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## Content

Practice-oriented Insights on Creative Problem Solving

**Sanjay Dhir 5-7**

Convergence of Micro-finance and GP level Community  
Enterprise Systems to Protect Interests of Vulnerable Farmers

**Amar KJR Nayak 9-17**

Bore Wells Vs. Open Wells: Water Crisis and  
Sustainable Alternatives in Kerala

**Rose Mary George 19-28**

Representation of Women on Boards of IT Companies:  
An Indian Story

**Kamal Kishore 29-36**

TMT Characteristics, Time-to-IPO and Firm Performance

**Rajeswararao S. Chaganti, Monica A. Zimmerman,  
Arun Kumaraswamy, Patrick Maggitti, Janine Black Arkles 37-56**



## Practice-oriented Insights on Creative Problem Solving

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### **Abstract**

This paper is based on an interview with Prof Sanjay Dhir of Department of Management Studies, Indian Institute of Technology (IIT) Delhi as part of Academic Interface series being launched with this issue. Prof Dhir heads the GIFT School of Strategic Alliances Management. He is a Fellow of the Indian Institute of Management (IIM) Lucknow. Earlier he has worked at Mahindra and Mahindra Ltd (Automotive), R&D Department, Nasik for three years. His major areas of interest are Strategic Management, Joint Ventures, Innovation Management, Management of Change and Transformation, Implementation Strategy and International Strategy. Prof Dhir teaches Creative Problem Solving, Management of Innovation, Strategic Management, etc. In this interview, he provides practice-oriented insights on creative problem solving which are equally useful for both academics as well as the practicing managers.

**Keywords:** Creative Problem Solving, Management Graduates, India

### **How the concept of Creative Problem Solving has evolved over time?**

'Problems' have been in existence since the origin of mankind. Individuals faced problems in their day to day life which were tackled using ad hoc personal methods. With the advent of businesses, problems evolved to a more structured form affecting different dimensions of business. Initially, these problems were solved using structured solutions that were scientifically developed. However, with the continual evolution of the businesses, problems turned complicated, unstructured and unique in form. Each business problem required individual and unique solutions. Further, the solutions had to be developed quickly owing to considerable influence of the problem on business operations. To tackle complicated and unique problems quickly required 'creativity' leading to the term 'Creative Problem Solving' (CPS).

Research on CPS originated in the behavioural sciences which was further gradually taken up by management researchers who realized that business problems are more complex than individual level problems. Soon, many processes and cycles for CPS were developed which could be directly adopted, customized to your problem setting and the applied to solve specific problems. Alex Osborn, regarded as 'father of brainstorming', in 1953 structured a seven step process for creative problem solving. Other prominent researcher of CPS was psychologist Sidney J. Parnes. Both Osborn and Parnes have extensively studied CPS from multiple dimensions. The multiple other researchers have studied CPS specifically from their respective areas.

CPS as a field has evolved through time and currently is being linked with Innovation. Businesses across the world are turning their problems into opportunities. CPS is not only considered useful for problem solving rather it is being treated as a way to tap new opportunities. Path breaking ideas pursued by

entrepreneurs may be attributed to CPS only, be it e-retailing, wallet services, travel or any other industry. Take the case of 'Splitwise', an app solves a very basic problem of money management in groups is being solved. However, it is a business opportunity identified by the promoters of the firm.

### **Why is it necessary to adopt creative problem solving in place of traditional one to resolve issues at the workplaces?**

Modern workplaces are very complex and dynamic in nature. Structured problem solving techniques may be futile in such an organizational setting. To deal with modern workplace problems in an agile and economic way requires out of the box thinking which is facilitated by CPS. CPS encourages managers to think broadly beyond the usual solutions for problem. Furthermore, CPS can deal with ill structured problem, which is spread across multiple business functions in an organization. In organization, CPS is used as a group function than an individual function which facilitates participation as well as varied thoughts on a matter. This supports modern day business outlook of collective work among employees. Furthermore, in comparison to the traditional method of problem solving, CPS provides freedom to managers in the process of problem solving and enables them to go a step beyond conventional wisdom to analyze and understand the problem.

### **How can organizations develop collective competencies in creative problem solving?**

CPS process is a group process requiring inputs from all the people who participate in it. A single individual may not be able to leverage CPS process completely and such a process may not be termed as CPS too. Individual may be trained on group behaviour through a CPS process. There are many CPS techniques that foster development of collective competencies. For instance, 'Six thinking hats' is a very well-known CPS technique which is used by many organizations to stimulate thinking. This technique was even used by erstwhile Indian Cricket team Coach Greg Chappell to inculcate lateral thinking capabilities, simplicity in problem solving as well improve communication. Moreover, the tool lays emphasis on personal emotions, control and above all creativity.

### **What are the challenges in fostering creative problem solving among employees in various organizations?**

CPS is a contemporary tool for problem solving. Application of CPS is negatively influenced by the organizational culture and the type of leadership in organization. Leaders in an organization are flag bearers for instilling CPS in its activities as well as responsible to involve people in the process. Organization culture, specifically in India, may cause impediments in the successful implementation of CPS in organization. Traits like Bureaucratic regime, top down decision making, power distance and uncertainty avoidance observed widely in Indian organizations may not support the successful use of CPS. Moreover, individual employee beliefs and attitude shall shape the effective utilization of CPS in an organization. Being a group activity, it may be quite difficult for an organization to successfully implement CPS across different levels of an organization. Conducive organizational culture, leadership style and employee attitude may facilitate fostering creative problem solving among employees in organization.

### **How creative problem solving can be inculcated in aspiring managers in Indian context?**

CPS as a process may be inculcated in aspiring managers by providing them adequate knowledge and practical training during their graduation and post-graduation level education. Majority of the prominent business schools in India have CPS subjects as part of Strategic Management or General Management course curriculum. This subject needs to have more of practical exposure to students than appraising them theoretically. Concerned faculty must focus on explaining the theory with practical

examples as well as guide students in applying them in different real business problems. CPS is an applied area, therefore due credit must be given to practical importance and application while training aspiring managers.

Organizations must also nurture entry level managers to think beyond the usual work and involve them for decision making in their work domain.

**How do you visualize creative problem solving as critical competency in near future, both in Indian and global contexts?**

Importance of CPS shall be evident as progress along time. With evolution, the kind of problems that businesses may face shall change manifolds. The problems may be characterized by enormous complexity and abstract nature. In such a scenario, CPS may be the key to solve problem. Moreover, the real gain from CPS as a competency may be derived from its utility of as a way to innovate and tap opportunities. Intense competitions have driven organization to act till its limits. The next step is to innovate, creativity may be first step to it. To identify business opportunities from problems faced by other businesses and market may be the key to sustain in the future.

In the Indian context, with the growing number of multinational firms in the market, the incumbent domestic and indigenous firms may have to act creatively. Business dynamics based on price and quality may not provide competitive edge. Indian organization need to think afresh and tackle their threats and problems for which CPS would be a handy tool.

In the Global context, most industries are saturated in developed nations. To sustain business in such a situation may be challenging to businesses.



## **Convergence of Micro-finance and GP level Community Enterprise Systems to Protect Interests of Vulnerable Farmers**

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### **Abstract**

This perspective paper discusses whether Microfinance in India achieved the twin objectives of (a) freeing the resource poor from being dependent on the local sahuakar; who not only lends credits but also provides multiple services at the door step of rural poor and (b) graduate from credit transactions to credit-saving-business transactions. The article argues that despite the various institutions of credit and micro finance, the poor seems to be locked up with local sahuakars and has rather become more vulnerable today. The institutional structure of SHG-Bank linkage, credit cooperatives and other microfinance structure have not been able to graduate from credit to business transactions. Further, the present credit institutional arrangement has not been successful in getting the poor to invest their small surplus in banks. This perspective paper explores on how the Farmer Producer Organizations (FPOs) could resolve both these issues in India if the microfinance function were to be converged with optimally designed cluster based Community Enterprise Systems (CES) at Gram Panchayat level.

**Keywords:** Microfinance, SHG-Bank Linkage, Village Sahuakar, Farmer Producer Organization, Investment options of poor, GP level optimally designed CES

### **Introduction**

Non availability of credit to rural poor and very high cost of credit from the local money lenders and sahuakars led National Bank for Agriculture and Rural Development (NABARD) to conceive the micro credit system through the Self Help Groups (SHGs) in the nineties. It helped poor women and household to come out of the credit traps. Following the successful innovation of SHG by NABARD, the Government of India adopted the Swarnajayanti Gram Swarozgar Yojana (SGSY) that lead to widespread replication of the micro credit model in the last over 20 years. Subsequently, many more development agencies, micro finance institutions joined and made it a mass movement. By the end of year 2015, NABARD plans to link nearly 92 million households in India through nearly 7.2 million SHGs under the SHG Bank linkage programme ([www.nabard.org](http://www.nabard.org)).

However, in the recent years, several issues have emerged in the microfinance sector in India. Most strikingly, the loan outstanding of the SHGs has been increasing and there has been a decline in the total number of SHGs in the country (Nair & Tankha, 2013, CCRD-LBSNAA, XXX). With high interest arbitrage between industrially advanced countries and rural India, the foreign financial institutions also began to add to the huge growth of sector but the bubble burst within a few years.

Over the years, several innovations have been attempted to improve timely delivery, credit quantity, repayment capacity, bank saving and overall social impact of micro credit to the rural poor in India. In order to facilitate micro saving, the Banking Correspondence (BCs) were introduced; performance of which has been poor till date (Nair & Tankha, 2013). Similarly, technology enabled credit and saving though is a great attempt, it has changed the situation for the rural agricultural poor. The national drive to create new bank accounts of the poor has been successful; but the transactions through these accounts do not exhibit the success. Further, formation of smaller banks to serve the needs of the rural poor has been undertaken. How would these resolve the issues of access, timely delivery, transaction cost of credit service, saving in banks by the poor, etc.; is not clear. The long time experience of Cooperative Banks and Regional Rural Banks do not seem to have solved these problems.

Micro credit through SHG-Bank Linkage programme has surely broken the dominance of local money lenders and sahuikars in rural India. However, has this removed the dependence of rural poor on the local sahuikars or do the sahuikars continue to exploit the rural poor? In other words, have the government interventions disabled the competitive structure of the local sahuikars? Are some fundamental dynamics of credit and saving of rural poor not fully captured in the various innovations that have been attempted so far? Further, have we fully deciphered the micro saving or investment options of rural poor or has there been a mismatch in the micro saving products offered by banks and the needs of the rural poor? Let's look at (a) expenditure pattern and sources of credit at times of distress of the poor and small farmers, (b) competitive structure of microfinance at the village level and (c) preferred saving and investment options of the poor in rural agricultural settings to be able to make sense of the situation and consider better policy options for the future.

### Expenditure Pattern and Sources of Credit under distress

Based on a three district survey (Nayak, *et al* 2015) of 2100 farmers in both irrigated and rainfed clusters, it has been observed that farmer families spend the most for food that is nearly 30%. The second most critical expense incurred by farmer families is on agriculture amounting to 28%. It is interesting to note that while farmer families spend 10 % more in agriculture than that of farmer families in rainfed clusters, farmer families in rainfed clusters spend nearly 10% more in food than families in irrigated clusters. Other consumption expenses include clothes & house maintenance, health and education of children. These together make about 35% of the total expenses incurred by farmer families across the irrigated and rainfed clusters. Please see table below for the details.

Farmer Family share of total expenses for different purposes in Different Agricultural Settings								
Agricultural Setting		AGRICULTURE	FOOD	CLOTH & HOUSE	HEALTH	EDUCATION	ANIMAL HUSBANDRY	MARKETING
Irrigated cluster	Mean	32.8%	25.6%	13.8%	11.7%	7.1%	2.1%	6.8%
	N	1050	1050	1050	1050	1050	1050	1050
	S. D.	1.7E1	1.2E1	7.6E0	9.2E0	9.1E0	4.2E0	5.9E0
Rainfed Cluster	Mean	23.0%	34.1%	14.7%	11.8%	7.9%	1.3%	7.3%
	N	1036	1036	1036	1036	1036	1036	1036

	S. D.	1.6E1	1.6E1	8.8E0	1.0E1	9.9E0	3.6E0	7.7E0
Total	Mean	28.0%	29.8%	14.3%	11.8%	7.4%	1.7%	7.0%
	N	2086	2086	2086	2086	2086	2086	2086
	S. D.	1.7E1	1.5E1	8.2E0	9.8E0	9.5E0	3.9E0	6.9E0

**Source:** Nayak, Amar et al (2015). Draft Report, NABARD Survey on Ramification of Debt Waiver & Risk Mitigation to make Agriculture Sustainable

A number of studies on microfinance and SHG Bank linkage show a similar pattern of expenses incurred by the poor households in rural agricultural settings (Tripathy S.N. 2015, Nair G.K. 2015, Mani G. & Tandon S. 2015, Sangwan S.S. & Deep G. 2015). Most of these expenses, especially health expenses are critical and emergency in nature. Credit from the formal channels viz., cooperative bank, RRBs, commercial banks and microfinance institutions is usually for agricultural production purposes and credit for these critical requirements are usually unavailable through these formal channels. Further, the transaction cost of lending for formal institutions are much higher than the informal lending sources (Srinivasan N. 2015).

In the absence of credit for these critical requirements, the small farmers and the poor seek credit from the traditional informal credit lenders viz., local money lenders, traders and sahumars/shop keepers in rural agricultural settings. Relatives and friends are other sources of credit at times of emergency. In addition to internal lending among members, SHGs also serve as another source of informal lenders in rural settings.

Among the various sources of informal credit, it is observed that local Sahukars seem to be main and dominant credit lender under critical emergency situations. The second important informal credit lending has been from relatives and friends. Though SHGs do not seem to be significant in the irrigated clusters, it is fairly significant in the rainfed agricultural settings. The role of money lenders and traders in rural credit lending surprisingly is relatively much lower as compared to the local sahumars. Please see table below for the details.

