Growth Models for Top Indian Software Firms

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Abstract

Indian software service providers are in an enviable position due to unprecedented market growth, overseas shortage of manpower, and access to high quality, low cost manpower within the country. We describe two alternate models for future growth of top Indian firms: *manpower based growth* (MBG) and *knowledge based growth* (KBG). In the first model, revenue growth is fuelled largely by growth in manpower. In the second model, the firm penetrates value added market segments, and growth is fuelled by increasing the revenue per person. We evaluate these options in detail, after examining the current markets, the recent changes and trends, entry barriers to value added segments, client and market perceptions of Indian service providers, and changes needed within the firm.

We argue that knowledge based growth needs significant improvement on three different dimensions: technical, consulting and project management capabilities. We propose a *mentor model* where these capabilities are largely built in house rather than by lateral recruitment or acquisition. This type of growth also requires several changes in the organization, including building a culture of knowledge, a reward and recognition system for it, and the willingness to differentiate people based on their abilities. A key change would be the ability of its people to take more decisions, whether it is about technology, consulting or project management. Unfortunately, decision making has not yet been delegated to the rank and file in these firms. The KBG model generates much higher revenues, limits recruitment to reasonable levels, and positions the company to resist onslaught from low cost competitors. Manpower based growth on the other hand does not require so much effort, change, or capability building but is difficult to sustain since the number of people needed would perhaps be excessive. We argue that the recent spectacular success could be an obstacle to future growth. That is because past success has been based on low cost delivery of relatively low end work. The natural tendency to continue on this path ignores several more lucrative market opportunities. We also describe how a firm following this model falls into the so called *low value trap*. Such a firm could also face price based competition from new and upcoming Indian firms, and perhaps those from China, Philippines or other countries.

We also examine whether it is feasible for an Indian firm to follow the KBG model and become a truly world class company. On balance, the MBG model is easier to implement, but does not take the best advantage of market opportunities. The KBG model is difficult to implement, but builds a truly world class company. It seems to be a trade off between what can easily be done and what seems desirable for achieving full potential.

Growth Models for Top Indian Software Firms

There is a tide in the affairs of men, which taken at the flood, leads on to fortune.
-William Shakespeare

The Indian software services industry is facing an interesting problem at the turn of the century. The export market is growing very fast, and so is the gap between demand and supply of overseas software professionals. A lot of demand that was held in check until Y2K issues were sorted out is now surfacing. Companies report that they have been flooded with new enquiries from overseas clients since January 2000. Although industry analysts do not agree on their predictions for the future with estimates for information technology (IT) services varying from $220 billion to over $600 billion by the 2003, they all agree that the market is huge and will continue to grow very rapidly. Qualified manpower to meet market needs is in short supply, with enrollments in software engineering at US Universities declining by over 40%. Recently, the German Government announced that it is seriously thinking of easing up visa restrictions to allow foreign professionals, particularly software professionals from India, to work there. Meanwhile, Indian companies have been recruiting at a feverish pace in the last few years to cope with demand. Several of them have increased their total manpower by 100% within the last two years and plan to double their manpower this year.

Since most of the software development work for overseas clients or customers is done in India at much lower cost, it allows Indian companies to charge much lower rates, and still earn much higher returns compared to several US based service providers. This 'off shore' model has been spectacularly successful, and the Indian industry has grown at a compound annual rate of around 30% over last ten years. The advantage has largely been based on cost, and is probably sustainable for several years to come, although salaries of Indian software professionals has been growing at over 20% in the last few years. However, salaries are going up in the US and Europe as well, and today, customers can get many services at one third to half the cost from Indian companies. Customers seem to be happy since several Indian firms are growing at 50% while getting over 70% of business from existing clients.

Clearly, for Indian companies, this is a problem of plenty. The market is huge and growing, and overseas service providers cannot compete on cost with Indian companies. The icing on the cake is that qualified manpower is in very short supply overseas. *The real issue is how best to take advantage of opportunities available in the market.* We examine options from the perspective of the top few Indian software firms that probably have the capability and size to penetrate entry barriers for services at the higher end of the value chain.

Markets and Competition

Let us take a closer look at the situation. The market is very heterogeneous. IT services are largely demanded by diverse *client* companies, who want an outside service company to provide a variety of services. Several Indian firms have focused on large Fortune 1000 companies. Over 200 of these companies outsource services from Indian software firms. On the other hand, there are new start up 'dotcom' companies, that want to set up a web based business, and sometimes operate without an office and one lap top. They often have only a general idea about what services they want, and are in a great hurry to get it. Sometimes they are willing to pay for services in cash, and sometimes they offer stock options or royalties to the service provider in lieu of cash. Some clients have IT budgets and are actively seeking to cut costs. Others are looking for value and are willing to pay a premium for it. Service providers need different marketing, sales, negotiating, project management and technical skills for different types of clients.

