Entrepreneurship Fit, Katz, J. A. & Welbourne T. M. (Eds.), *Managing People in Entrepreneurial Organizations,* Vol. 5, pp. 23–54

Mehta, S. N. (1996), Worker Shortages Continue to Worry about a Quarter of Small Businesses, *Wall Street Journal,* June 27

NASSCOM (2016), *Start-Up Report - Momentous Rise of the Indian Start-Up Ecosystem,* accessed on 10th September 2017 from https://www.nasscom.in/knowledge-center/publications/start-report-momentous-rise-indian-start-ecosystem

NASSCOM (2018), *Catalysing the Ecosystem for A Trillion Dollar Digital Economy,* February 10, accessed on 12th December 2018 from https://www.nasscom.in/sites/default/files/NASSCOM-annual-guidance-fy-2018.pdf

Rubenstein, B. (2004), "Ten Elements of a Successful HR Start-up—Getting Back to Basics," *Employment Relations Today,* Vol. 31(3), pp. 33–41

Stinchcombe, A. L. (2000), "Social Structure and Organizations," *Advances in Strategic Management*, Vol. 17, pp. 229–259

The Hindu (2018), *Top Indian Startups on Hiring Spree: A Report,* accessed on 12th September 2018 from https://www.thehindu.com/business/Industry/top-

indian-startups-on-hiring-spree-report/article 21274852.ece

Vecchio, R. P. (2003). "Entrepreneurship and Leadership: Common Trends and Common Threads", *Human Resource Management Review,* Vol. 13, pp. 303–327

Williamson, I. O. (2000), "Employer Legitimacy and Recruitment Success in Small Businesses", *Entrepreneurship Theory and Practice,* Vol. 25(1), pp. 27–42

Williamson, I. O., Cable, D. M., & Aldrich, H. E. (2002), Smaller but not Necessarily Weaker: How Small Businesses can Overcome Barriers to Recruitment, J. Katz, & T. M. Welbourne (Eds.), *Managing People in Entrepreneurial Organizations,* Vol. 5, pp. 83–106

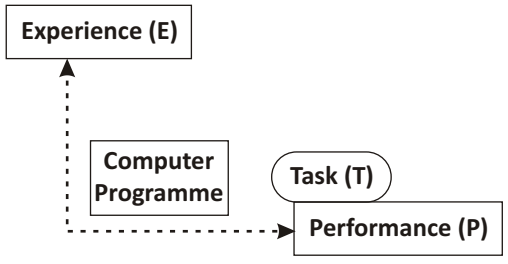
Artificial Intelligence and Machine Learning

1. What is Machine Learning (ML)?

The general idea about Machine Learning (ML) can be traced back to 1959 with the approach proposed by Arthur Samuel, one of its pioneers. He defined ML[1] *as the field of study that gave computers the ability to learn without being explicitly programmed*.[2] In his IBM days, Arthur Samuel developed a computer programme that could play checkers game better than him. Machine Learning was developed as a subset of Artificial Intelligence that enables computer programmers to develop applications more lucidly. In 1998, Tom Mitchell, another well regarded machine learning researcher, added to the definition, and stated that *a computer program is said to learn from experience E with respect to some task T and some performance measure P, if its performance on T, as measured by P, improves with experience E.* Figure 1 represents this concept graphically.

For example, a financial organization wants to detect credit card frauds for its existing customers. Based on the classical definition of ML presented in Figure 1, the primary task T of the system will be to identify whether a given transaction is good or bad successfully,

Figure 1. – A Computer Program Gains Experience (E) to Perform A Machine-learning Task (T) At A Specific Performance-level (P)



Source: Author's Compilation

and if possible, count the number of fraudulent transactions. The performance measure P for the ML task T is provided by the proportion of F within the total transactions. The fraud detection system learns through experience E, which has been built with the knowledge set of previous transactions. The experience was gained with time and through numerous iterations of the task, where transactions were successfully identified as good or bad. Therefore, the choice of P is crucial for an ML task.