INFORMAL SOURCES OF CREDIT IN EMERGENCY SITUATIONS INTEREST RATE & FREQUENCIES AS REPORTED BY FARMERS IN DIFFERENT AGRICULTURAL SETTINGS						
AGRICULTURAL SETTINGS		SAHUKARS	RELATIVES & FRIENDS	SHGs	MONEY LENDERS	TRADERS
Irrigated Clusters	Mean	28.35	23.71	24.00	22.91	24.00
	N	31	21	2	22	1
	S.D.	15.9	3.5	.000	3.9	.
Rainfed Clusters	Mean	49.70	48.94	19.54	25.75	48.00
	N	138	51	56	4	5
	S.D.	14.4	16.7	8.0	13.7	16.9
Total	Mean	45.79	41.58	19.70	23.35	44.00

	N	169	72	58	26	6
	S.D.	16.9	18.3	7.9	6.1	18.1

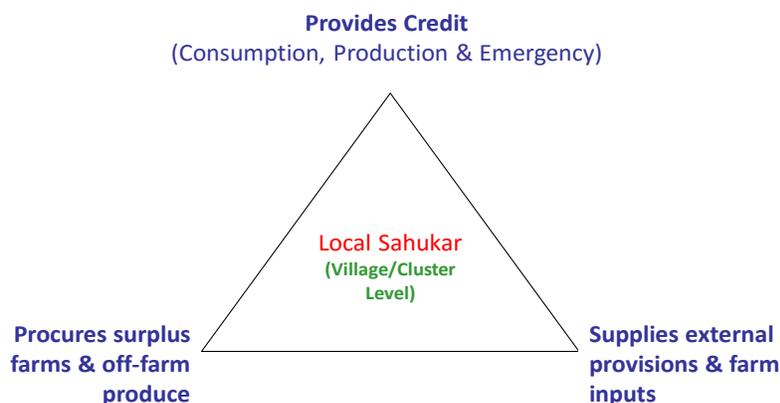
**Source:** Nayak, Amar et al (2015).Draft Report, NABARD Survey on Ramification of Debt Waiver & Risk Mitigation to make Agriculture Sustainable

Although the rate of interest charged by the local sahukar is greater than other informal lenders of credit; what makes the local sahukar the preferred choice for seeking credit by the poor and farmers under distress? While all these informal credit agencies are closer to the poor small farmers and are usually based in the community as compared to the formal credit lending agencies; the local sahukar seems to have the edge. What are the differences in the type of services and quality of service offered by the various local shaukar, local traders, money lenders and SHGs? In the next section, we look at the institutional structure and product and service basket that probably gives the sahukar the competitive edge over the other sources of credit.

### Competitive structure of Microfinance at Village-level

Analyzing the competitors in a given settings helps us in understanding whether there is complete lack of service providers or there are monopolistic competition or a highly dynamic market for a product or service. Local sahuks that have been rooted in the villages amongst the poor offer the stiffest competition to the top down structure of large banks and the SHG Bank Linkage programme in the country. A competitor analysis of this traditional rural credit system reveals that the power of control by these local traditional agents is indeed significant. Figure below provides the multi-pronged approach of a village based sahuks in remote villages in the country.

Figure 1:  
**The Community based Institution of Sahukar**



Nayak, Amar KJR. 2012. Implementing Community Enterprise System for Sustainability of Rural Agricultural Communities: A Manual

While the formal banking system provides credit for production, there is little support for consumption and emergency credit. In the SHG Bank linkage programme; the other needs of credit are however met;

as the credit here is not linked to a specific activity. The local institution of sahuakar had not only inbuilt these credit provisions but also provide services on a 24\*7 basis throughout the year.

In addition to providing credit for all purposes, the institution of the sahuakar provides other related services to the rural poor. It procures all surplus farm and off-farm products irrespective of the quality and quantity. It also supplies all possible external provisions and farm inputs at the door steps of the rural poor.

Being based in the community, the sahuakar supervises the production of the poor and ensures repayment through timely follow up of its clients. Even though, the poor is aware of the exploitation; she/he has little option not to be dependent on the local institution of the sahuakar who offers a convenient single window multiple services at the doorstep.

Has any of the extension activities of the government or any development agency matched the competitiveness of the local institution of sahuakars in India? But for a very few small cooperatives that are community based and have worked as a single window service provider for all needs of the poor; most of the interventions of the governments are top down and built on a specialized services viz., credit, agri-inputs, marketing, etc.

### **Vulnerability of the Poor**

The state supported microcredit through the SHG-Bank Linkage programme since 1990s has come as a great relief to the poor; as it freed the poor from the high cost credit from the local sahuakars. However, in the context of deep rootedness of the institution of the sahuakar in rural India, how has the state supported credit intervention impact the relationship between the poor and the local sahuakar? How would the poor deal with her/his other service requirements viz., procurement of consumables, other services and sale of her/his surplus produce? In the absence of institutional options for these services, the poor is likely to rely on the local sahuakar for these services. Having partially lost his credit lending business, would the local sahuakar tend to seek greater rents from his clients, the poor for these services?

Even if the poor has reduced the cost of credit through the SHG-bank linkage, a part from the increased agricultural production is grabbed by the sahuakar who still continues to be a key player in procuring the agricultural produce from the poor. This has been possible due to lack of reach of the government promoted marketing outfits to rural poor and the inability of the rural poor to organize themselves for collective marketing of their produce. In the absence of alternative buyers, the local sahuakar takes his pound of flesh from the poor by negotiating lower procurement price for the produce or through improper weighing scales.

The local sahuakar has yet another window through which, he seeks his additional pound of flesh from the net income of the poor. Having reduced his credit lending portfolio, the local sahuakar has strengthened his retail services on consumables and emergency services like vehicles for personal transport, tractor for agriculture and mill for grain processing. With limited choice available for these services, the rural poor again go to the local sahuakar for these services; who in turn seeks his rent from the poor on these transactions. A study on the change in wealth of sahuakars as compared to poor of the respective village during the last two decades would clarify how the wealth created through various development interventions in agriculture and rural India have got distributed.

Empirical evidences from an on-going action research in 55 villages of two tribal GPs in Rayagada district during 2009-2015 showed that when a new institution or development agency offers a single or fewer

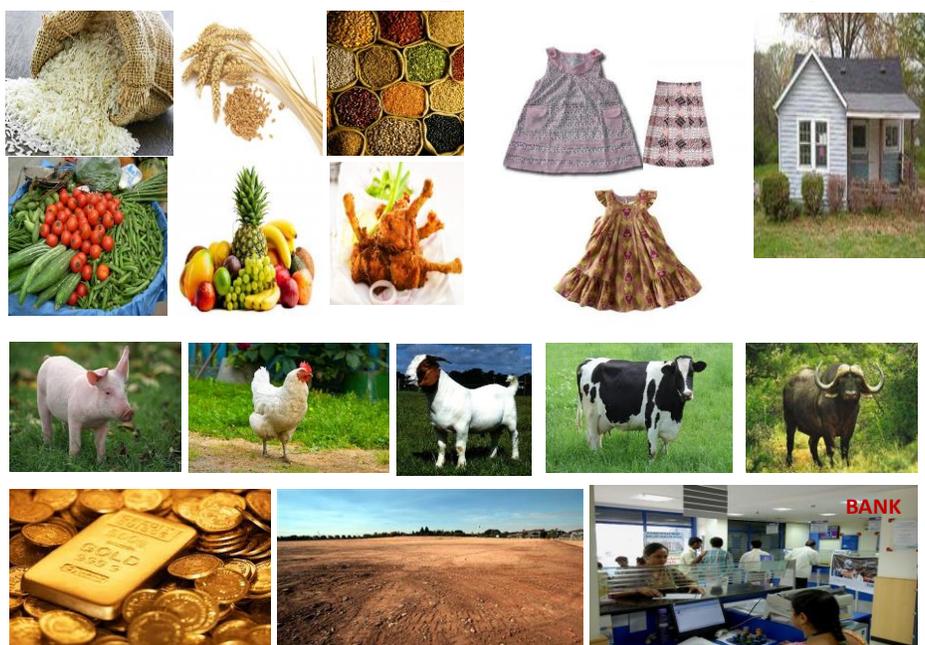
services than those offered by the local sahukar; it makes the poor more vulnerable than before. The poor were actually threatened for breaking away from the traditional business relationship with the sahukar and were charged extra rent for the services that were sought from him.

### Saving and Investment Choices of the Poor

Analyzing the investment choices and saving patterns of the poor indeed is quite revealing. Let me present here a conversation that I have had with women of an SHG group working as a sangha with Deccan Development Society in Zaheerabad district, Telangana state. When I asked the women of this group; *what would you do if you had some surplus income?* They said; *“we would buy more food for ourselves”*. Then I asked them; *what would you do if you still had some more to save?* They said; *“we would buy food for our children and grandchildren”*. Then I went on to ask them; *what would you do if you still had more to save?* They said; *“we would repair our houses”*. Curious about their responses, I further asked; *what would you do if you were still left with some money to save?* They said; *“we would buy some chicken and small animals like goats and pigs; and if we still had more we would buy a pair or two of cattle”*. Then, I took the courage to ask them; *what would you do if you still had more to invest?* They said; *“we would buy some gold”*. Unable to find bank as one of their option for saving, I took another chance to ask them; *what would you do, if you were still left with some more to save?* They said; *“we would buy some land”*. Finally frustrated, I asked them bluntly; *when would you save your surplus money in a bank?* To my amazement and surprise, they answered; *“when we do not have any use of the money; we put it in a bank”*.

Indeed the choices of the poor to invest or save their surplus money are many and varied as is shown in Figure 2 below.

**Figure 2:**  
**Sources of Differential Savings & Investment for the poor**



**Source:** Nayak 2014, Lecture for IAS probationers at LBSNAA

The saving or investment options of the poor actually offer much higher rates of return than the interest on savings in any bank. The choices of investment as mentioned by the women also provides them

greater flexibility for encashing easily, better liquidity, and minimize transaction costs for exchange; if the investments made are required for family consumption purposes. The procedural trouble of bank deposit and withdrawal is also avoided by the women folk through these investments. Indeed, I realized that the poor women folk were focused on investment and not on mere saving that I was biased with. There have been lot of efforts to simplify the procedures and enhance access of banks to the poor through bank mitras, banking correspondents and providing ATMs. However, the rate of return on saving and the flexibility offered by the banks is no match to the traditional investment options of the rural agricultural poor in the country. Clearly, there is a mismatch in the micro investment need of the poor and the banking structure for saving. Accordingly, the SHG-Bank linkage programme largely appears to have remained to be a unidirectional credit supply and repayment system.

### **Way Forward to Microfinance**

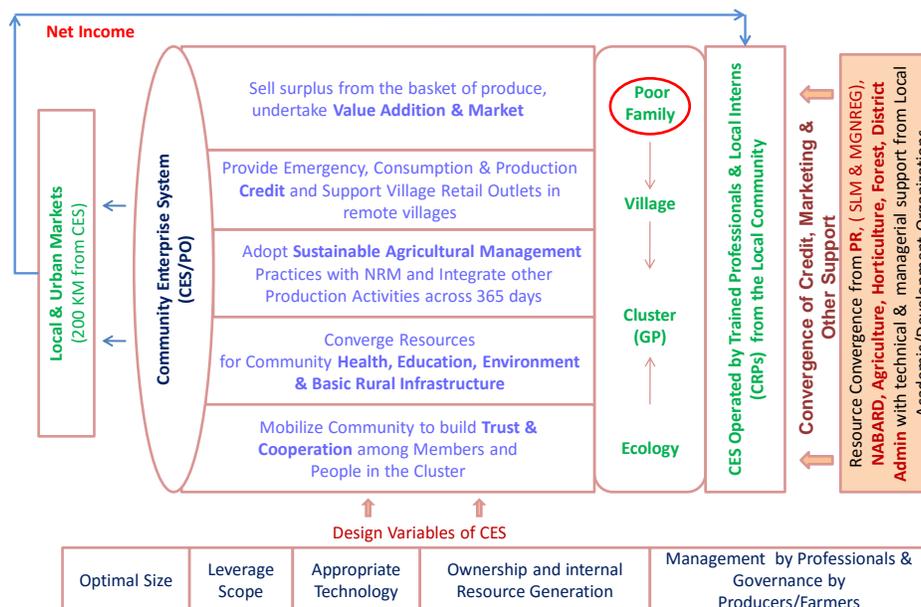
With the above context where, (a) the microfinance system or any credit institution of the government is not competitive to the institution of local sahukar in terms of the multiple services it offers, and (b) the disconnect between the saving products in the banking system and the investment choices of the poor; how do we go forward? Can we design an optimal cluster based community enterprise system (producer organization) consisting of SHGs at a Gram Panchayat/cluster level that is to be managed by grass-root level managers consisting of 2-3 trained professionals and few local youth. The team of grass-root level managers can undertake all the multiple services of providing credit, saving options, procure all surplus produce of the resource poor, and supply most of the consumables and services required by the people in the community. It may even take up issues of sanitation, drinking water, preventive health care, primary education of children and basic village infrastructure at the optimal cluster level.

In communities; where SHGs have been saturated and SHGs have been in operation for a few years, we may consider the community based producer organization model at the Gram Panchayat (GP) level that can facilitate micro investment plan for individual poor families/household in the traditional way and at the same time find greater value for their produce through better marketing system (Nayak, 2013). The speed of credit delivery, timeliness and flexibility of credit needs of the poor can also be achieved at a much lower transaction cost if the credit is routed through the GP level producer organization.

The design of the producer organization that can overcome the present limitations of the microfinance and other development interventions; however needs to be carefully designed simultaneously on size of membership and its geographic spread, multiple scope of activities or services it needs to engage in, appropriate technology of agricultural production and processing, a mix of trained professionals and local youth for managing the operation of the producer organization and the gradual building of ownership of the poor in their respective producer organizations. Based on the action research on recreating sustainable community system, the optimal size that has been arrived at is approximately 1000 resource poor producer families<sup>1</sup> in a cluster of about 1500-2000 hectares of geography which is equivalent to a Gram Panchayat in rural agricultural settings.

In addition to the above internal design of the proposed community enterprise system (CES) or farmer producer organization (FPO), we also need to optimize the market distance to increase the net income of the resource poor. The optimal market distance seem to be within 200 Km where the net incomes for the small producers is maximum. For the community enterprise system (producer organization) to deliver multiple services, the various resources of the government need to be converged with the producer organization. The proposed design of the sustainable community enterprise system (CES)/FPOs is shown in Figure 3 below.

**Figure 3: Organizational Design & Institutional Relationship For Optimally Designed GP Level CES/FPOs**



**Source:** Nayak, Amar KJR. 2013. Implementing Community Enterprise System for Sustainability of Rural Agricultural Communities: A Manual

The figure above shows the multiple functions that the producer organizations need to take up; though in a phased manner. It shall not only offer credit and saving linkages at the door step but also engage marketing and value addition of different surplus produce of the poor. It can also undertake retail services required by the poor. Further, the GP based producer organization can take up the health, sanitation, drinking water, preventive health care, primary education and rural infrastructure, agricultural extension services for the people at the GP level. Such a community based, owned and managed producer organization working as a single window service provider to the resource poor can drastically remove the present asymmetric disadvantages of the poor in the rural agricultural ecosystems and has the potential to create a stable and healthy community.

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**End-notes**

<sup>1</sup>The design factor for this number is 4; that is even if a fourth of this number is share strong solidarity and work together, the group would be financially viable. Since the community participation is usually low under the present market system, the optimal membership size has been kept at this level.

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## **Bore Wells Vs. Open Wells: Water Crisis and Sustainable Alternatives in Kerala**

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### **Abstract**

Recently bore wells have been identified as an alternative to the increasing water/groundwater scarcity in Kerala. But whether bore wells could serve the purpose of open wells becomes a matter of debate. In this context conflicting arguments arise among people on the question of inter-linkage between groundwater in open wells and bore wells. Geologists, engineers and scientists held opposing position regarding this problem making the issue much more complicated than answered. This paper attempts to discuss the opposing arguments over groundwater inter-linkage in open wells and bore wells in the context of decreasing ground water table and feeble regulations in Kerala. The paper also presents the contemporary relevance in the findings of a report submitted by Cyriac Kurian, Hydrologist of Kerala Water Authority. The report highlights how the constant use of water in the bore wells caused depletion in water level in open wells. Thus the objective of the paper is to unravel the sustainability of bore wells as an alternate strategy to open wells in Kerala.