Some services earn $30 an hour, and others, nearly $500 an hour. The rate depends on a somewhat nebulous notion of 'value to customer'. Value added means different things to different customers, and is defined in different ways by service providers and IT consultants. However, some things stand out clearly. There are distinct stages in the life cycle of many software projects, especially those that ultimately require some customized software to be written. Initially the client recognizes a vague need, and tries to understand whether to use more of IT, and if so, how to use it to obtain some concrete business advantage. This might be in terms of lower costs, better customer reach, better customer service and so on. Sometimes the client would hire an IT consultant, like one of the 'Big 5' (Andersen, Pricewater House Coopers, Deloitte & Touche, Ernst & Young and KPMG), to help him do this. After this stage, some of the technical decisions on platforms, hardware, and on some of the detailed 'business requirements' are made. This could include the kind of features and options the software would provide. A high level systems analysis is also done. The client usually perceives this work as valuable and is willing to pay premium rates for it. This often ranges from $200 to $500 an hour. Very little programming goes into it, but it requires a good understanding of technology and business. The consultant might then submit a report and leave. A key determinant of rates is the extent to which service providers take responsibility for choice of hardware, platforms and architecture. Clients are willing to pay premium rates for this service. However, Indian firms usually shy away from this responsibility and end up doing a lot of downstream, low value, programming work.

Indian firms almost invariably get in after the high end consulting work is completed, although there have been some exceptions of late. They sit down with the client, understand the requirements, prepare a project proposal and then begin work, which largely consists of programming, testing, installing, and perhaps later, maintenance. This kind of work commands much lower rates, even for US based firms including the Big 5, and could vary between $100 to $150 per hour. It is important to note that Indian service providers earn much lower rates per hour. For instance, for software development work off shore, rates might be less than $30 per hour currently. For 'on site' work done overseas, rates might vary between $50 and $120, although the average is probably close to $60 per hour

'Full cycle' or 'end to end' projects which offer the full range of services from consulting to implementation help service providers in several ways. First, they generate higher revenues for the initial higher end consulting work. This could even be more than 50% of total project revenues in some cases. Second, they generate a lot of downstream work. Finally, higher rates can be charged even for low end work, since initial consulting rates often set a benchmark.

US based competitors broadly fall into two categories. One group generates around $125,000 per person per year, and the second, which includes the Big 5, generates well over $200,000 per person per year. Some of them generate over $300,000 per person per year. Even the best Indian company today generates less than $60,000 per year. There are some difficulties with calculating revenue per person figures since employees not working directly on client projects are treated differently by different companies. It is also not clear how subcontracting by service providers is treated. However, the fact remains that there are very large differences between Indian and US based service providers. There are several possible reasons for this difference that we examine later. It is important to note that *even for the same type of work done overseas at the client site,* Indian companies get much lower rates compared to US based service providers. At the same time, the best Indian firms generate much higher profitability compared to several US based competitors because their costs are lower.

Several Indian firms, including the best ones, continue to carry a legacy from the past. In the early 1990s, they entered the US market based on low cost, low end work. Sales and software delivery professionals have internalized this way of doing business. However, the market situation has changed completely since then. With the growth of the Internet, and several new technologies, demand far exceeds supply. The notion of value has also come in, and customers are willing to pay premium rates. However, Indian firms often continue to act as though the only way to get business is by charging low rates. In one instance, a US based client wanted to revamp its in house software, and decided to get it done by an Indian service provider. However, some low end work for keeping the current system going was given to a US competitor. It was clear that the work done by the Indian firm was higher in the value chain, and required higher skills. Paradoxically, the client rated the Indian firm's capability higher, but paid the US firm higher rates. The reason was that the Indian firm asked for very low rates. Afterwards, the client told the Indian firm that they were charging a 'ridiculously low price.' In fact, there are instances where Indian firms have done work for *one fifth* the price paid to US based firms. Sometimes this work is taken over by an Indian firm after the client is dissatisfied with the work done by some other US firm. However they charge very low rates even though they know that the earlier firm got five times more for incomplete work. Perhaps these are exceptional cases, but they illustrate how an old mind set based on low cost bidding for projects sometimes continues to retard future growth.

No doubt, the best firms are aware of this problem. They have tried to move away from *time and material* based projects where payment (at low rates) is tied to the number of people and the amount of time spent, to *fixed price, fixed time* projects with bonuses and penalties for advance or delayed completion. In principle, the second option allows software service firms to price projects based on the notion of value rather than on cost. However, Indian firms continue to use a cost plus approach while arriving at a fixed price. If initial time and effort estimates are incorrect, as they often are, the service provider might end up making less money than they would have on a time and material basis. The reason for being overcautious is a legacy from the past, where they continue to believe that their real competitive advantage is based only on low cost. It is difficult to change this when markets are growing so fast and when Indian companies are recruiting new people at a rapid pace. When projects are awarded based on competitive bidding, Indian firms often end up bidding half of the nearest US competitor. In one instance, an Indian firm came up with a figure of $2 million based on its traditional cost plus approach to bidding. Since they were under pressure to generate higher revenues, they finally bid $7 million. Perhaps they also recognised that too low a bid might be counterproductive. However, the nearest US competitor was at $13 million. Although the Indian firm won the contract, it is anyone's guess whether they should have bid $8, $9 or even $10 million for the project. In fairness, it must be said that it is difficult to arrive at a proper bid price based on the notion of value. There is also an issue of brand image, and clients often assume that they should get much lower rates from off shore service providers.

In this situation, it is natural that the best companies will try to target higher value services and higher rates so that scarce human resources generate the maximum possible revenues. There are two ways of achieving high growth. One is to recruit a lot of people. Another way is to increase the revenue per person. That has several challenges that we examine in detail. The McKinsey-NASSCOM (National Association of Software and Service Companies) study has set an ambitious target of $50 billion by 2008 for software exports from India. They project that the number of software professionals would increase from 0.28 million to 2.2 million. This implies that the revenue per person would increase from about $14,000 to $23,000 per person per year over the next 8 years. This just about keeps pace with inflation in India. This is clearly a manpower based growth strategy. (These figures are national averages. The best companies generate over $50K per person per year today). The Government has indicated that it wants to

upgrade 43 additional engineering colleges to the level of the well known Indian Institutes of Technology (IITs) to meet the sky rocketing demand for software professionals. However, that is a very difficult task. One of the biggest constraints is availability of high quality faculty to teach in these Institutes. If the quality of people entering Indian software exports is not maintained, we might lose ground to China, Philippines and other countries. Even the low cost approach would be under threat with increased competition from these countries.