2. What is Artificial Intelligence (AI)?

Artificial Intelligence involves the development of machines which can

[1]Machine Learning is referred as ML in this article hereafter

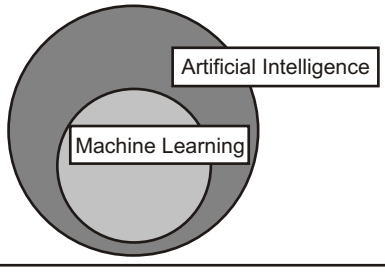
[2]Wiederhold G & McCarthy J (1992), Arthur Samuel: Pioneer in Machine Learning, *IBM Journal of Research and Development*, Vol 36 (3), pp.329-331

accomplish tasks that would otherwise need human aptitude. Typical examples of AI[3] tasks include natural language processing, voice command recognition, and image identification. AI has a presence in driverless cars, Google Voice commands, auto-complete action in emails, and many more real-life activities. AI can be broadly categorized into two parts, *weak AI* and *strong AI*. Weak AI can respond to situations but cannot think for themselves whereas machines with strong AI can think and act just like human beings. In reality, most instances of AI are weak AI, and rarely any strong AI can be found. In 1965, Herbert Simon the founding father of AI, stated that *machines would be capable of doing any work a man can do.* This event was the stepping stone towards developing the concept of AI[3]. Some relevant examples of AI are visual perception, speech recognition, decision-making and translation between languages.

3. What is the Difference between Artificial Intelligence and Machine Learning?

In today's world, AI and ML are the buzzwords, and often they are used interchangeably. However, these two concepts are not the same. Machine Learning can be defined as a subset of Artificial Intelligence. AI is a broader concept than ML which signifies that machines can carry out tasks that typically require human knowledge. ML states that machines are given access of data, and they learn the techniques on their own. The emergence of ML has come after two significant breakthroughs - one is the idea that machines can learn by themselves (Samuel, 1959[4]), and the other is the evolution of the internet and the wave of *big data.* Big data usually refers to large and complex data sets which the traditional data processing techniques find quite difficult to deal with. However these data sets being exceptionally valuable from the point of view of the vast information hidden within, it is creating a new generation of decision support data management system. Grover et al. (2018) put forth that the market of big data technology and services is expected to grow at a 23.1 per cent compound annual rate, reaching $48.6 billion in 2019[5].

Figure 2. – Artificial Intelligence and Machine-Learning Disciplines



[3] Artificial Intelligence is referred as AI in this article hereafter

[4] Arthur Samuel is most known within the AI community for his groundbreaking work in computer checkers in 1959, and seminal research on machine learning

[5] Grover, V., Chiang, R.H.L., Liang, T-P & Zhang, D. (2018). Creating Strategic Business Value from Big Data Analytics: A Research Framework, *Journal of Management Information Systems,* Vol. 35 (2), pp. 388–423.

Further, the development of *neural networks* has propelled the faster emergence of AI. *Neural networks* were built to emulate human brains and neurons, hence the name. E.g. ML applications can read the text, and also can understand whether a statement is a complaint or a compliment.

4. How can Artificial Intelligence be useful for real world applications?

With increasing data availability, AI is now being used to solve real-life business problems and will be used to drive tangible business value for a wide range of industries. Often it will be useful for firms to look at AI through the lens of business capabilities rather than technology alone. Examples of AI include visual perception, speech recognition, decision-making, and translation between languages, self-driving cars, and humanoid robots (such as ASIMO and Boston Dynamics) among many others. AI can support three critical business needs: automation of business processes, gaining insight through data analysis and engaging with customers and employees.

5. What are the primary types of Machine Learning?

Machine Learning tasks are typically classified into three broad categories:

a. Supervised learning: Here, the machine learns by the experience gathered from the input data that is appropriately labelled (i.e., predictors and target/outcome variables are known apriori). The algorithm iterates until it achieves a desired level of accuracy.

When to use: Abundant labelled data is available.

Common Algorithms: Simple Regression, CART (Classification and Regression Tree), Random Forests, Naïve Bayesian Classifiers, Support Vector Machines.

b. Semi-supervised learning: The machine learns through an iterative training exercise, due to the scarcity of labelled data records.