**Keywords:** Bore well, Groundwater, Water conflict, Sustainability, Regulation, Water right

### **Introduction**

In Kerala, ground water is the main source of drinking water and about ninety percentage of the rural population depends on ground water sources. Groundwater potential of Kerala differs from place to place due to its varied hydro-geological characteristics. Kerala's demand for ground water is mainly for household purposes, agriculture and industrial needs. Recently there has been a spurt in groundwater extraction during the last decade and the state shows a heavy imbalance in the availability of ground water over the past ten years. The unsustainable extraction of groundwater by the land owners pretense threat to groundwater storage. The installation of large number of open wells and bore wells with high power centrifugal pumps alter the natural balance of ground water recharge which results in ground water depletion. The increased demand of groundwater associated with the varying land use pattern results into unregulated exploitation of ground water in many parts of the state. The shift from food crops to highly water intensive cash crops like rubber, pepper and coffee cause increased extraction of groundwater. The non-agricultural use of land affected the groundwater recharge and aquifer potential.

The construction boom in Kerala severely affected the replenishable capacity of groundwater as it is one of the major ingredients in the construction of buildings. The individual houses, major and minor buildings and skyscrapers continue its dependency on the same aquifer results in its degradation.

Ground water abstraction structures like wells have increased to five million in Kerala in accordance with the apartment and housing boom. The number of open wells in the state is estimated roughly as one well for every eight to ten person, means well density of Kerala is highest in the world. Sand mining, brick industry and quarrying also caused groundwater depletion in Kerala. As groundwater is the major source of drinking water, the acute scarcity during summer resulted into the emergence of groundwater markets in Kerala. Individual rationality has often led to unsustainable extraction of the resource, blind competition and elevated groundwater price in the open market.

In this context a groundwater estimation was conducted by the Central Ground Water Board (CGWB) in association with State Ground Water Department and other central as well as state agencies. A Ground Water Estimation Committee (GEC) was constituted in 2004 and 2009<sup>i</sup> and the estimation was conducted based on the Ground Water Estimation Methodology - 1997. In 2004 all the 151 blocks of Kerala were considered for ground water computation and classified into over-exploited, critical and semi-critical<sup>ii</sup> category based on the availability of ground water. In this assessment fifty blocks have moved into the unsafe category; among the fifty, five blocks were classified as over-exploited, fifteen as critical and thirty as semi-critical. Athiyannoor in Thiruvananthapuram tops the list of blocks with over exploited resources, followed by Kozhikode, Kasargod, Chittur and Kodungalloor. As per the new estimation in 2009, Chittur block belongs to over-exploited category and the three blocks namely Kasaragod, Malampuzha and Kodungalloor belongs to critical category. The total groundwater utilisation is highest in Palakkad district (327.75 MCM) and lowest in Wayanad district (71.93 MCM) (CGWB, 2011). Based on the 2004 computation the five over-exploited blocks were declared as 'notified area' as per the Ground Water (Control and Regulation Act, 2002)<sup>iii</sup>. In notified areas like Kozhikode, permission from groundwater authority is necessary to dig a bore well. But unauthorised constructions are going on in notified areas. Allegations are few from these areas due to the ignorance of people about groundwater laws.

### **The spurt of bore wells**

It is clear that in Kerala groundwater is subjected to over exploitation and mismanagement. Regarding groundwater extraction structures open wells dominated the scene for years. Recently there is a trend towards bore well construction as open well construction entails larger cost and time. Though bore well gives hard water which is not good for household purposes people opt for it because of the impracticalities involved in open well construction. Moreover a bore well can be constructed within six hours even in the limited space available within the compound of one's own land. It does not take much space like that of open wells; even a person having less than 3 cents of land can afford to dig it. Adding to these advantages of bore well there exists innumerable constraints to dig an open well. For instance, in housing colonies, where houses are closely situated digging of open wells is almost impossible. The difficulties range from health reasons (presence of coliphom bacteria in open well water as a result of nearby septic tanks) to strict conditions stipulated in Kerala Building Rules. As per the building rules which are applicable to Panchayats as well, the permission of the secretary is necessary for digging open wells (Section 18, 103-109)<sup>iv</sup>. Though these conditions do not follows strictly people refrain from digging open wells due to these stringent conditions. Since water supply from the water authority cannot be relied upon, many people become compelled to dig bore wells. Very few people refrain from constructing bore well as it gives hard water.

When bore wells are rampant in use for so many years people become aware about the adverse effects it creates. Issues reports from places where bore wells causes water depletion in nearby open wells. Though legal actions related to conflict over the use of bore wells found less among people, in many places all over Kerala local people attempt to prevent bore well construction. As such the bore well

construction agencies dig it during night time to escape from the public protest. Bore wells become an alternative source to drinking water and emerging as a model in Kerala. Though legal actions found less, certain issues in Kerala points to the harm made by bore wells on other water users. One of such instance is the Plachimada issue<sup>v</sup>, in Palakkad district where the uncontrolled water withdrawal through bore wells resulted into water depletion in nearby open wells. Soon after three years the Coca-cola company in Plachimada, was forced to close due to public protest which got national as well as international attention. The Plachimada struggle acted as an eye opener to the people in Kerala. In this circumstance digging bore wells in Kerala becomes problematic.

In spite of the problems mount with bore well use, many people opt for it in rural/urban areas because of cost-efficiency. Also there are supporting arguments among engineers and few geologists for bore wells. They argue that water extraction through bore wells do not affect the water availability in open wells as both take water from different aquifers. As per geological science water from both open well and bore well is considered as groundwater. Groundwater is stored in the aquifers seen below earth's surface. There are mainly three types of aquifers. They are, (a) confined aquifers, (b) unconfined aquifers and (c) semi-confined aquifers. Confined aquifers situate in between the hard rocks seen deep under the earth and unconfined aquifers situate on the surface terrain of the earth. It is also to be noted that the confined aquifers and unconfined aquifers are separated by the natural constructions under earth. Out of these aquifers, open wells draw water from unconfined aquifers; bore wells and tube wells draw water from confined aquifers. Since open wells draw water from the unconfined aquifers that affect the water level in the nearby open wells, and not that in the bore wells. Similarly, bore well draws water from the confined aquifers that affect the water level in the nearby bore wells and not that in the open wells. This entails the conclusion that drawing water from the bore well, irrespective of the quantity of water drawn, does not affect the water level in the open wells. This argument is based on the hypothesis that all bore wells drawn water from confined aquifers alone.<sup>vi</sup> This position is affirmed by most of the engineers in Kerala. On the strength of this argument bore wells are indiscriminately digging in Kerala for household, agricultural and industrial purposes as well as for constructing single/multi-storied buildings. Dependence on the same bore wells and aquifer continue for long time and gallons of water is drawn in many parts of the state.

The other argument is based on the theory that the water in the open wells and that in the bore wells are inter-related. According to this argument, bore wells drawn water not only from confined aquifers but also from unconfined aquifers. The advocates of this theory assert that no bore well in Kerala draws water from confined aquifers. Majority of the bore wells in Kerala draw water from unconfined and semi-confined aquifers, i.e. water is drawn from the fractured hard rock aquifers, which are not unconfined aquifers. Because fractures in the deep hard rocks are connected to the fractures in the weathered rocks on the surface earth. Open wells are situated on the weathered rocks of the earth; it means that fractures on the hard rocks and weathered rocks are inter-linked. Water accumulates in the bore well from above through these fractures. This leads to the conclusion that the aquifers found in the fractured hard rocks are really unconfined aquifers. While constructing a bore well these fractures can be seen when the hard rocks are drilled. Bore wells draw water from the fractures with water availability<sup>vii</sup>. Every fracture need not necessarily have water availability in them; hence water cannot be expected from every bore well. After construction bore wells extract water from the fractures, thus the bore well seems to be filled with water. This process continues when the pumping is going on from the bore well. As a result, water from the above open wells reach the bore wells and the water level in the open wells go down.

It is clear that water availability in the bore wells are directly related to water availability in the fractures which are connected with open wells<sup>viii</sup>. However water availability in the fractures is dependant in nature. Certain fractures provide water in plenty and from such bore wells approximately one lakh litres of water can be pumped in one hour. If large fractures are available then water can be drawn incessantly for months. Such bore wells are called Artesian wells. If plenty of water is available in the fractures seen in the hard rocks, then it does not need to draw water from the fractured weathered rocks. Per se that kind bore wells do not affect the water availability in open wells. The above detailed argument concludes that there are various types of aquifers and fractures exist below the surface earth, we cannot conclusively or authentically say that all bore wells adversely affect/do not affect the water level in the open wells. This largely depends on the nature of aquifers as well as the structure and size of the fractures in the region where the bore well is drilled.

The above mentioned fact is evident in the report submitted in 1995 by Sri. Cyriac Kurien, Hydrologist of Kerala Water Authority. The report entitled 'Interim Report on Monitoring Cheekode Project–Phase I' describes the inter-relation between bore wells and open wells. The report based on the experiments conducted as part of the Cheekode project implementation, unfortunately did not get proper attention from the authorities. The project, also known as 'Danida Project' was started by Kerala Water Authority in 1990s with the help of Government of Denmark, for water supply to Kundotty–Cheekode region in Malappuram district. Water supply was started by constructing bore wells, instead of depending on other water resources. But in no time it was noticed that water level in the open wells was dropped and people in the locality started allegations against the project. In order to get a true picture of the situation, a scientific study was conducted by the leading officials themselves. Finally the report was prepared based on field measurements conducted on the bore wells constructed for the project.

While conducting the field tests, no recharge of ground water was noticed by the team members. Moreover, due to summer most of the rivers had gone dry and the local people started resistance against to the project. Owing to public protest, pumping in certain bore wells were stopped for 22 days and pumping in certain other bore wells were reduced to half. It was in these circumstances that the study on the consequences of bore well pumping on open well was conducted. The objective of the study was to identify whether there was any variation in the water level in open wells within the radius of 300 meters from the bore wells. It was noticed that bore wells are tapping water from the fractured zone as in normal case. Open wells were situated on the weather zone and bore wells drew water from the fractured zone. Following were the observations made consequent on the study and pumping tests:

1. When pumping started water moved downwards from weathered zone to fractured zone through fractures.
2. As a result, when pumping proceeds, water level in the open wells decreases.
3. The greater the distance between bore wells and open wells, the lesser the water depletion in open wells.
4. The decrease in water level in the open wells is proportional to the pumping in bore wells.
5. When pumping was suspended for 22 days, water level in the open wells was raised by 75% in almost 66% of the wells. That is, in scientific terms, 75% of draw down was noticed.
6. It was noticed that even after the pumping was stopped for 2-3 days water level in the open wells continued to decrease. This was due to the fact that water was flowing down to the fractured zone, where the bore wells situated.
7. In 34% of open wells water level lowered even though no pumping was done in the bore wells under study. Because these 34% of open wells were situated down below those pumping bore wells.

8. During the period of study there was little water flow in the nearby stream. During summer this stream may become dry and if water pumping continues at this rate from the bore wells during drought, the open wells would become dry.

Consequent to the study following proposals were made to raise the water level in the open wells based on the above observations:

1. To have water in the open wells they have to be deepened at least 5 meter more (to their present depth).
2. Water from other sources to provide drinking water to the affected people may be worked out.
3. Constructing a number of barrages in the streams will definitely help recharge of the weathered zone in which these open wells are located.

The investigation team submitted the report to Government with the above mentioned findings and suggestions. But no attention was given to the landmark findings on the negative impact of bore wells. Still studies related to the interaction of water in the open well and that in the bore well is found less in Kerala.

In Kerala tube wells are also in rampant use for extracting groundwater. There are differences between bore wells and tube wells though common people use the terms alternatively. The major difference is that tube wells drawn water from confined aquifers; its construction and structure is also different from that of bore wells. In Kerala tube wells are drilled mainly in the sedimentary terrain found in the region from Kollam to Thirur and in the Vizhinjam–Poovar region. (The so called tube wells found in other regions apart from the Kollam-Thirur and Vizhinjam–Poovar region are actually bore wells). When this region is drilled for tube wells a sandy strata can be noticed among the different stratas of earth. Holes are made in that part of the pipe for tube well; then water filtering through the sand reaches the tube well. The bottom of the pipe is sealed as such water will be stored in the pipe. In coastal areas, water is available within 6 meters of depth. Such tube wells constructing in coastal areas are called filter points, or shallow tube wells. Since shallow tube wells draw water from unconfined aquifers, this might adversely affect the water table in the open wells. Tube wells like open wells will get easily recharged and do not cause water depletion in open wells as it takes water from confined aquifers.

### **Legal nuances of the problem**

Groundwater anywhere in India is subject to over exploitation as the laws related to groundwater are not state-of-the-art and efficient. The law to depend for groundwater related conflicts is the age old British law, i.e. the Indian Easement Act, 1882. As per Indian Easement Act 1882 the landowner owns the water below his land and he has exclusive right to extract and use the ground water. An easement is a property right that gives its holder a non-possessory interest in another person's land. It allows the easement holder to use the property that he or she does not own or possess. But it does not allow the easement holder to occupy the land or exclude others from the land unless they interfere with the easement holder's use. In contrast, the possessor of the land may continue to use the easement and may exclude everyone except the easement holder from the land. Right of way, right to light, right to standing or flowing water are examples of Easement Right. According to Indian Easement Act 1882 the land for the beneficial enjoyment of which the right exists is called the dominant heritage, and the owner or occupier thereof the dominant owner; the land on which the liability is imposed is called the servient heritage, and the owner or occupier thereof the servient owner. An easement may be permanent, or for a term of years or limited period, or subject to periodical interruption. Apart from the Easement provisions the Act also mentions about the rights of the owner i.e., the dominant owner. As per article 7 (a) and (b) the owner enjoys exclusive right over an immovable property, to enjoy and

dispose of the same and all products thereof and accessions thereto and to enjoy without disturbance by another the natural advantages arising from its situation.

Article 7 also grants exclusive rights to the owner over groundwater. Article 7 (g) assures the right of every owner of land to collect and dispose within his own limits of all water under the land and on its surface which does not pass in a defined channel. As per the above provisions the right to groundwater is not an easement right, because in the exercise of this right no servient heritage is required. Instead groundwater is identified as a 'natural advantage' that is coexistent with the land. A dominant heritage is absent here as in the case of easement right, since groundwater is a right attached to land which should be available to the owner without any disturbance by another. As such groundwater is not an easement right and it cannot be separated from land rights for others use. Clauses 7 (f) to (j) clearly illustrates the position of surface water and the rights of every land owner over it with a view to ensure access to water along with property rights. But it excludes the provisions related to ground water.