The IT services industry is going to be more knowledge intensive. Even the best Indian firms often do not pay enough attention to this. One of the reasons is tremendous growth opportunities. A person spending time in training is better utilized in a project where he or she would generate revenues for the firm. Any additional skills required could be picked up while doing the project. This approach works well up to a point. However, if stretched too far, it would have an adverse impact on the knowledge base in the organization. Usually other knowledge intensive organizations tackle this with fresh and lateral recruitments. However in the IT services industry, fresh recruits are unlikely to bring in new knowledge, and lateral recruitment is difficult given the overall shortage in manpower. Top management in these firms is caught between the dilemma of spending time and money for training to gain higher revenues later, or grabbing today's opportunities. For several reasons, they end up choosing the latter option. However, this choice determines the type of organization, its market position and brand image in the long run.

Changing market requirements

Several industry analysts have written about changing markets. For our purpose, we focus on those changes that have serious implications for Indian firms. We have mentioned earlier the tremendous growth in demand coupled with manpower shortage. Another change is the *speed of business*, where companies are gearing up to respond quickly to markets and competition. In this situation, companies want IT solutions fast. Traditional projects spread over several years will no doubt continue, but there is a growing market for projects implemented quickly, with delivery times sometimes cut in half. The tremendous growth of the Internet with all its implications for business has changed the nature of software projects and services in fundamental ways. First, it is not always possible to separate projects into initial consulting and later development phases. Time is often a major consideration, and clients want the entire project to be done by one service provider much more quickly. Even when time is not a consideration, the new technologies available provide many more options, and it is likely that smooth implementation will be possible if there is one service provider. Project execution is also changing with many more requirement changes coming late in the development cycle. In the traditional 'waterfall' method projects began with software development, and were implemented in a sequential fashion with clients giving periodic approvals over the life of the project. However with end to end projects and several late requirement changes, a new method is required.

It is also important to realize in this situation that the knowledge and skill base of people is the ultimate asset of a service provider. This includes project and customer management skills, technical knowledge, and *domain* knowledge about the client's business and industry. With changing technology and markets, this knowledge has to be updated continuously. Indian firms have mastered project management and some aspects of technical knowledge, and have an excellent system to transfer this to new people through a combination of induction training, continuing education, mentoring and on the job learning. Perhaps, this has become a key strength and a part of their culture. For instance, not completing a project on time is usually not an option in the company. At the same time, the internal systems and processes do not build domain knowledge, system analysis capabilities and customer management skills to the same extent. There is also a need for higher level technical skills. This requires mastery of one or more

technologies and an understanding of other alternatives. But most important, it requires the ability to evaluate, judge and choose among different technology alternatives, and then make some decisions. Unfortunately, several technology experts are not good at making decisions, *even about technology*. This is perhaps because they do not pay enough attention to this aspect of their work, and perhaps because it does not need technical or problem solving skills, but decision making abilities. Again, Indian companies do not have systems and processes that allow people to gain this mastery. In the past, these firms have shied away from providing services that required technology choice. Thus new market needs are not reflected in matching capabilities of service providers.

Market perceptions of Indian service providers

Any growth plan needs to take stock of market perceptions regarding Indian service providers. There are several truths, half truths and myths regarding this issue, and it is important for the top firms to have a clear understanding of what customers think, and what they look for. More detailed work is needed, but preliminary investigation shows that some issues stand out clearly. Customers want quality, skills, on time delivery, competitive price, clear communication during the life of the project, installation and maintenance support, vendor's ability to understand requirements, and flexibility. Thus there are several dimensions other than cost that are important for customers. However, Indian firms are still perceived as low cost, low value service providers, although a few of them have done a few value added projects. The problem with this perception is that this does not bring in enough value added work. A bigger problem is that the rank and file of even the best Indian firms shares this perception. That requires a change in attitude and is a major challenge for top management. An Indian firm usually responds to client requests. In contrast, the best overseas firms are pro-active and suggest solutions before the client is aware that there is a problem. A common customer perception is that Indian firms are not imaginative or creative in the solutions they suggest. This is perhaps linked to the low cost, low risk approach to business.

The relationship with the client is sometimes conflicting. Developers initially are passive, and accept many changes without protest. But perhaps internally, they are building up resentment. At some point, they go to the other extreme and become aggressive with the client. Perhaps it might be better to be more balanced and straightforward in their dealings from the beginning. Customer also look for value added communication during project execution. But Indian firms usually do not or cannot provide it. Some of this has to do with young Indian software developers working in an alien culture. Some of it has to do with the prevailing approach to business and client relations. On the positive side, customers are happy with their commitment, and appreciate their accommodation. They are also often impressed with the potential of Indian software professionals.