When to use: Labelled data is hard to get in the public domain, Natural Language Processing.

Algorithms: Self-Training Algorithms; Transductive Support Vector Machine (SVM), Graph-based Algorithms

c. Unsupervised learning: Here, the machine cannot learn from the data because there are no target/outcome variables at all. This scenario is also known as non-labelled data. This type of techniques are particularly used for clustering, customer segmentation into different groups. Often researchers apply unsupervised learning to identify the best predictor/variables(s)

When to use: Labelled data is hard to get in the public domain, Sentiment Analysis of Social Network Messages.

Algorithms: Clustering, Association Rule Mining.

d. Reinforcement learning: Machine is exposed to an unknown environment and learns by trial and error method. Data (in the form of rewards and punishments) are given only as feedback to the programme's actions, such as driving a vehicle or playing a game against an opponent.

When to use: Dynamic or approximate dynamic programming; the only way to collect information about the environment is to interact with it.

Algorithms: Markov Decision Process, Monte Carlo Methods, State–action–reward–state–action (SARSA).

6. What are the risks associated with Artificial Intelligence?

While Artificial Intelligence has come a long way in accomplishing many technological goals, the risks associated with it are many and may turn evil. Researchers are not sure about the timeline by which AI may become super-intelligent and overpower humans. Most of them are assuming that human-level AI will happen before 2060 and if the projection is correct, it is high time we are aware of the probable malicious effects of AI on humankind. The worst fear of robots taking control over human by sheer use of Artificial Intelligence was accepted by Stephen Hawkins who claimed that "the development of full artificial intelligence could spell the end of the human race." The narrow AI system that is operative across the board is designed to outperform human intelligence, but researchers are striving to develop general AI that will be powered to beat every human cognitive task. If that is being achieved, AI may develop a destructive method of making its goals as human's desire and machine's target is almost impossible to align fully. Further, as intelligence enables controls, it is also a matter of debate whether in the long run machine will control over a human.

7. What are the Ethical Challenges associated with Artificial Intelligence?

As pointed out by Peter Norvig, Director of Research, Google, and one of the pioneers of Machine Learning, "the challenge now is to make sure everyone benefits from this technology.[6]" Researchers are trying to enhance the reach of AI to every one of the society including the bottom of the pyramid while trying to ensure that its advantages will not remain restricted only to the niche section of society. The software on which AI is based is often complex and difficult to understand, and hence the scrutiny needed for ethical acceptance of any software remains undone most of the time. This step reduces the moral dimension of a machine learning process or artificial intelligence, in due course of time which may pose a grave risk in the future. Further, without any standardized safety test,

[6]"Why the Biggest Challenge Facing AI is an Ethical One", BBC Future Now, 2017, http://www.bbc.com/future/story/20170307-the-ethical-challenge-facing-artificial-intelligence

policymakers remain suspicious to implement this technique on a mass scale.

The biggest ethical challenge, however, lies in the issue of machine replacing workforce and the question of tackling jobless economic growth. Whether increasing automation will lead to a spurt in unemployment is questionable. But at the same time, there are also evidence from countries like Germany or China where robots are working alongside human and even have already replaced large-scale workforce.

8. What are the open questions that Artificial Intelligence poses today?

a. Machines will rise to the extent that it will be smarter than a human being with too much power and control. The machine will dominate the planet with benevolence or malevolence.

b. Robots, which run on digital computers are assumed to have no subjective awareness and thus cannot understand qualitative perspectives. But, if general AI is developed, it may happen that the robots will "behave" like human without having any "sense."

c. Understanding ourselves well enough to build intelligent machines is an essential but highly debated criterion to achieve the next level of Artificial Intelligence. Replicating ourselves need a perfect understanding of the human brain's functioning and delivering Artificial Intelligence up to that mark is especially a tricky task faced by researchers.

d. As robots now get citizenship which ensures personhood, it is also questioned whether they have human rights.

International Management Institute Kolkata
2/4C, Judges Court Road
Alipore, Kolkata 700027
Telephone: +91 33 6652 9658
website: www.imi-k.edu.in