There is no clear definition for groundwater and its ownership rights in the Easement Act. Thus it is argued that treating groundwater as an easement would give rise to legal remedies. Courts also noted that there are differences in matters related to surface and groundwater and they cannot be governed by same law. In India the common law principles emerged in Britain continue to be followed in groundwater laws. The British legacy based on individual property rights still follows in India and many other commonwealth nations. Thus the right to groundwater as an inalienable part of the right to land, is supported by customary and statutory laws in India<sup>ix</sup> (Vani, 2009: 435-470). Statutory and customary laws in India treat groundwater as a dependant entity which cannot control directly. As per the provisions, the ownership rights of the land owner over available natural resources is inter-twined with his rights over land.

### **Statutory and customary laws on groundwater**

For centuries, the common law tradition was followed in many nations like India, United States, Canada, Australia, etc. As such courts seldom initiated a move towards separating the land rights and water rights. When it flooded with groundwater misappropriation cases, it relied on public trust doctrine<sup>x</sup> as well as the fundamental right to water rather than attempting to separate land and water rights. For instance the Supreme Court in *Kesoram Industries/State of Bengal Case* ruled that, "deep underground water belongs to the state in the sense that the doctrine of Public Trust extends there too. Holder of a land may have only a right to user and cannot take any action or do any harm as a result where the rights of others are affected". In certain other cases the exclusive right of the land owner was further emphasised in many judicial verdicts and courts tried to regulate the groundwater extraction through statutory laws. Copping with that the central government circulated a model bill among the states and they enacted conformity legislations. A series of acts were implemented throughout the nation with a view to regulate the groundwater use. The Kerala Ground Water (Control and Regulation) Act 2002 is an initiative in that direction aims to regulate the groundwater use.

Kerala enacted the legislation with few other states as per the directives of central government and CGWB. As per this act, the entire power to control ground water use is vested in the Ground Water Authority. Though the Authority is created in Kerala it has not been functioning effectively in preventing ground water exploitation. It is also found that exercising direct control over groundwater extraction is difficult. Landowners use invisible structures like narrow centrifugal pumps beneath the ground to extract groundwater. Big farmers usually have costly groundwater extracting mechanism to irrigate their farmhouse, weakens the aquifer potential and affects the neighboring wells. The situation gets worsened during summer when possibility for water markets also rise; it is observed that all over Kerala

farmers sell groundwater at the time of acute water scarcity and attains huge profit. Thus controlling groundwater extraction through millions of wells and tubes becomes problematic.

Recently there is a legislative trend in many countries that attempt to change the nature of groundwater from a private property to a public resource. This change enables the state to adopt the position of guardian or trustee of groundwater resources, to grant rights and introduce measures to prevent aquifer depletion, groundwater pollution and water resources planning. Many nations continued the trend following Israel who enacted legislation towards this direction in 1959 itself. The development of bringing private waters into public domain continues in Spain, Italy, France, Morocco, Greece, etc. In India no attempt has been made in this direction; the States enacted the groundwater regulation acts without any declaration of state ownership over the resources. The Central Model Bill as well as the State Acts deals with groundwater users without referring to the ownership rights of groundwater. All the acts except the Maharashtra act aim at regulating the use of wells through licensing including the Kerala Act. It doesn't attempts to separate land and water rights. The Maharashtra Water Resources Regulatory Authority (MWRRA)<sup>xi</sup> Act, 2005 is an initiative to separate land and water rights by converting the groundwater right to a usufructuary right. However it fails to redefine property rights over groundwater (Ibid).

In customary practices as well landowners generally regard wells as part of their private property denying others the right to restrict his extraction of groundwater. Instances can be cited from all over India where access to water for the landless is denied everyday. Those who possess marginal amount of land also subject to water poverty. Unequal access to land simultaneously gives rise to wastage of water among the affluent and inadequate availability of safe drinking water to the poor community. The inequality in land rights gives large land owners a disproportionately larger access to groundwater which opens the possibility of water trade in the emerging water market. Similarly, land reforms in Kerala also played a crucial role in determining the rights over groundwater. It by and large failed to abolish the intermediaries and to implement effective land ceiling, caused inequitable access to land and thereby water resources. Moreover in Kerala the absence of statutory laws paved way to the emergence of legal pluralism in groundwater governance. The pluralistic nature of ground water rights is highly visible in Kerala society. The social laws and customs governed the major chunk of ground water management in Kerala for long years which ensured the equitable distribution of water to a certain extent. Situation changed in accordance with the change in land use pattern and other external factors. Increasing water scarcity, water pollution, water conflicts as well as the increasing water scarcity and demand are the immediate consequences of such changes. This situation invites concrete statutory laws regulating groundwater extraction in Kerala.

## Conclusion

In this context, where unregulated extraction of groundwater through bore wells are increasing in the absence stringent laws, the sustainability of bore wells as an alternative to open wells becomes a critical matter for debate. Thus scientific studies pertaining to the relation between bore wells and open wells seems to be the need of the hour. Social scientists intervened where scientific community failed to respond to the increasing conflicts over bore wells. Social scientists can make the issue live on discussion, can conduct field studies among people but are unable to find geological facts. Lack of scientific studies on this matter lead to ground water exploitation in Kerala. Scientific truth should unravel with a view to regulate the booming construction of bore wells in Kerala and thereby to conserve the precious groundwater resources. Scientific reports can also alleviate policy discussion and legislative processes regarding groundwater control and conservation. Different from Kerala neighboring states like Tamil Nadu and Andhra Pradesh, used to depend on bore wells for years are now reluctant to

dig more bore wells due to salt water intrusion<sup>xii</sup>. When the neighboring states desist from digging bore wells, people in Kerala are attracted towards bore wells. Instead of depending on bore wells as an alternative, the rain water harvesting methods and structures in Kerala should improve to increase the ground water table as rainwater availability in Kerala is high. People in Kerala are not hesitant to spend lakhs of rupees to deepen the open wells or to dig bore wells, show a prejudice towards constructing rain water harvesting structures. Orientation towards rain water harvesting modeling the *Pani Panchayath* system in the state of Rajasthan can be worked out under the auspices of local self-governments. The report of the Gadgil committee to preserve the Western Ghats is also worth mentioning in this context.

However improving rain water harvesting methods alone does not serve the purpose of increasing ground water table in Kerala. Because there is a great apprehension regarding the simultaneous growth of bore wells and rain water harvesting structures. It is a fact that ground water table can increase through the continuous use of rain water harvesting methods. But if bore wells continue their water extraction the water stored through rain water harvesting may go down directly to the bore wells through the fractures seen in the weathered rocks and hard rocks. If this phenomenon persist those who built the rain water harvesting structures may not be the beneficiaries of its result. Groundwater becomes the monopoly of those who use bore wells than people who struggle for conserving the valuable resource. Thus Geologists and engineers in Kerala should intervene in this matter instead of being grouped over the matter and publish their findings in order to ensure conservation of ground water.

Regarding equal access to groundwater newer land reforms attempt to bring effective redistribution of land is one of the available remedy in Kerala. Because proper decentralisation of land power ensures decentralisation of groundwater rights. In this perspective land struggle in Kerala can also incorporate the issue of ground water accessibility in the larger availability of land. Attempts to separate land and water rights through state level statutory laws can be experimented in Kerala following the Maharashtra model. Identifying groundwater rights as a separate entity necessitates rigorous land reform measures in Kerala. Moreover, the land policy of the state should be sound enough to ensure the efficient management of land and its natural resources. The policy should adopt an integrated approach in dealing with land and natural resources. The Kerala Land Use Board can act in this direction which already established its policies with an eye to protect the natural resources. As the nature of land use determines the quality and quantity of groundwater availability obligatory guidelines should be issued with regard to land appropriation. At the national level, Easement Law can be amended in a manner which separates land and water rights or it can incorporate groundwater as an Easement right in its provisions. Parliament can model the new trend emerging worldwide for separating land and water rights as a remedy to groundwater exploitation.

### End Notes

<sup>i</sup> As per the new estimation in 2009 Chittur block belongs to over-exploited category and the three blocks namely Kasaragod, Malampuzha and Kodungallor belongs to critical category.

<sup>ii</sup> Over-exploited Areas, where stage of ground water development is more than 100% both pre-monsoon and post-monsoon ground water level shows a significant decline. Critical Areas, where stage of ground water development is more than 90% but less than 100% and either pre-monsoon or post-monsoon or both shows a significant long term decline in ground water level. And areas where ground water development is more than 100% but neither pre-monsoon nor post-monsoon ground water level show a significant long term decline. Semi-critical Areas, for cautious ground water development - areas where ground water resource assessment shows a stage of ground water development more than 70%

but less than 90% and either pre-monsoon or post-monsoon ground water level shows significant long term decline.

iii The Kerala Ground Water (Control and Regulation Act) 2002, intend to control groundwater extraction in the State. The Ground Water Authority in Kerala is created on the basis of this Act. The provisions in the act also deals with the construction and usage of open wells and bore wells, mechanisms of control and penalty.

<sup>iv</sup> If permission is obtained, the conditions in section 104 related to construction of buildings have to be adhered for constructing an open well. For example, the well should be 1.5m distant from the boundaries of the neighbors property, it can built either attached to the existing building, or inside the building, or set apart from the building. There should not be any leach pit, sock pit, refuse pit, earth closet or septic tank within a radius of 7.5 metre from the open well. As per rule 105, the well should be protected with a wall of one metre height. The permit obtained adhering to the conditions have to be renewed every year after two years.

<sup>v</sup> The Plachimada issue is a popular agitation against ground water exploitation by Coca-cola Company in Palakkad district, Kerala. The agitation was successful enough to threaten the corporate strength as the company terminated its production in Kerala.

<sup>vi</sup> Reply to author's article in Mathrubhumi weekly by K.V. Mohanan, 'Jalanirapp Kurayunnathil Kuzhal Kinarukal Alla Villain', July 14-20-2013.

<sup>vii</sup> While digging a bore well, the region up to hard rock is sealed with a casing pipe except on the hard rock. Sealing is not necessary in the hard rock because that would prevent the flow of water from the fractures to the bore well. Normally, the life of a bore well is twenty years. By this time clay may deposit in the fractures and water flow gets blocked. The clay deposits have to be cleared for further availability of water.

<sup>viii</sup> The argument detailed is based on a discussion, the author had with Sri. Cyriac Kurien, Hydrologist, Kerala Water Authority.

<sup>ix</sup> Land Acts, such as Madras Land Encroachments Act of 1905, the Maharashtra Land Revenue Code 1966, the Madhya Pradesh Land revenue Code 1959 and the Orissa Prevention of Land Encroachment Act, 1972 refer to all water resources over which the rights of the state and private persons are defined, except groundwater.

<sup>x</sup> The public trust doctrine is the principle that certain resources are preserved for public use, and that the government is required to maintain them for the public's reasonable use.

<sup>xi</sup> The Maharashtra Act attempts to achieve some measure of equity by providing that every landholder in the command area of a river basin is entitled to water, and that in times of scarcity, each landholder shall, as far as possible, be given a quota adequate to irrigate at least one acre of land, Section 12(6) (a) and (b), and that the Water Resources Authority shall ensure that the principle of 'tail to head' irrigation is implemented by the River Bain Agency , Section 12 (7).

<sup>xii</sup> Salt water intrusion occurs in bore wells situate close to sea. Through the fractures under earth salt water from the sea intrudes into bore well and the water becomes salty. Due to the phenomenon, many bore wells in Tamil Nadu and Andhra Pradesh have become useless.

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## Representation of Women on Boards of IT Companies: An Indian Story

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### **Abstract**

The new Companies Act introduced in India in August, 2013 incorporated a mandatory provision for appointing at least one woman director on the board of directors of listed and certain other companies. The companies were required to comply with the law by 31<sup>st</sup> March, 2015. The change in law led to a virtual scramble for identification of woman to be appointed as directors on boards of listed companies. The new norm was aimed to improve gender diversity on Indian corporate boards. Different countries have adopted varied methods for better representation of women on corporate high offices, viz. quota system, comply or explain incentive and voluntary action etc. Information Technology sector in India is a high growth sector and is one that is considered highly professionalized also. How the companies in this sector have responded to gender diversity norm propagated through the new law? The paper examines this aspect by analyzing the board composition of a sample of large Indian IT companies.

**Keywords:** Board of Directors, IT companies, New Companies Act, Women Directors, India

### **Introduction**

The Government of India promulgated a new Companies Law in August, 2013 which for the first time made it mandatory for certain category of companies to appoint at least one woman on its Board of Directors. The provision was enacted with the objective to improve gender diversity on boards of Indian companies. It provides:

*Section 149(1) - Provided further that such class or classes of companies as may be prescribed, shall have at least one woman director (Companies Act, 2013).*

The Rules framed under the Act, Companies (Appointment and Qualifications of Directors) Rules, 2014, enjoins following companies to appoint at least one woman director on their Board (Rules, 2014):

- (i) all listed companies, and
- (ii) other public limited companies having paid up capital of Rs. one hundred crore or turnover of Rs. three hundred crore.

Further, any intermittent vacancy of women director shall be filled up by the Board by woman director only within three months or next board meeting whichever is later. This provision was incorporated in the law to fill up much needed gender diversity on the Board of corporates. The existing companies were given time till 31<sup>st</sup> March, 2015 to comply with the new legislative provision. India is the first

country among the developing nations which has decided through legislation to make representations of women on company boards mandatory. Pursuant to this change in law, the capital market regulator, Security and Exchange Board of India (SEBI) also amended its listing agreement (Listing Agreement, 2014) for companies to incorporate a provision similar to the section 149 of the Act. This led to a virtual scramble among Indian corporate management to fill up women seats on their boards and reports revealed that most companies complied by appointing family women or relatives as board members. Some companies with progressive outlook were, however, appointing woman directors on their boards even before the new law was enacted.

### **International Perspective on Women Board Members**

In the absence of any legal mandate, Indian companies have been averse to giving adequate representation to women on their board of directors even though there has been no dearth of professional women to fill up the positions on corporate high offices. Many countries had enacted legal provisions or adopted other measures to improve women presence in their board rooms. Norway and Iceland had introduced 40% quota for women directors which resulted in significant increase in women positions on corporate boards. The quota position also prevails in some other countries like Iceland, Belgium and Israel. In some others, either there is voluntary provision or comply or explain type norm. United Kingdom and Australia have adopted comply and explain policy towards creation of women diversity on boards. The US Regulation requires disclosure by companies with regard to consideration of women diversity while selecting directors on their boards. The process of women participation in board rooms has, however, been rather slow though of late some improvement has been witnessed. The position of women representation on companies in some advanced countries can be gauged from Figure 1.

Most of US and European companies have women representation on boards in excess of 20%. This has resulted out of a slew of legislative and regulatory measures taken by their governments with effective follow up. The numbers in India and Hongkong are around 10% and in Japan, it is about 3% only. In Australia, the position is as good as in European nations, being in the region of 20%. The countries in Asian region, however, had been relatively slow in advancing women empowerment in corporate board rooms and have to travel a distance in achieving objective of greater women equality in corporate ceiling. The recent legislative push given in India is expected to improve Indian corporate gender diversity at higher levels and generate, in the longer run, a more progressive outlook in this regard.