Other areas of weakness are ability to service emerging needs of clients, quality of proposals, being a partner in meeting business targets of customer, and bringing in value beyond expected deliverables. US clients are more comfortable with people who speak up, are assertive, aggressively offer new ideas, are able to identify what needs to be done, and know how to do it. A service provider needs to have the skills to elicit requirements, especially from customers who are not clear about them, and has to pay more attention to front end requirements analysis. The business role of the IT service needs to be fully understood and appreciated. Within project management itself there are some areas of concern. There are insufficient status reports, there are too many very young people, the speed of proposal writing needs to be improved in some cases, there should be on going expectation setting during the project, and better system analysis skills are needed. In short, customers feel Indian firms have the abilities to deliver projects that are low

value, but need to develop their abilities to move up the value chain. Premium customers want the service provider to be a partner or a consultant, and not a vendor.

Future patterns of growth

Consider two models of growth. One model, which we call 'manpower based growth' (MBG), is largely the model followed by Indian firms so far. This model has very successfully exploited offshore development with its emphasis on producing where it is cheap and selling where profits are high. There would be some increase in revenue per person, from current levels of about $50K per person per year to about $80K over the next five years, but growth would largely come from doing more projects based on hiring more people. For instance, a few of the best companies are planning to increase their manpower four to five fold in the next five years.

Another model can be termed 'knowledge based growth' (KBG). In this model, the revenue per person is increased substantially, and brought much closer to that of US or Europe based service providers, based on higher value services and higher level of in house capabilities. Of course, to take advantage of market opportunities, an Indian firm would still need to do substantial recruitment. However, the potential to increase revenue per person is tremendous if we note the difference between $50K per person year compared to over $135K of similar firms like Cambridge Technology Partners (CTP) and Sapient Corporation. No doubt, the return on sales and margins are much higher for Indian firms since off shore development costs much less. However, competitors like Sapient and CTP are able to generate much higher revenues per person, and if Indian firms can approach that, returns and growth rates would go up still higher. There is yet another level at which the Big 5 operate. These firms generate between 35% and 65% of their total IT services revenue from consulting, for which they charge $250 an hour or higher. In addition, firms like Andersen do a lot of IT implementation as a follow up of consulting, and charge over $100 an hour for programming and software development. Indian firms do the same development work at much lower rates. Thus, the Big 5 are perceived as high priced, high value consultants, and are able to command significantly higher rates for all types of work.

Both models attempt to move up the value chain, but one does it gradually, and another does it in a discrete way. Another crucial difference between these models is the proportion of total revenues from high end value added consulting. The MBG model would typically target about 5% of total revenues from consulting. The KBG model would be closer to the model followed by the Big 5 and would attempt to generate around 30% of total revenues from consulting. Other models of growth are also possible. For many newer clients from the small and medium enterprises (SME) segment, and dotcoms, Indian service providers could generate future revenues by licensing and royalties, or even equity participation, alliances and acquisition. These clients often do not have cash to pay up front, and would be ready to explore other options. However, this requires skills for evaluating dotcoms, assessing risks, and negotiating for the right terms: something that Indian companies have not done in the past. A closely related option is growth by acquisition of US based companies, since capital is no longer a constraint for top Indian firms. It would require easing of Government restrictions on overseas investments. Improvements in productivity, especially delivery times of projects, combined with fixed price, fixed time projects can also add significantly to growth. A 10% improvement in project delivery time would translate directly into 10% more projects completed in the same time period. A crude analogy comes from the automobile industry, where in the early 1980s, Japanese auto makers completed new car projects at half the cost, with half the manpower, *twice as fast*, compared to US and European auto makers. Similar improvements in productivity are possible for Indian firms if they put in enough time and effort.

Moving up the value chain

A closely related issue is how these firms move up the value chain. Currently this is largely based on long term client relationships, doing several projects for a particular client over a couple of years, including 'low end' maintenance and support, gaining client confidence, and then being asked to do more value added work. In this approach, Indian companies typically start off charging lower fees initially, and then obtain higher fees later for more value added work. However, the scope for substantial fee increase is often limited because past rates become a benchmark for future work. However, for new clients, it is possible to start off at a higher level. There is also a distinct possibility that some clients would view Indian firms as capable of only doing projects of a certain type, and hire other service providers for more value added work. Given the perennial shortage of manpower, Indian firms are sometimes forced to move people from 'low end' maintenance work to 'high end' work at a client site. Clients usually resist this, thinking that the new work requires new people with higher skills. Indian firms on the other hand maintain that their best people are at the overseas client site, and they can handle all types of work.

Another way to move up the value chain is to make a clean break from the past. In this case, an Indian firm would start off by positioning itself as a value adding service provider with high capabilities. This requires changes on several fronts, including changing the brand image of the company and significantly improving capabilities within the firm. There would be a transition period, but eventually the firm would re-position itself higher in the value chain.

There are different ways of making significant in roads into the value added market. One can be loosely termed the 'Toyota' model, and the other the 'BMW' model. Toyota entered the US market as a low end producer of high quality, low cost cars. After nearly twenty years, it has moved into the top end luxury car market with the Lexus. BMW on the other hand entered the US market from day one as a luxury car maker and started with premium prices. Toyota has a presence in almost every segment of the market from low end to premium cars. BMW is more focused on luxury cars. Toyota's phenomenal success is based on a very high and broad level of in house capabilities including low cost, high quality manufacturing, product design, new car project launches, marketing, and deep in house technical strength. For instance, at any given time Toyota has over 40 new car projects on hand, and employs several thousand technical people in such projects who conceive, design, execute and launch new cars. Such a phenomenal level of capabilities were built slowly and systematically, largely in house, over several decades. BMW has been an engineering, design and marketing driven company, focusing their energies on a narrow range of cars. Typically, Asian car makers, including Nissan, Daewoo and Hyundai have used the Toyota strategy with varying degrees of success. Several European car makers on the other hand have used the BMW strategy.

However there are some crucial differences between the growing car markets in the late 1970s and 1908s, and the IT services market today. First and foremost, IT services is largely a knowledge driven industry, especially at the higher end of value added services. Managing an enterprise with thousands of knowledge workers is very challenging. Second, there is a shortage of high quality manpower in the IT services industry. Spreading high caliber people thin over a wide variety of services when market opportunities in each segment are growing very fast reduces the immediate risk of putting all one's eggs in one basket. On the other hand, it does not allow a firm to really grow or penetrate any market segment. A narrowly focused strategy allows it to build capabilities fast in one segment, for instance, high end e-commerce consulting, but has some risk. It is therefore important to decide the mix of services a firm will offer, especially for new customers and for SMEs. Thus there might be a different menu of services for Fortune 1000

companies, and for other customers. For instance, a long term relationship might be useful for large companies, while a transaction or project based approach might be better for smaller companies or for some kinds of high value work. The relationship model would mean that the service provider does a wide range of work, from low to high end. The transaction based approach would mean that it does only selected work.

Following the Toyota model means mastering a very broad and deep range of technical skills. It requires a lot of attention to internal processes, training, recruitment, continuing education and mentoring. Also, it takes a lot of time to build up a range of skills - in the case of Toyota, it took them over 20 years before they came out with a Lexus. However Indian firms probably do not have that kind of time. They would lose opportunities if they waited that long to build capabilities. Following the BMW model has another kind of risk: if a firm is too focused, then later, some other competitor like Toyota might enter with a high value low price service. More importantly, large clients usually require a wide range of services that include low end work. If a firm refuses to meet all the needs of the client, he would switch over to another service provider.

Another difference is the very rapid rate of change in technologies and market requirements. While building capabilities, it is important to identify and impart those core set of skills and knowledge that will allow people to keep themselves updated over the years. At the same time, it is inevitable that there will be more recruitment to acquire some skills. Customer expectations are also rising. An excellent, value added project a few years ago would today be regarded as a low value project.

In short, companies trying to move up the value chain would have to considerably improve their knowledge base while growing very rapidly in a market where technology and customer demand is changing very fast. There is also a need to choose the right strategy for penetrating strong entry barriers to markets at the higher end of the value chain, manage customers much better, and create a better brand image. Perhaps all this would have to be done within the next two to three years: otherwise, it will be difficult to break the entrenched image of being low cost service providers. That is indeed a tall order.

Manpower Based Growth

In this model, revenue per person per year would increase gradually at around 10% per year. A service provider typically enters into a long term relationship with a large client, say a Fortune 1000 company and provides a wide range of services, mostly low end, over several years. High value services are usually provided by other IT consulting firms. Benchmark rates are negotiated and payments are on a time and material basis, depending upon the number of people and the time spent. This model has worked extremely well in the past, and is something that everyone in the typical Indian firm is comfortable with. Marketing has used this successfully in the past. Developers and project leaders are also comfortable with this model, although they sometimes express concern about promising too much, and over committing to customers. Thus everyone understands this model, and hence this type of growth will be acceptable within the company. If competition is based on price, then it will continue to work well. This model has been fine tuned and mastered by Indian firms, and allows people to quickly gain experience, and move into project leader (PL) roles within two to three years. Thus, a young developer is insulated from the offshore client, and works in a team. He or she then learns in the process how to manage a team, and becomes a PL. Often, those who have spent a lot of time at a particular client site find it difficult to move into the role of a PL off shore because they have not worked in a team. On the flip side, customer management skills and domain knowledge might suffer a little because the emphasis on off shore development isolates young developers from clients and markets.

However, this model requires substantially higher number of people to sustain growth rates of over 50% in the next few years. One issue is whether the firm can hire so many people of the right quality in such a short time. For instance, each of the best firms is planning to recruit several thousand people every year for the next few years. A preliminary estimate shows that the top five firms would try to recruit a total of about 10,000 people each year. Perhaps there are not enough high quality graduates coming out of college every year. If there is a dilution in quality of people recruited, it will adversely affect market reputation. Another issue is how to train so many people. This includes not only induction training, but also continuing education. One way is to make each person responsible for updating his or her knowledge. A firm would provide training programs and courses either in house or by sending people outside, but the onus of upgrading knowledge and skills would be on the individual. This system would need to be backed up by proper and periodic performance and knowledge appraisal.

We would also need to examine whether this model compromises on building technical depth and expertise in people. For instance, if a person works on the same type of projects, then he or she does not get a chance to keep up with new developments and technology trends, or learn new skills. Thus, in this model, people quickly learn project management skills and how to lead a team, but find it difficult to acquire system analysis, software architecture, and customer management skills, or how to understand and set business requirements. Given the tremendous demand for the current mix of work that largely consists of maintenance and client led custom development projects (where most important requirements, business and technical, are set by the client), developers would not get a chance to gain other skills and knowledge. Therefore, when a relationship client comes back after two years asking for value added work, there might not be enough people on hand who can handle the work. It is not only a question of not having the required number of people on hand, it is also a question of having the right type of people. For instance a client was not satisfied with the work done by one of the Big 5 firms, and asked an Indian company to do it. The offer was refused since at that point in time they did not feel they could deliver what the client wanted. That is because in this model, we start off with relatively low value work with a client, and then try to move up the value chain over time. That means that people would either have to gain expertise for doing value added work on their own, or through continuing education. It would be difficult to gain this expertise while working on a low value project with the additional pressure of deadlines. In short, the organization currently does not have the *critical mass* of people with these skills and capabilities. It is hoped that once this critical mass is built up, then it would spread through the organization, much as project management skills did in the past. However, the means of spreading this knowledge would have to be thought through more carefully.