### **IT Industry in India**

Information Technology sector has contributed immensely to the Indian economy. Its share in national GDP is nearly 9.5%. According to NASSCOM statistics, it is now largest employer in private sector (NASSCOM, 2015). About 10 million professionals and other employees are engaged in the IT industry. IT sector has the largest share in export of services constituting more than 38%. IT industry has in past few years made big strides and led to the transformation of economy of the country. India's technology sector (including hardware) is estimated to have generated US\$ 146 billion in revenue during FY15 compared to US\$ 118 billion in FY14, implying a growth rate of 23.72 per cent (Ibaf, 2015). The sector is expected to grow 11 per cent per annum and triple its current annual revenue to reach US\$ 350 billion by FY 2025, as per estimates of the industry body (NASSCOM, 2015).

India is the topmost off shoring destination for IT companies across the world. The high growth in IT sector has attracted professionals not only from IT areas but also different branches of engineering and other domains in good numbers.

Being an intellectual based industry, the top management of these companies has also been found to be largely professional oriented. A search of board composition of IT companies in India has revealed that most of boards consist of professional persons as directors guiding the business strategy and policies of companies. In these circumstances, it raised a curious question regarding response of IT companies to new legislative provision in the latest Companies Act that each listed company must have at least one woman director.

### Objective of Study

The study has been conducted to assess and analyze the representation of woman directors on Board of Directors of Indian IT companies in response to new legal mandate of Companies Act, 2013 that each listed company must have at least one woman on the board.

### Data and Methodology

For the purpose of study, the list of all public companies in IT software sector, listed on National Stock Exchange (NSE), was drawn. A sample of 30 companies with market capitalization of Rs. 1000 million or more was selected as a representative sample. The composition of board of directors of these 30 companies, as provided in the websites of companies, was examined to determine the numbers of total directors and woman directors among them. The results were analysed to study the pattern of women representation on boards of Indian IT companies.

### Analysis and Findings

The results of study have been shown in Table 1 attached as Annexure I and summary thereof is given below:

**Table 2: No of IT companies with different no of directors**

Women Director	No of companies	%
1 Women Director	24	80%
2 Women Directors	6	20%
3 Women Directors	0	0%

While 80% of IT companies have complied with woman director norm by just minimum requirement, a symbol of mere tokenism in improving gender representation on their boards. In other words, male dominance continues on corporate boards of IT companies. The result supports an earlier study “that although many of these (IT) companies promote gender equality in the workplace and women in senior positions of authority, the Indian software sphere continues to be almost entirely male-dominated” (CIS, 2013). In another 20% companies, there are two woman directors and none of companies have three or more woman directors on the boards irrespective of the size of the board. None of these companies have woman Chairperson signifying that in all companies under study, male dominance prevails in the positions at helm. Does this position results from lack of competent women IT professionals in India? Even the internationally well-known names like Tata Consultancy, Wipro, Tech Mahindra have just woman director while companies like Infosys and HCL Technologies have two women directors on their boards. There are seven companies with 11 or more directors but none of them have appointed more than one woman as director.

The law mandates for appointment of just one woman on boards of companies irrespective of the size of board or total number of directors. The Companies Act provides for a minimum of 3 and maximum of 15 directors on boards of public limited companies which comes under purview of woman director

norm. A company with 5 directors is required to have one woman as director, as also a company with 15 directors, three times the board numbers of previous company. In other word, the law does not prescribe for number of woman directors as percentage of total directors which would be true indicator of gender diversity on corporate boards in India. The position in this regard in case of IT companies is reflected in following table:

**Table 3: Percent share of woman directors in IT companies**

Sl. No	Percentage of women directors	No of companies
1	0-5 %	0
2	5-10%	9
3	10-15%	14
4	15-20%	3
5	20-25%	2
6	25-30%	0
7	30-35%	2
8	Above 35%	0
	Average =14.5%	Total= 30

It emerges that in half of IT companies, percentage share of women directors is between 10 -15% and on the average, it is at 14.5%. Only in 2 companies, percentage of women directors is more than 25%. The law also enjoins on listed companies to have at least one third Independent Directors on their boards. These are directors who are not related to promoters and have no pecuniary relationship with company or its promoters or directors. The condition of independence does not apply to women directors, which means that companies are free to appoint their relatives and friends on boards in compliance of law. This has been given a leeway to companies to overlook professional women and offer board seats to family women. A women who is nominated as Independent Director will not be reckoned as fulfilling the position of women director which need to be separately appointed.

#### **Status of women Directors in top IT companies in USA**

For comparison purposes, the position of women representation in top It companies in USA was also assessed and is reflected in Table 3 (Annexure II). The outcome is presented below:

**Table 4: No of IT companies with different no of directors**

Women Director	No of companies	%
0 Women Director	1	10%
1 Women Director	2	20%
2 Women Directors	3	30%
3 Women Directors	4	40%

In major US technology companies, there are 20 women directors in 10 companies, while in India, only 36 directors find seat on 30 corporate boards, showing much less women representation. In US companies, while 40% companies have three directors each, no Indian company has this feature. 70% of IT companies in US have appointed two or more directors on their boards, though only 20% Indian IT companies have such distinction. Since, US Government has not enacted any mandatory norm for

women directors on company boards, one US company is shorn of any women representation on its board. It emerges that major IT companies have shown better progress in gender equality even without any legislative quota provision.

### Women Directors in other Sectors

Internationally a 2014 report by Credit Suisse brought out that women constituted only 6.7% on corporate boards though there was an increasing trend over past few years.

**Table 5: Percentage of women Directors on Corporate Board**

Year	2010	2011	2012	2013
Percentage of women on boards	5.5%	5.8%	6.2%	6.7%

**Source:** Credit Suisse, 2014

In India, a study conducted in 2012-13, on a sample of NSE 50 (National Stock Exchange) companies and their board composition revealed that on an average 56% of companies had at least one woman on their board (Sharma, 2014). In banking industry, at least four banks are led by women chairpersons or CEO, including two public sector banks. The Government of India has also floated in 2014, a bank predominantly devoted to the cause of women, led by a woman as chairperson and its board is largely comprised with women directors. However, while most private sector banks have at least one women board member, most of public sector banks have not inducted women as directors. Being bodies set up under independent statutory enactments, they have escaped the mandate of new provision dealing with women seats on boards, but as purveyor of the new law, Government was expected to play a role model in showing way with their own undertakings. One noteworthy aspect in financial sector is that a good number of women are heading organizations and have earned a name for themselves.

### What IT companies need to do?

Here are some suggestions that IT companies can follow to improve gender diversity on their boards in the medium to long run:

- The Chairmen, CEOs and other members of board have to bring a change in the mindset that only male directors can take better strategic decisions for long term value of companies,
- Top management should encourage, motivate and groom senior women executives for gradual upgradation to top most positions to build a sustainable pipeline for women directors,
- Companies should devise suitable training programmes in leadership and strategic decision making, for grooming senior women professionals for board positions,
- A pragmatic view should be taken in women specific matters of career breaks, flexi working timings and post maternity facilitation,
- Board selection process should be non-discriminatory and without any bias towards soft gender,
- A holistic and sustainable long term strategy towards gender diversity on corporate boards should be adopted by top management of companies and implemented in right earnest,

### Conclusion

Even before the introduction of new provision regarding one woman director on the board, some IT and other companies with progressive outlook inducted women on their boards. The new legislation made it mandatory and companies scrambled to comply before the deadline. It was, however, observed that

most of companies appointed women directors from their families and tended to defeat the very intent of law which sought to widen gender diversity on corporate boards by providing representation to professional women. The Information Technology sector in India has been brimming with rich professional women talent but the study has revealed that IT companies has shown only tokenism in appointing women directors in compliance of legal mandate. It is expected that such companies will exhibit more women orientation in their board nominations in future matching with the professional nature of their industry in true spirit of gender diversity. The role of Chairman and CEO is critical in making a strong business case for more women representation on boards. Not only that they should also plan some training programs for women members of board as well as women senior executives for grooming them for an effective role in strategic decision making.

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**Table 1: Women Directors in IT Companies listed on NSE with Market Cap of Rs. 1000 cr or above as on 2<sup>nd</sup> January, 2016**

SL. No.	Company	Total no. of Directors	Chairman (M/F)	No of women Directors	No of men Directors	% of women Directors
1	Infosys	8	M	2	6	25.0
2	Tata Consultancy Services	11	M	1	10	9.1
3	HCL Technologies	10	M	2	8	20.0
4	Wipro	10	M	1	9	10.0
5	Tech Mahindra	10	M	1	10	10.0
6	Mindtree	10	M	2	8	20.0
7	Info Edge (India)	9	M	1	8	11.1
8	Just Dial	8	M	1	7	12.5
9	Zensar Technologies	9	M	1	8	11.1
10	Vakrangee Software	8	M	1	7	12.5
11	Tata Elexi	7	M	1	7	14.3

12	Take solutions	11	M	1	10	9.1
13	SQS India BFSI	9	M	1	8	11.1
14	Sonata Software	8	M	1	7	12.5
15	Ramco Systems	9	M	1	8	11.1
16	Persistent Systems	8	M	1	7	12.5
17	Polaris Consultants	12	M	1	11	8.3
18	8K Miles	6	M	2	4	33.3
19	Accelaya kale Solutions Ltd	8	M	2	6	25.0
20	<a href="#">Cyient</a>	11	M	1	10	9.1
21	<a href="#">eClerx Services</a>	9	M	1	8	11.1
22	<a href="#">First sour.Solu.</a>	11	M	1	10	9.1
23	<a href="#">Geometric</a>	8	M	1	8	12.5
24	<a href="#">Hexaware Tech.</a>	11	M	1	10	9.1
25	<a href="#">Hinduja Global</a>	6	M	2	4	33.3
26	<a href="#">Intellect Design</a>	5	M	1	4	20.0
27	<a href="#">KPIT Tech.</a>	10	M	1	9	10.0
28	<a href="#">Lycos Internet</a>	7	M	1	6	14.3
29	<a href="#">MphasiS</a>	9	M	1	8	11.1
30	NIIT Tech	7	M	1	6	14.3

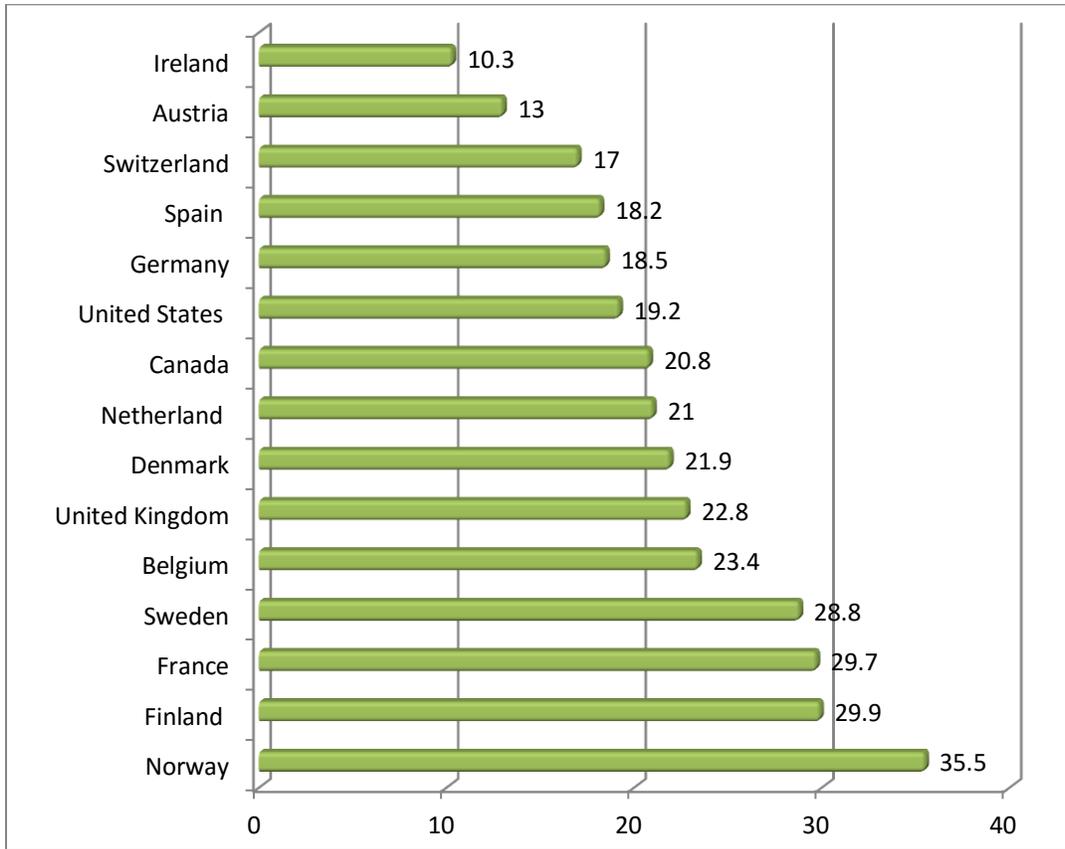
Source: Compiled from NSE and web sites of respective companies as on 7<sup>th</sup> January, 2016

**Table 3: Women Directors in top IT Companies in USA**

Sl. No.	Company	Total no. of Directors	No of women Directors	No of men Directors	% of women Directors
1	Microsoft	11	3	8	27.2
2	IBM	14	3	11	21.4
3	Oracle	13	2	11	15.4
4	Xerox	8	3	5	37.5
5	Cognizant	10	1	9	10.0
6	VMware	8	0	8	0.0
7	Adobe	13	2	11	15.4
8	CSC	9	1	8	11.1
9	Intuit	10	3	7	30.0
10	Apple	8	2	6	25.0

Source: Compiled from web sites of respective companies as on 17<sup>th</sup> February, 2016

**Figure I: Percentage Women Share of Board positions at Stock Exchange Index Companies in USA, Canada and Europe**



Source: Compiled from Catalyst, October 2014 data, <http://www.catalyst.org> (June, 2015)

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## **TMT Characteristics, Time-to-IPO and Firm Performance \***

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### **Abstract**

We explore the influences of the demographic characteristics of a firm's top management team (TMT) on the time it takes to complete an initial public offering (time-to-IPO), and the consequences of this decision for the firm's performance. Using data from pre-packaged software industry firms that completed IPOs between 1993 and 1997, we find TMT age, tenure, size, and tenure heterogeneity all increase time-to-IPO. While time-to-IPO has no direct effect on firm performance, it moderates some of the relationship between TMT characteristics and firm performance.

**Key words:** TMT characteristics, Firm performance, Time-to-IPO, Moderating role

### **Introduction**

There are good reasons for a firm's top managers and investors to complete an IPO early in the life of the firm. For instance, they may be motivated to complete an IPO by the desire to improve the firm's reputation, create a currency for acquisitions, or mobilize capital for supporting growth (Brau and Fawcett, 2006). An IPO is considered by many to be an achievement and/or a performance milestone for a new firm and an indicator that it is primed for growth (Chang, 2004). An IPO provides an opportunity for founders and investors to "cash out" and be compensated for shouldering considerable risk during

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\* A preliminary version of this paper was presented in November 2011 at the SMS 31<sup>st</sup> Annual International Conference at Miami, FL. We thank Trevor Hayward and Thomas Craig for their assistance with data collection.

the formative stages of a firm (Pagano, *et al.*, 1998). In addition, firm capitalists and other investors, seeking to increase the “real” rate of return on their investment, may prefer that a firm complete an IPO sooner rather than later (Shepherd and Zacharakis, 2001, p. 59).