Another important issue is maintaining not only the quality of people, but also the value systems and culture of the organization. For instance, older employees are by and large proud of the firm they work in, accept values like informal relationships, delivering projects on time, and are willing to do the existing type of work. There is a tendency, especially among fresh recruits to be dissatisfied with routine projects. Many of them are driven by 'glamour', which often means working on the latest technology. With the tremendous growth in manpower, there needs to be greater attention to maintaining the best aspects of the culture, while changing what is required. New customer requirements and new technologies might create a separation between new recruits and older employees. Communicating the company's vision and values to everyone becomes that much more difficult. Another example is related to customer management. To what extent does a firm accommodate customer requests for change without asking for more money. Similarly, how do you manage a long term client? For instance, customer feedback strongly suggests that Indian firms should be more aggressive in suggesting solutions. Is this widely accepted in the

organization, and is there a commonly understood way of doing this? The point is that several issues of this type will become more difficult to manage with the tremendous growth in manpower. It is perhaps important to pay more attention to this.

The real issue here is whether this model substantially opens the door to more value added services, or keeps a firm broadly within the same market segment. Thus, would it be possible to substantially move up the value chain? Two factors will drive this. One is the tried and tested model of providing low cost, low value services, that has succeeded so well in the past. The second is the tremendous growth in all segments of the market, including low value work. In this situation, the natural tendency of Indian firms would be to continue to accept more such work. Opportunities would continue to grow faster than available manpower, leading to a situation where people are always over stretched. Even if you keep 12% to 15% on the bench, they might be eventually moving into low value projects. Thus, new capabilities are not built as quickly as one would like, and the firm might have to refuse a lot of value added work due to shortage of high skill, high knowledge manpower. In fact, this has already happened in several firms. Therefore, even after a few years, it might not have a critical mass of people with higher skills and knowledge, and hence, it continues to take advantage of the tremendous opportunities in relatively low value added work. The vicious cycle, which we call the *low value trap*, thus continues, fuelled largely by too many low value added opportunities and shortage of high quality manpower (see Figure 1). One way of breaking out of this is to start work for a client before a request for proposal for software development is sent out. Such requests are sent out after the front end consulting work has been completed. If the firm can start off with end to end projects, it could eventually break out of the low value cycle. However, this can be done effectively provided there are sufficient number of people in the organization with such capabilities.

The MBG model also implies that the firm would provide a wide variety of services in a wide variety of markets. Thus it would continue with legacy maintenance, package implementation, custom software development, and also get into IT consulting. It would work with Fortune 1000 companies, SMEs, and e-businesses. It would in a sense spread itself out over a wide range of services and markets. This in itself might not be bad since markets are so unpredictable now. Later, if need be, some focusing could be done.

Knowledge Based Growth

In this model, growth would be led by higher knowledge within the company, allowing it to provide much higher value added services. This would include IT consulting services, the higher end of Internet and e-commerce services, some aspects of business consulting, and require higher levels of domain knowledge, systems analysis, software architecture and consulting skills. Although all these skills are also required in the MBG model, the difference is in emphasis and speed of transition, with a conscious attempt to focus more and more on value added services. The rationale is that with a constraint on the number of high quality people we can recruit, real revenue growth would come from substantially increasing the revenue per person. Therefore, we put our best people only in value added work, groom fresh recruits for such work in the near future, and forego if necessary some of the current low value opportunities. The reason was explained earlier through Figure 1, where business as usual would over stretch the organization and its people, perhaps not allowing it to build new capabilities. In the current model people are not groomed for higher levels of work and revenue generation, with the result that after a few years, a person can no longer feel confident of doing value added business or IT consulting work. In the past, a few of the best Indian firms have moved away from low value work or refused to renew relationships where clients have refused to increase rates. Thus there is a growing acceptance of the fact that they need to charge more for the same type of work. But there is a

difference between rate increases and value added work, and perhaps there is not enough appreciation of the need to focus on the latter.

There is also an attempt simultaneously, to substantially increase the revenue per person and move it rapidly from the current levels to something in the range of $130K - $150K five years from now. Obviously, this cannot be done for the company as a whole, or even for all new projects. This is because for some time, the organization would not have a sufficient number of people to handle a sufficient number of value added projects to sustain current rates of revenue growth for the company. However, the target would be to eventually generate around 30% of total revenues from consulting. Therefore, the company needs to aggressively leverage its current capabilities in the value added services market, and use that to develop more people in house by using a judicious mixture of experienced and new people on such projects. Given the current shortage of high level skills and knowledge, there would be a need initially to recruit people laterally at higher levels to help this business grow.

There is an element of risk since the organization would be departing to some extent from what it has done so successfully in the past. Existing clients would not probably accept the new business model. Even new clients, used to a certain image of off shore service providers, might find it difficult to accept it. Thus the model presents a marketing challenge, that re-positions the company higher in the value chain in the eyes of the customer. Recent rumours that some Indian firms are seriously considering overseas acquisitions might be a step in the right direction, but needs careful management afterwards. Fortunately, given the market capitalization boom of Indian companies, this is a feasible option provided the Government gives the green signal for overseas investments and acquisitions.

It would also have an impact on the culture of the organization. A relatively rapid transition to value added work, while foregoing many traditional opportunities might be difficult initially. Many people, both in sales and in development might not be ready for it. It might also require recruitment of a different mix of people, and a re-look at rewards and incentives. Most Indian firms have so far steadfastly treated all types of work and employees on par. Thus maintenance and e-commerce are treated in the same way, and people working in both types of work are rewarded and promoted in the same way. The new business model might require a re-examination of this, especially if the company has to attract and retain people with higher knowledge and skills that are usually in short supply. Since the model is based on knowledge, eventually it would mean that knowledge would also have to be recognized and rewarded, as opposed to only experience, project management skills, revenue generated, customer satisfaction, and leadership. This knowledge is not of a fundamental type, but related to higher levels of technical knowledge, deeper knowledge of different systems, software architecture, domain knowledge, consulting skills and so on.

One complaint from project leaders is that customers are not clear about their requirements. This lack of clarity is turned into a business opportunity in the KBG model, since that allows the company to provide IT consulting services. It also allows the company to continue to attract and retain high quality talent and take advantage of several new value added opportunities that existing clients are prepared to give. There is a wide gap between rates charged by offshore and US based service providers. Therefore, some of the mundane work like detailed estimation of work, time, manpower and so on for each project to arrive at a fee can be eliminated if the company can move into value based pricing. This knowledge base also allows the company to re-learn and re-position itself in an industry with such a high rate of change and obsolescence.

Comparing the two models

Scarce manpower is a driving force for an Indian firm trying to maintain high growth rates. Let us make an attempt to quantify the manpower needs and the financial returns, say five years from now. Suppose the total revenue is R, and a fraction c comes from consulting. Benchmark figures for the Big 5 range from 35% to 65%. Consulting not only generates higher revenue per person ($300K per person per year compared to $100K per person per year for on site work), but also generates more revenues downstream through additional software development work, and allows the firm to charge a higher rate for it. For instance, the Big 5 charge around $100 per hour for developers, whereas many Indian vendors might charge less than $70 per hour for on site work. For given revenues, manpower reduction occurs due to two reasons. First, each consultant generates higher revenues. In addition, each consulting dollar generates k dollars downstream, where $k > 1$. Second, there is a downstream rate increase due to consulting.

Consider a hypothetical Indian firm that would reach $2 billion revenues in five years. Appendix 1 shows that that significant reductions in manpower are possible with more consulting. If we assume that a 20% downstream rate increase is possible, then with 30% revenues coming from consulting, a firm needs only 13,700 people as compared to 20,000 without consulting, a reduction of over 30%. A proper comparison of the two models on manpower needs might assume, as stated earlier, that 5% revenues come from consulting in the MBG model and say, 30% in the KBG model. At that level, the manpower needs are 18,500 and 13,700 respectively, which is a significant reduction. If a downstream rate increase of 50% is possible, then the reduction in manpower is about 40%

There are three parameters that influence the manpower needs. One, the fraction c of consulting, two, the multiplier k, which determines the downstream revenues from consulting, and three, the increase in downstream rate. Manpower needs come down as c, k and the downstream rates increase. The situation is shown graphically in Figure 2. It is also worth noting that if a firm changes its brand image, then the higher downstream revenues would apply to nearly all the work done by it. Perhaps a firm with only 5% revenues from consulting cannot achieve that change in brand image, whereas another firm with 30% might do so. In that case, the manpower required would come down still further

Another way of looking at the same issue is to try and quantify the benefits from consulting with a given number of employees. Thus, with a given number of employees, revenues can increase significantly with consulting. For instance, if total fraction form consulting is 30%, then a $2 billion company becomes a $3.1 billion company if they can also get a downstream rate increase of 30% (see Appendix 2 for details). This would put it in the same league as the Big 5 today, although the revenue per person would be lower. However, with the off shore model, the company would probably have much higher profitability.

The major difference is therefore, the number of people that need to be recruited. However, the KBG model would need a large number of high value consultants, software architects and system analysts. A key question here is how to get so many consultants. However, there are several issues to consider here. First is what are the new capabilities required for a knowledge based organization? How does the firm build these capabilities? We examine these issues later.

Another difference between the two models has to do with decision making. In the MBG model, the rank and file of the organization is hardly ever called upon to take decisions. They focus on delivering projects. However, in the KBG model, several decisions have to be made. Thus software architects have to make choices about technology and architecture, consultants about

the kind of recommendations they would make, and program mangers about how to manage customers and make trade offs while implementing projects. Thus people need to make more decisions, whether it is about technology, consulting or project management. Unfortunately, decision making in the rank and file of these firms is not yet part of the culture.

New Capabilities Required

A firm following the KBG model would need higher capabilities on three dimensions. First is the technical one. In the past, some of the top Indian firms made a successful transition from mainframes to two tier client server architecture to three tier architecture. This required considerable effort and forethought. A few years ago, one question that bothered several software companies was which technology or architecture to bet on in a fast changing world. Companies usually kept away from committing themselves early to any new trend, trained people in new technologies, and then watched trends to come to a decision later. That probably continues to remain an important question. The key capability was to learn and master a new technology. With the best and brightest recruits from several top engineering colleges, these companies were able to make the transition to new technologies. The current method of teaching in these colleges focuses on problem solving, self learning and learning from peers. These skills came in useful when developers had to learn new technologies.