On the other hand, there are equally good reasons for top managers and investors to delay an IPO to the greatest extent possible. The change from private to public ownership is a significant transformational event and may expose the firm again to the liabilities of newness (Fischer and Pollock, 2004). Indeed, research has shown that a significant number of firms under-perform the market or fail within three to five years after their IPOs (Fischer and Pollock, 2004; Jain and Kini, 2000; Ritter, 1984). As such, managers may elect to take time to learn and build their human resources, systems, and operations, as well as build market share so that the firm can withstand the intense scrutiny and demands of operating as a public company.

It is this dilemma that Jovanovic and Rousseau (2001) attempted to solve, when they raised the question “Why wait?” in their paper analyzing the time firms have taken to complete their initial public offerings (IPOs). They suggested that the answer to this question may depend on the trade-off that the firm’s top managers make between incurring the opportunity cost of waiting, and taking the time to learn about their technologies, products and markets (Clark, 2002).

The choice of when to go public is an important one for a firm’s legitimacy, immediate resource needs, and future performance. A number of studies have explored the implications of time-to-IPO, i.e., the time elapsed between firm founding and completion of its IPO. Many studies have considered time-to-IPO as an outcome or performance measure in relationship to firm characteristics including industry (Giot and Schwienbacher, 2007; Shepherd and Zakarakis, 2001), geographic location (Shepherd and Zakarakis, 2001), location near rivals (Stuart and Sorenson, 2003), the reputation of firm capital firms investing in the firm and that of the firm’s alliance partners (Chang, 2004), and the breadth of experience of the founding team (Beckman and Burton, 2008). Other studies have used time-to-IPO – typically termed “firm age” or “firm age at IPO” – as a variable with the potential to influence either firm outcomes at IPO, such as under-pricing (e.g., Ritter, 1998), or the firm’s post-IPO market performance or survival (e.g., Fischer and Pollock, 2004; Higgins and Gulati, 2006; Jain and Kini, 2008).

In this study, we focus specifically on the influences of the demographic characteristics of a firm’s top management team (TMT) – a set of variables that decidedly influences the firm’s early development and subsequent evolution – on its time-to-IPO and performance. For the firm, the time between founding and IPO (i.e., time-to-IPO) may provide an opportunity for learning and preparation in advance of the IPO. The effect that TMT characteristics have on firm performance may well be influenced by the time-to-IPO, i.e. the firm’s time-to-IPO also may moderate the relationship between TMT characteristics and firm performance. Accordingly, we examine three related issues: (1) the direct influence of the demographic characteristics of the firm’s TMT on its time-to-IPO and firm performance; (2) the direct effect of time-to-IPO on the firm’s performance; and (3) the potential role of time-to-IPO as a moderator in the relationships between TMT characteristics and the firm’s performance.

Our study contributes to the literature by providing a more comprehensive understanding of the relationships among TMT characteristics, time to IPO, and firm performance. Specifically, we build on literature that views the TMT as a valuable source of human and social capital based on the team members’ knowledge and experience (e.g. Carpenter, *et al.*, 2004; Hambrick and Mason, 1984; Hitt, *et al.*, 2001). Our study contributes to the literature by testing the value that additional time elapsed between startup and IPO might afford a firm to learn and prepare for the increased complexity of life as

a public company and so enhance its performance. Our study also makes potentially valuable practical contributions. In particular, our findings pertaining to the performance implications of time-to-IPO will be of interest to entrepreneurs, executives of new firms, and firm capitalists alike.

The remainder of our paper is organized as follows. We begin with a review of literature on TMT characteristics, time-to-IPO, and firm performance. We present a theoretical model relating TMT characteristics to time to IPO and firm performance, and the moderating role of time-to-IPO. Next, we describe our data and methods. We then present the results of our analysis. Finally, we discuss our results and conclude with ideas for future research.

### **Theoretical Background and Hypotheses**

The examination of the link between TMT demographic characteristics, as proxies for the underlying traits, capabilities, and processes of the team, and firm outcomes enjoys a long tradition in the strategy literature (for recent reviews, see Carpenter, *et al.*, 2004; Hambrick, 2007). TMT knowledge and experience, in particular, are viewed as important resources in terms of human and social capital because they afford the firm direct and indirect access to valuable knowledge and information (Fischer and Pollock, 2004; Hitt, *et al.*, 2001; Pfeffer, 1994). As Hambrick (2007) notes, there is considerable evidence that TMT characteristics influence a variety of firm behaviors and outcomes. Past research has shown that TMT demographic heterogeneity significantly influences the propensity for change (e.g., Grimm and Smith, 1991; Wiersema and Bantel, 1992) and firm outcomes such as firm performance (Glick, *et al.*, 1993; Hambrick, *et al.*, 1996; Kilduff, *et al.*, 2000; Simons, *et al.*, 1999). In the entrepreneurship literature as well, TMT demographic characteristics are routinely identified as proxies for other variables that potentially influence firm strategy and performance (e.g., Certo, *et al.*, 2009; Cooper and Bruno, 1977; Daily, *et al.*, 2003; Eisenhardt and Schoonhoven, 1990; Gilbert, *et al.*, 2006; Weinzimmer, 1997; Zimmerman, 2008).

Figure 1 offers a preview of our theoretical model. In the remainder of this section, we use pertinent literature to develop our hypotheses on the relationships among the firm's TMT characteristics, time-to-IPO and short-term and long-term performance.

#### **TMT age, Time-to-IPO and Firm performance**

One frequently studied TMT demographic characteristics is age. Hambrick and Mason (1984) argued that age is related to status quo and the willingness to accept change. According to Vroom and Pahl (1971), older manager are more risk-averse than younger manager, and Pegels and Yang (2000) noted that younger managers seek strategic change. Yang, *et al.* (2011) found that the age of a specific member of the TMT, the CEO, is positively related to a firm's time to IPO. They argued that because going public is a complex strategic change for a firm, younger CEOs are more likely to take a company public earlier in a firm's life than older CEOs.

TMT age has been positively associated with higher levels of experience (Sandberg and Hofer, 1987; Sapienza and Grimm, 1997). Higher levels of experience, a critical attribute associated with human capital, can potentially increase the capacity of the TMT to combine existing knowledge and resources productively (Hitt, *et al.*, 2001). Higher levels of experience can also increase confidence and self-efficacy, i.e., the belief that one can successfully accomplish a task (Bandura, 1997).

Additionally, the age of TMT members has been used in TMT research as a proxy for networks and affiliations (e.g., Richard and Shelor, 2002) and, more generally, social capital. Social capital enables TMTs to have access to sources of valuable information and knowledge outside of the firm (Fischer and

Pollock, 2004). From this perspective, older TMTs are likely to have stronger ties to individuals and organizations which can provide legitimacy to the firm.

These positive aspects of age suggest that, all else being equal, older TMTs may be able to weigh the pros and cons of completing an IPO earlier versus later, may be more inclined to avoid risky decisions than their younger counterparts (Miller and Shamsie, 2001; Vroom and Pahl, 1971) and, thereby, avoid the risk of a failed IPO (Ling, *et al.*, 2008). Furthermore, they are likely to take as much time as needed to develop the organizational capabilities to position the firm to perform well, rather than acting hastily to complete an IPO too early in the life of the firm. Accordingly, we hypothesize:

**H1a:** *TMT age is positively related to a firm's time-to-IPO.*

**H1b:** *TMT age is positively related to a firm's performance.*

### **TMT tenure, Time-to-IPO and Firm performance**

TMT tenure, the duration of time during which members have been part of the firm's TMT, is an important characteristic (Pfeffer, 1981) that offers insight into the behavior of TMTs on issues related to strategic change (Boeker, 1997; Wiersema and Bantel, 1992). Long-tenured TMT members form cohesive networks with other members and develop a unique pattern of interactions (Fischer and Pollock, 2004). With time, the TMT members may accumulate deep firm-specific knowledge, and discern the value of their respective competences. Furthermore, team members with relatively long tenure may perceive a high level of personal "investment" in the firm. All of these considerations may enable them to develop a "collective mindset" and a common perspective of the firm, thereby resulting in TMT cohesion, consistent decisions and consistent behaviors (Hambrick and Mason, 1984).

While there are benefits to having a long-tenured TMT, Finkelstein and Hambrick (1990, p. 486) reported, "...firms led by long-tenured executives will tend to have (1) persistent, unchanging strategies, (2) strategies that conform closely to industry averages, and (3) performance that conforms to industry averages." Therefore, long-tenured TMTs may be associated with risk averseness and a strong commitment to a course of action, which may compromise the ability of the firm to change course and adapt as necessary. In the case of an IPO, a long-tenured team may delay the firm's IPO and also negatively influence the firm's performance. Based on the above arguments, we hypothesize as follows:

**H2a:** *TMT tenure is positively related to a firm's time-to-IPO.*

**H2b:** *TMT tenure is negatively related to a firm's performance.*

### **TMT size, Time-to-IPO and Firm performance**

TMT size is another frequently studied TMT characteristic. A large TMT means that more resources are available to the firm (Hambrick and D'Aveni, 1992), and more information can be processed and brought to bear on problems, thereby resulting in potentially better decisions (Cummings, *et al.*, 1974; Haleblan and Finkelstein, 1993). Several entrepreneurship studies have found that a larger TMT contributed to more effective problem solving and firm performance compared to smaller TMTs (Cooper and Bruno, 1977; Eisenhardt and Schoonhoven, 1990; Song, *et al.*, 2008).

Large TMTs, however, tend to experience higher transactions costs, more coordination problems, and more disagreements than small TMTs (Bruderl, *et al.*, 1992; Gilbert, *et al.*, 2006; Koeller and Lechler, 2006) and may take longer to make decisions (Thomas and Fink, 1963). In the context of a firm considering an IPO, TMT size may affect the decision to go public. Large TMTs may take more time to decide to go public. In addition, the resources of a large TMT may also enable the firm to make better decisions and position the firm for long-term success. Accordingly, we hypothesize:

**H3a:** *TMT size is positively related to a firm's time-to-IPO.*

**H3b:** *TMT size is positively related to a firm's performance.*

### **TMT age heterogeneity, Time-to-IPO and Firm performance**

There is extensive literature examining the heterogeneity of the TMT (Zimmerman, 2008). One form of heterogeneity frequently studied is age heterogeneity. TMT age heterogeneity results from differences in the respective ages of team members. If age is a proxy for perspectives, belief systems, networks and affiliations (Richard and Shelor, 2002), heterogeneity in age implies access to a broader set of perspectives and information (Williams and O'Reilly, 1998) and potentially more creativity in addressing strategic issues (Richard and Shelor, 2002; Wiersema and Bantel, 1992). Indeed, greater TMT age heterogeneity has been linked to better firm performance (Kilduff, *et al.*, 2000; Richard and Shelor, 2002; Wiersema and Bantel, 1992).

While there are many positive aspects to age heterogeneity, there are negative consequences. For instance, age heterogeneity may result in conflict, and conflict may lead to poor decision processes (Amason, 1996; Jehn, 1995; Jehn, *et al.*, 1999), slower decisions, (Miller, *et al.*, 1998) and lower propensity to respond to competitors (Hambrick, *et al.*, 1996). In the context of an IPO, such conflicts may delay the decision to take the company public and/or the IPO event. However, the potential for more creativity and better decision-making due to age heterogeneity may positively influence firm performance. Accordingly, we hypothesize:

**H4a:** *TMT age heterogeneity is positively related to a firm's time-to-IPO.*

**H4b:** *TMT age heterogeneity is positively related to a firm's performance.*

### **TMT tenure heterogeneity, Time-to-IPO and Firm performance**

A second form of TMT heterogeneity is that of the team members' tenure. Heterogeneity in TMT tenure implies that TMT members were hired at different times. Some members may be founders of the firm while others are recruited to bring in skills and experience critical to strategic flexibility and emergent demands as the firm prepared for the IPO event and life as a public company (Bantel and Jackson, 1989; Certo, 2003; Wiersema and Bantel, 1992; Zimmerman, 2008). Tenure heterogeneity within the TMT has been found to benefit firm performance and strategic change (Hambrick, *et al.*, 1996; Murray, 1989; Wiersema and Bantel, 1992).

Negative aspects of TMT tenure heterogeneity include greater cognitive rigidity and commitment to the status quo, less social integration, higher turnover, and poorer communication than groups with less heterogeneity (Bantel and Jackson, 1989; Williams and O'Reilly, 1998). Bantel (1993) argued that teams with higher tenure *homogeneity* form a cohort that influences consensus and is positively related to reaching a consensus in a strategic decision.

As in the case of age heterogeneity, tenure heterogeneity may lead to conflicting perspectives and slower decisions. In the context of an IPO, tenure heterogeneity may delay the IPO event, but positively influence firm performance. Accordingly, we hypothesize:

**H5a:** *TMT tenure heterogeneity is positively related to a firm's time-to-IPO.*

**H5b:** *TMT tenure heterogeneity is positively related to a firm's performance.*

### **TMT functional heterogeneity, Time-to-IPO and Firm performance**

A third frequently studied form of TMT heterogeneity is that of functional heterogeneity. Top managers are thought to have a generalist's perspective (Hambrick and Mason, 1984), many top

managers have a functional specialization (Gupta, 1984). Hambrick and Mason (1984) argued that a top manager's functional experience provides a functional orientation that influences decisions. In new firms, the founding team members were found to have emphasized the functional areas in which they were experienced (Boeker, 1988). Researchers have argued that greater heterogeneity in the functional backgrounds of team members increases variety in the environmental scanning alternatives and effective decision making, influences competitive action and response, leads to creativity and innovation, influences strategic decision making, and improves firm performance (Bantel and Jackson, 1989; Glick, *et al.*, 1993; Hambrick and Mason, 1984; Hambrick, *et al.*, 1996; Lant, *et al.*, 1992; Murray, 1989; Roure and Keeley, 1990; Weinzimmer, 1997; Williams and O'Reilly, 1998; Zimmerman, 2008).

Eisenhardt and Schoonhoven (1990) found a TMT with more functional heterogeneity can better address strategic opportunities and better enable the firm to grow. In new firms Ensley *et al.* (1998), however, found TMT functional background heterogeneity was negatively related to revenue generated. A team experienced across functional areas (e.g., finance, human resources, marketing, operations, engineering) enables the firm to respond to challenges and opportunities more effectively than a team focused in one functional area (e.g., engineering). Heterogeneity in the top managers' functional background provides a signal to investors about the quality of an IPO firm, and firms with a management team with greater functional background heterogeneity raised more money at IPO than those with a less heterogeneous team (Zimmerman, 2008).

As in the case of age and tenure heterogeneity, we anticipate that functional heterogeneity may lead to conflicting perspectives and slower decisions. In the context of an IPO, tenure heterogeneity may delay the IPO event, but positively influence firm performance. Accordingly, we hypothesize:

**H6a:** *TMT functional heterogeneity is negatively related to a firm's time-to-IPO.*

**H6b:** *TMT functional heterogeneity is positively related to a firm's performance.*

### **Time-to-IPO and Firm Performance**

In the IPO literature, studies have used firm age as a measure of risk and generally found a positive relationship between firm age and firm performance, presumably due to the reduction in uncertainty associated with the firm (Daily, *et al.*, 2003; Hoskisson, *et al.*, 1994; Mikkelsen, *et al.*, 1997). From a learning theory perspective, this result appears reasonable. Learning theory maintains that a firm learns when it acquires useful information (Huber, 1991). Accordingly, a firm's time-to-IPO, all else being equal, may be an indicator of the extent to which the TMT has had time to acquire useful information pertaining to this event and the future, and prepare for the anticipated future. For instance, given more time, a firm is more likely to have searched and acquired information to increase its competitive advantage, build a track-record, staff various critical functions, and put in place appropriate organizational structures, processes and governance mechanisms. Firms that are in existence for longer periods of time prior to undertaking an IPO have more time to develop and enhance their competitive position, staffing, capabilities, slack resources and track-record of performance. Shepherd and Zakarakis (2001) found that firm-capital-backed high-technology firms took a longer time to complete their IPO than non-technology firms and speculated that this might be because high-technology firms take longer to develop. Thus, from a learning theory perspective, a longer time-to-IPO will enable TMTs to acquire knowledge and information that can prove to be beneficial to firm performance.

All other things being equal, a shorter time-to-IPO might mean that the firm is not yet "ready" for IPO and may be lacking in legitimacy. Such a firm is more likely to disappoint the stock market after the initial exuberance subsides and compromise its very legitimacy. Absent legitimacy, the firm's ability to attract relevant resources, build new capabilities or renew existing ones, and sustain its long-term

performance as a public firm would be limited severely. Its very survival would be in doubt, as indicated by strong findings that a significant proportion of firms tended to under-perform the market and failed subsequent to their IPOs (Certo, *et al.*, 2009; Ritter, 1998). Accordingly, we contend that the longer a firm takes to complete IPO, the better would be its post-IPO performance:

**H7:** *Time-to-IPO is positively related to firm's performance*

### **Time-to-IPO as a Potential Moderator**

In a comprehensive review of the so-called upper-echelon theory, Carpenter, *et al.*, (2004: 750) summarized, "the underlying (upper echelon) framework is a linear one – the situation (faced by the firm) is enacted by the TMT, enactment leads to strategic choices, and those choices affect (firm) performance. The linkages connecting the situation directly to (upper echelon) characteristics and strategic choices are never explicitly addressed ..." Additionally, in their meta-analysis of prior research on IPO underpricing, Daily, *et al.*, (2003) examined research studies on IPO underpricing and suggested the possibility that there may be as-yet unexplored moderating influences at work.

One such potential moderating influence on the relationship between TMT characteristics and firm performance may be that of the time-to-IPO. Time-to-IPO is akin to a resource. It affords TMTs opportunity to learn technology, product and markets, and prepare the firm to operate as a public entity. The time-to-IPO can supplement the human and social capital and resources that firm already has. The time-to-IPO in conjunction with the other capital and resources available to the firm can make a difference to firm performance. But not all firms may need the time-to-IPO nor can benefit from it evenly. Certain TMTs may actually benefit from wide window of time available and certain other TMTs may be challenged by a rather narrow window of time. For example, relatively young TMTs may actually benefit from long time-to-IPO, as it gives the TMT time to learn and it may result in high firm performance; in contrast, short time-to-IPO may challenge relatively young TMTs and it may hurt firm performance. Along the same lines as the above, relatively large TMTs may not need much time to learn and complete IPO; nonetheless their firm performance can get a boost from a wide window of time. TMTs with long tenured members, taking a long institutional view of the firm, might choose to take a long ramp to complete IPO and profit from it. Whereas, TMTs with relatively short tenured members might take a different ramp with different firm performance consequences. In other words, the time-to-IPO and TMT characteristics interact and jointly influence firm performance. Accordingly, we hypothesize:

**H8:** *Time-to-IPO of a firm moderates the relationships between TMT demographic characteristics and firm performance.*

### **Data and Methodology**

To test our hypotheses, we analyzed a sample of firms in the pre-packaged software industry (SIC code 7372) that completed their IPO during the period of January 1, 1993 through December 31, 1997. Researching a single industry has the methodological advantage of isolating industry effects from confounding relationships between the independent and dependent variables (Dess, *et al.*, 1990). The pre-packaged software industry was selected because a large number of firms in this space completed their IPO during a period of significant IPO activity preceding the dot-com bubble. According to the IPO Reporter and IPO Data, 243 US based software firms completed their IPOs during the period between January 1, 1993 and December 31, 1997.

The primary data source for the study was the prospectus issued at the time of IPO by the firms. We were able to obtain IPO prospectuses for 172 of the 243 firms. Nevertheless, our sample was representative of the population of pre-packaged software firms that completed their IPO between

1993 and 1997. The average IPO value of the population was \$30.6 million and the average IPO value of firms in our sample was \$32.7 million.

For each of the firms, we collected the following data:

### **Dependent Variables**

**Time-to-IPO.** Time-to-IPO was measured as the time (in years) elapsed from a firm's date of incorporation to the date of the IPO.

**Firm performance.** Capital raised at the time of IPO is a measure of the market value of the firm at the time of its IPO (Deeds, *et al.*, 2004; Finkle, 1998). In this study, we calculated the net proceeds received by the firm from the IPO as the capital raised through the IPO less the underwriters' fees, as reported in the firm's prospectus.

### **Independent Variables**

For the purposes of this study, the TMT comprised the individuals listed in the prospectus as the management team (Shrader, *et al.*, 2000). This includes all of the top officers and the key decision makers of the company such as the Chief Executive Officer, Chief Financial Officer, Chief Operating Officer, as well as all the managers listed in the management section of the IPO prospectus (Murray, 1989). Data on TMT demographic characteristics and heterogeneity were collected from the biographies of the members in the IPO prospectus and S1 and SB-2 filings at the SEC.

**TMT age** was calculated as the average age of the individual TMT members.

**TMT size** was calculated as the number of members in the firm's TMT.

**TMT tenure** was measured using the average time in years between an individual TMT member's hire date and the IPO date. A lower number indicates that the team has been put together close to the date of IPO, and a higher number indicates that the team was put in place earlier in the life cycle of the firm.

**TMT age heterogeneity.** Age heterogeneity was computed as the coefficient of variation of the team members' age (Murray, 1989; Richard and Shelor, 2002), where a high score indicates age heterogeneity and a low score indicates lack of age heterogeneity.

**TMT tenure heterogeneity.** Tenure heterogeneity was calculated as the coefficient of variation of the top managers' tenure (Murray, 1989), where a high score indicates tenure heterogeneity and low score indicates lack of tenure heterogeneity.

**TMT functional heterogeneity.** Functional heterogeneity was calculated using Blau's (1977) heterogeneity index  $(1 - \sum i^2)$ , where  $i$  is the proportion of TMT in members with background in a given functional area, e.g., finance, human resources, general management, marketing, operations, R&D, information technology, and legal (see Boeker, 1988; Tihanyi *et al.*, 2000; Zimmerman, 2008). A high score indicates a high level of heterogeneity in the functional backgrounds of team members, whereas a low score indicates a lack of functional heterogeneity.

### **Control Variables**

To control for the effects, if any, of the IPO market environment and other aspects of the firm itself on its performance, we treated the following as control variables:

**IPO year.** The period covered by the study (1993-1997) witnessed varying capital market conditions, with 1993 and 1996 being regarded as “hot markets” for IPO (Zimmerman, 2008). To control for the effects of these varying conditions on IPO activity, we created the following dummy variables IPOyear1993, IPOyear1994, IPOyear1995 and IPOyear1996. If a firm completed its IPO in 1995, the IPOyear1995 dummy will have a value 1 and all other IPOyear dummy variables will have value 0.

**VC equity.** Past research has demonstrated the critical role played by VC support in ensuring that a firm raises sufficient capital through an IPO (e.g., Brav and Gompers, 1997; Chang, 2004; Gompers, 1995; Gulati and Higgins, 2003). We measured VC involvement as the percentage of equity held by VCs, as declared in the firm’s IPO prospectus.

**Underwriter reputation.** Past research has shown that the reputation of the lead underwriter influences the capital raised by the firm through an IPO (Beatty and Ritter, 1986; Gulati and Higgins, 2003; Lange, *et al.*, 2001). We measured underwriter reputation using the index created by Carter, *et al.* (1998). A value of 0 denotes the lowest reputation, whereas a value of 9 denotes the highest reputation.

In addition, we used two variables to control for the prior performance of firms:

**Net income during prior year** was measured as the net income declared by the firm for the full financial year immediately preceding the IPO date.

**Book value of equity during prior year** was measured as the book value of equity declared by the firm for the full financial year immediately preceding the IPO date. The book value of equity can be either a positive or a negative value, depending on whether the firm has accumulated retained earnings or losses during its lifespan prior to the IPO. Accordingly, it can serve as a cumulative or summary record of firm performance.

## Data Analysis

Descriptive statistics and bivariate correlations are presented in Table I.

To test the relationships between TMT variables and the time-to-IPO, we completed a regression model treating time-to-IPO as the dependent variable and the TMT variables and the control variables as the independents. Next, to test the relationships between TMT variables and firm performance, we completed a regression model treating firm performance as the dependent variable and TMT variables and control variables as the independents. To test the relationship between TMT variables, time-to-IPO and firm performance, we completed a regression model with firm performance as a dependent variable and TMT variables, time-to-IPO and the control variables as the independent variables. Finally, to test moderating influence of time-to-IPO on the relationships between TMT variables and firm performance, we completed a regression model treating firm performance as the dependent variable, time-to-IPO, TMT variables and control variables, cross-product of time-to-IPO and TMT variable as the independent variables. We introduced one cross-product term at a time in the model and analyzed only those interaction terms that had significant effect on firm performance. To minimize the concerns arising from multi-collinearity, we centered all variables around their respective means. The highest Variance Inflation Factor (VIF) for variables in our models was 3.60; it was significantly less than the typically recommended cut-off value of 10. The results are presented in Table II.

## Study Results

**TMT Characteristics and Time-to-IPO:** According to the regression results presented in Model 2a (Table II), TMT age did have a positive and significant effect on time-to-IPO, supporting Hypothesis H1a ( $\beta=$

0.12;  $p < 0.05$ ). TMT average tenure had a positive and significant effect on time-to-IPO ( $\beta = 0.68$ ;  $p < 0.01$ ) in support of hypothesis H2a. TMT size had a positive and significant effect on time-to-IPO ( $\beta = 0.15$ ;  $p < 0.05$ ), lending support to hypothesis H3a. TMT age heterogeneity had no significant effect on time-to-IPO, failing to support hypothesis H4a. TMT tenure heterogeneity had a significant and positive effect on time-to-IPO ( $\beta = 0.26$ ;  $p < 0.01$ ). This result supports hypothesis H5a. And, TMT's functional heterogeneity had no significant effect on time-to-IPO. We did not find support for hypothesis H6a.

**TMT Characteristics and Firm Performance:** Results from Model 2b (Table II) show that TMT size had a significant and positive effect on firm performance ( $\beta = 0.18$ ;  $p < 0.05$ ), supporting our hypothesis H3b. Also, from Model 2b (Table II), results show that TMT's functional heterogeneity had a significant and positive effect on firm performance ( $\beta = 0.13$ ;  $p < 0.10$ ), lending support to hypothesis H6b.

**Time-to-IPO and Firm performance:** The results from Model 2c (Table II) also show that time-to-IPO had no effect on firm performance. The result indicated no support for hypothesis H7 in which we argued that time-to-IPO would have direct and positive relationship with firm performance.

**Moderating role of Time-to-IPO:** With respect to hypothesis H8 in which we predicted that time-to-IPO would moderate the relationships between TMT characteristics and firm performance, results presented in Models 2d and 2e (Table II) show the following: time-to-IPO and TMT size jointly effect firm performance ( $\beta = 0.18$ ;  $p < 0.05$ ). Also, time-to-IPO and TMT's functional heterogeneity jointly determine firm performance ( $\beta = 0.18$ ;  $p < 0.01$ ). In these two respects hypothesis H8 found support.

## Discussion

We started with the premise that a question that firms seeking to do IPO face is: "how long do we wait to do an IPO?" The answer, in part, is that it is a matter of choice – a choice that is made by TMT. The results presented in this paper affirm that TMT characteristics determine the time-to-IPO and TMT characteristics and time-to-IPO jointly effect firm performance. Some TMTs may need more time to prepare the firm to face the changes associated with transformation from a private enterprise to a public firm and manage the attendant risks. The pre-IPO process involves learning – learning on the part of the TMT members and this goes beyond technology related matters; and it involves willingness to make trade-offs with revenue and profit from any delays. This was the trade-off that Jovanovic and Rousseau (2001) and Clark (2002) posited. The results presented in this paper contribute to our understanding of the behavior of firms in matters related to a major milestone, viz., IPO, specifically, time-to-IPO, its determinants and firm performance consequences.

The positive relationship we found between TMT's age and time-to-IPO suggests that TMTs with relatively old members, who may be heavy on human and social capital, seemed to rely on the capital and take a long ramp to learn all that it takes to complete their IPO. And by the same arguments situations that present relatively short calendar to do an IPO can be challenging contexts for relatively young TMTs. In part, this study is about early TMTs, specifically, early TMTs that were in place at IPO. Beckman, *et al.*, (2007) tracked TMT membership changes, i.e., entrances and exits, which had occurred in "early teams" of 161 firms in multiple industries. Their findings showed that human capital, e.g., functional diversity, and social capital, e.g., background diversity in terms of the number of firms previously associated with, were positively related to the likelihood of their firms reaching major milestones, e.g., completing a successful IPO. Results presented in this paper add depth to the findings of Beckman, *et al.* (2007) in that TMT team tenure was positively related to time-to-IPO. Long tenured teams can be thought of as comprising members who were present at "creation," have a "vision," and

have firm-specific knowledge of the firm. These qualities seemed to have a positive effect on the time-to-IPO.

Doing an IPO is about strategic change and restructuring. Learning to initiate and successfully complete the changes can be critical to the success of new public firms. Findings presented in this paper with respect to TMT group heterogeneity lend further support to the findings of Wiersema and Bantel (1992) who showed that firms with long tenured teams were more likely to engage in corporate strategy changes. The results presented in this paper extend the work done by Wiersema and Bantel (1992) to new firms and to decisions related to IPO. Going public is a risky event for the firm: Hambrick and Mason (1984), Vroom and Pahl (1971), among others, have argued that older TMTs tend to be risk-averse than younger TMTs and favor *status quo*. Along the same as the above, Yang, *et al.* (2011) found that relatively old CEOs are more likely to complete IPO later than sooner. Our results reinforce these prior findings.

The time cycle over which TMTs have come together, namely in a short hiring cycle or rather long hiring cycle, as reflected in TMT's tenure heterogeneity, also seemed to matter. Each new addition to the TMT tends to bring on board a member with a different frame of reference. Such additions to TMT seemed to make a difference. A story line that emerges from our results is: time-to-IPO *per se* does not make a difference to firm performance. In the sample of pre-packaged software firms examined in the study, firms that completed their IPO relatively early or rather late reported about same performance (as measured by the amount of capital raised). From the standpoint of the TMT, the order in which firms enter the capital market did not matter. One take-away for firms seeking to do an IPO: "Take your time, do your homework, prepare the firm for a successful IPO, and know that TMT characteristics matter more than being competing to do IPO first."

Then should the TMT do an IPO sooner, rather than later? That depends on the characteristics of the TMT that is in place. The time-to-IPO and the TMT characteristics, specifically, TMT size and TMT's functional heterogeneity, seemed to jointly have an effect on firm performance. The time-to-IPO provides the context in which the effects of TMT characteristics on firm performance are better understood: Moderating role of the time-to-IPO graphed in Figures 2a and 2b suggest the following: Firms with large TMTs reported higher performance than firms with small TMTs. Apparently, the more members in the TMT, the greater were the resources at hand, the greater were the opportunities to learn from each other, and the merrier it was with respect to firm performance! Relatively long calendar to complete an IPO seemed to provide further lift to the effect of TMT size on firm performance. (see Figures 2a and 2b)

Likewise, with TMT tenure, results presented in Figure 2b suggest the following: TMT tenure and time-to-IPO jointly determine firm performance. When IPO calendar is relatively short, firms with relatively short tenured TMTs outperform firms with long tenured TMTs. In contrast to this, when IPO calendar is relatively long, firms with long tenured TMTs outperform the firms with short tenured TMTs. A possible explanation is: TMTs are often engineered with a mission in mind – short tenured TMTs, i.e., TMT members are hired in a short order of time, are engineered with a mission to take the firm public as soon as possible and the firms indeed do outperform when the IPO ramp is rather short; long tenured teams, i.e., TMT members are hired a long period of time, are engineered rather deliberately and slowly, and firms do much better when the TMTs take relatively long time to complete IPO.

The moderator model that we proposed and tested in this paper sheds more light on the suggestion that Daily *et al.*, (2003) made on the possibility that there may be unidentified moderating influences on the performance of new firms. Specifically, the results presented in this paper identified time-to-IPO as a

moderator. There may be numerous other moderator variables as well. Nonetheless the findings add depth to the genre of studies that looked at the so-called intermediate decision and process related issues by adding time-to-IPO as yet another decision.

Our study has a couple of limitations. First, according to our hypotheses, TMT characteristics influence the time-to-IPO as well as firm performance. Our theory raises concerns related to endogeneity. Therefore, in addition to the OLS models and the results presented in Table II, we estimated a two-stage model of firm performance. First, we estimated time-to-IPO as a function of TMT variables and control variables (i.e., Model 2a) and, in the second stage, we regressed firm performance on control variables and the predicted values of time-to-IPO from the first stage model (i.e., Model 2a). We found that time-to-IPO was positively and significantly ( $p < 0.05$ ) related to firm performance (results available with authors). However, it was not possible for us to include TMT variables or interaction terms in this model due to significant multi-collinearity. Therefore, we were not able to estimate an endogenous model. Second, we note that our study was based on a sample of firms in one industry, viz., pre-packaged software industry. As the pre-IPO learning process and, consequently, the time-to-IPO tend vary significantly from industry to industry, we suggest caution in extending the conclusions of our study to other industries.

## Conclusion

In this study, using a sample of technology firms in the pre-packaged software industry that completed their IPO during the mid-1990s, we explored how a firm's TMT demographics and heterogeneity influenced its time-to-IPO and its performance. Our analysis revealed the key influences of TMT age, size, TMT tenure and TMT functional heterogeneity on the time a firm takes to complete its IPO. Finally, we found that a firm's time-to-IPO moderates the relationships between several TMT characteristics and firm performance. Though our results increase our understanding of antecedents and consequences of the time it takes for a firm to go public, they still do not open the "black box" of the going-public decision. Accordingly, we identify three distinct and related issues for future research. These are implicitly referred to in the literature on IPO and alluded to in this paper.

The first one focuses on a firm's readiness to do an IPO. Is it possible that founders may delay an IPO as long as possible in order to better prepare for the intense demands of being a public company? What are the attributes of a firm that is IPO-ready? What attributes are important for readiness? What attributes are less important? What is the sequence in which successful entrepreneurs and top executives proceed to build IPO-ready firms? A better understanding of the pre-IPO process would be valuable. A second area for potential future research issue relates to a question that is raised by Chemmanur and Fulghieri (1999), viz., when is it optimal for a firm to go public rather than finance its projects through a private placement of equity? Chemmanur and Fulghieri (1999, p. 252) model that "... in equilibrium, firms go public only when a sufficient amount of information about them has accumulated in the public domain (so that the costs to outsiders of assessing true firm value become sufficiently small); (and) younger firms, which entail a greater information acquisition cost, choose the firm capitalist in equilibrium."

Finally, newly minted public firms take a U-turn and go private. From time to time in business history, "going private" waves have occurred – the most recent wave being in 2006-2007. Leveraged buyouts, management buyouts, and corporate restructurings form a separate stream of research dealing with relatively old firms and firms in special situations. Yet, there may be some parallels between "going public" and "going private" decisions that are worth exploring.

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Table I. Summary statistics and Correlations for key variables

Variables	Mean	Std. Dev.	1	2	3	4	5	6	7	8
1. TMT Average Age	43.25	4.41	1.00							
2. TMT Average Tenure	3.49	2.27	0.08	1.00						
3. TMT Size	6.54	2.34	-0.22**	-0.04	1.00					
4. TMT Age Heterogeneity	0.15	0.05	-0.07	0.05	-0.01	1.00				
5. TMT Tenure Heterogeneity	0.74	0.31	-0.12	-0.21**	0.25**	0.00	1.00			
6. TMT Functional Heterogeneity	0.69	0.14	-0.21**	-0.14	0.44**	0.02	0.32**	1.00		
7. Time-to-IPO	7.80	4.44	0.09	0.63**	0.18*	0.02	0.19*	0.09	1.00	
8. Firm Performance	24.62	27.87	-0.02	0.08	0.32**	-0.04	0.09	0.23**	0.18*	1.00

N = 156

\*\* indicates significance at p<0.01 (two tailed)

\* indicates significance at p<0.05 (two-tailed)

Table II. Models of relationships among TMT characteristics, Time-to-IPO and Performance at IPO

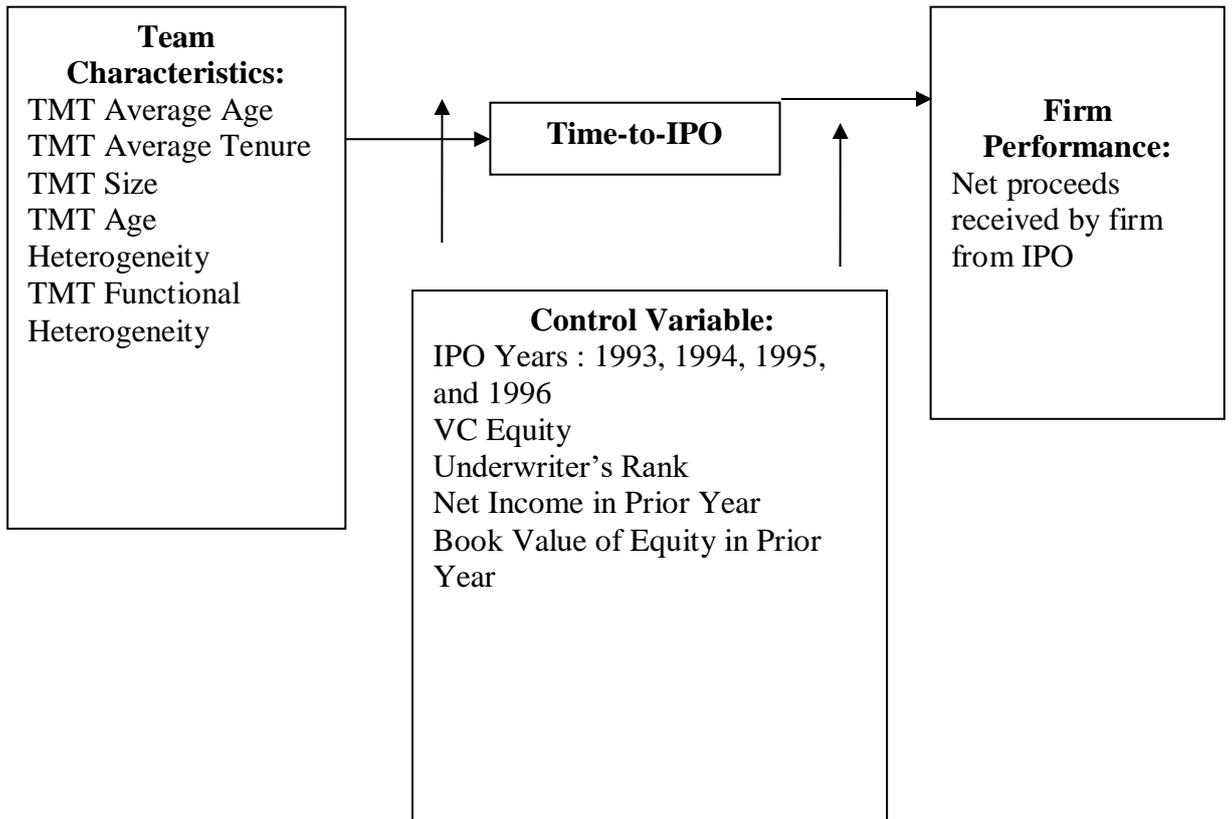
	Dependent: Time-to- IPO	Dependent: Firm Performance			
	2a	2b	2c	2d	2e
(Constant)					
IPO-year 1993	-0.11	-0.07	-0.07	-0.06	-0.07
IPO-year 1994	-0.06	0.02	0.03	0.04	0.03
IPO-year 1995	-0.18 <sup>†</sup>	0.13	0.13	0.15	0.16
IPO-year 1996	-0.04	0.18 <sup>*</sup>	0.19 <sup>*</sup>	0.19 <sup>*</sup>	0.18 <sup>*</sup>
VC Equity	0.02	-0.10	-0.10	-0.09	-0.09
Underwriter's Rank	-0.02	0.24 <sup>**</sup>	0.24 <sup>**</sup>	0.26 <sup>**</sup>	0.24 <sup>**</sup>
Net income prior year	0.10	0.40 <sup>**</sup>	0.39 <sup>**</sup>	0.38 <sup>**</sup>	0.36 <sup>**</sup>
Book value of equity prior year	0.02	0.01	0.01	0.02	0.03
TMT Average Age	0.12 <sup>*</sup>	0.07	0.06	0.06	0.03
TMT Average Tenure	0.68 <sup>**</sup>	0.09	0.07	-0.07	0.11
TMT Size	0.15 <sup>*</sup>	0.18 <sup>*</sup>	0.17 <sup>*</sup>	0.15 <sup>†</sup>	0.18 <sup>*</sup>
TMT Age Heterogeneity	0.00	-0.06	-0.06	-0.06	-0.07
TMT Tenure Heterogeneity	0.26 <sup>**</sup>	-0.01	-0.02	-0.04	-0.02
TMT Functional Heterogeneity	0.07	0.13 <sup>†</sup>	0.13	0.14 <sup>†</sup>	0.13 <sup>†</sup>
Time-to-IPO			0.02	0.08	-0.02
Time-to-IPO x TMT Average Tenure				0.18 <sup>*</sup>	
Time-to-IPO x TMT size					0.18 <sup>**</sup>
Adjusted R-squared	0.52	0.36	0.36	0.37	0.38
F	13.08 <sup>**</sup>	7.15 <sup>**</sup>	6.33 <sup>**</sup>	6.64 <sup>**</sup>	6.90 <sup>**</sup>
N	155	155	155	155	155

\*\* indicates significance at p< 0.01

\* indicates significance at p<0.05

† indicates significance at p<0.10

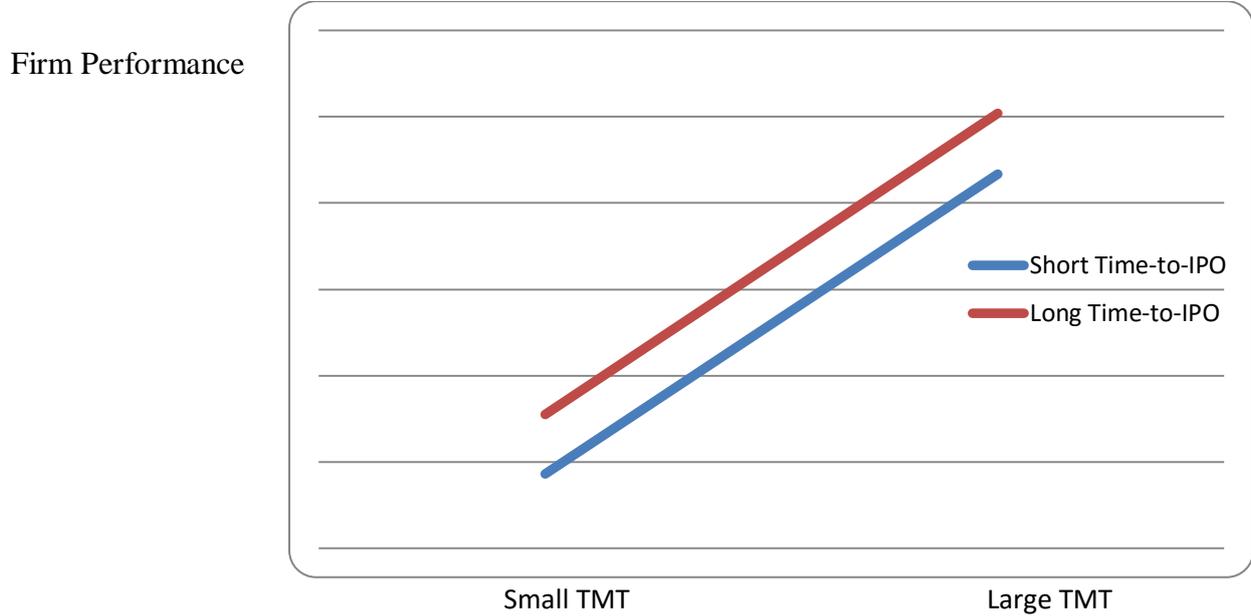
**Figure 1. Relationships Between Team Characteristics, Time-to-IPO and Firm Performance**



Figures 2a and 2b

Moderating effects of Time-to-IPO on the relationship between TMT characteristics and Firm Performance

2a. Time-to-IPO x TMT Size



2b. Time-to-IPO x TMT Average Tenure