However, another challenge has been added. It is no longer sufficient for someone to learn or master a new component, tool, technology, language or platform. There is a need to choose among several alternatives, to interface different technologies, and configure them for a particular application. Often clients have legacy systems or hardware that they want to retain. There is often a need for solutions to a client's problem that use different software environments (e.g., Microsoft, Sun and IBM). The service provider rather than the vendor who made the product has to take responsibility for interfacing and for final performance. For Internet based applications, there is a quantum jump in the number of users, and a need for faster response times and better performance. Multiple software components from different vendors are sometimes used and only the expert, if at all, knows how well they interface. Clients are looking more and more towards service providers to make these types of technology decisions. In this situation, ability to learn or master a new technology is not sufficient. One needs to be able to evaluate options and know what each technology can or cannot do. Also there is a need to decide which of them can be interfaced well, and so on. Sometimes you need to develop a system that is flexible or platform independent. You might have to decide whether to try and interface two technologies that look promising for a project without prior experience. If it works, the performance will be superior. A high caliber development team might be able to pull it off. If it does not work, then the project is delayed. Unfortunately, these skills, exemplified in the *software architect* are not taught at engineering colleges: problem solving and decision making based on mastery of technology are different things. Given the current pressure on people to deliver projects, they usually do not have time to learn these types of skills. Moreover, these skills can perhaps only be learnt as an understudy on a live project. Surgery cannot be taught in a classroom. It has to be learnt on the job as an assistant to a master surgeon over several operations. Even then, the first few operations might be done under the observation of senior surgeons.

Unfortunately, Indian firms do not appreciate this point sufficiently. No doubt, there is a growing acceptance of the fact that there are gaps in technical skills, especially new technologies, system analysis and software architecture. However, they do not recognize that system design, analysis, and architecture go beyond mastering a new technology. One reason is their phenomenal success in the recent past. They have overcome several new challenges and feel they can overcome the next ones as well. That confidence is welcome. However, the method of tackling them might have

to change from a 'cowboy can-do' approach to a more systematic acquisition, nurturing and growth of high level technical knowledge. A crude analogy is the difference between an undergraduate and a Ph.D. program. One can be scaled up easily by hiring more teachers. Another cannot, since a thesis required individual mentoring. In the past, Indian firms have recruited people, sent them for some training, and then put them on the job as part of a team. People learnt reasonably well under this model. The same method of training people for higher skills will probably not work. Given the nature of these firms, there is a tendency to use purely technology based solutions for scaling up training, for instance, creating a knowledge system accessible to everyone in the company. However, this does not mean that people will regularly access it and learn from it. Also, that people will have the incentive to put this knowledge into the database in the first place. Some firms experimented with hiring the best people and making them available as in house consultants. That also does not seem to work very well, since project leaders are either not aware of the expertise these people have, or under time pressure, feel that the old ways of working are the best. The methods of training might have to be closer to those used in consulting and law firms, and in specialized medicine. That creates a close interaction between master and pupil on a live project, and over time, builds capabilities in a wider set of people.

The second dimension is business consulting skills. Several companies in diverse industries like oil, steel, consumer goods, retailing, insurance, finance, manufacturing and so on are trying to leverage the Internet to improve their business. Often they are not clear what they want, and look for advice, guidance or high quality innovative solutions from service providers. This lack of clarity could be for several reasons. They could be start up dotcom companies that have a general idea, but have not worked out details. For instance, someone might want to set up an interactive web site for some target group, say urban women, and have some broad ideas. He or she might not be clear about all kinds of details like what the web site should contain, what is already available, how to set priorities, and more importantly, what exactly is possible from a technical point of view. This start up cannot afford high priced business consultants who give a strategy and then leave software implementation to some service provider. It would want a service provider who can also provide consulting and deliver results fast. A consumer goods company might want to cut costs in the distribution chain using the Internet. However, they might not have thought through issues like whether they need different distribution systems for different types of products, how to set target inventory levels, and how collection of point of sales data can help them to cut inventory and distribution costs, and delivery lead times. Other issues include trade off between inventory and transportation costs. For high margin products with fluctuating demand, a policy of frequent and fast replenishment of stocks from a central warehouse might work better. For low margin commodity products, a more traditional policy that optimizes total costs might work better. No doubt, the company could hire consultants to design the system and then call in a service provider for either writing custom software of for implementing some ERP or supply chain package. However, clients are increasingly uncomfortable with two separate companies, one doing consulting and another implementing software solutions. Often unanticipated issues arise during software implementation, and projects get delayed. A pension fund might want to create a competitive advantage by offering their customers direct access to their accounts, and allow them to do some on line transactions. They might not know what kinds of options and features will help, and more importantly, what type of things are possible using new technology. There is a clear opportunity for service providers who can also do consulting. Until recently, Indian firms have neglected domain knowledge and business consulting skills.

The third dimension is program management. This includes traditional project management, but needs higher skills. The nature of projects has changed, and the earlier 'waterfall' method with milestones and deliverables might not work. Projects now need to be more flexible, allowing for late requirement changes, and might have to go through several iterations. Another major driver

of this change is the need to complete projects much faster. Concept and prototype testing is already being done for such projects. The project leader or program manager has to deal with more complex technical and business issues, and needs to manage a much more diverse group that has consulting skills and domain knowledge, software architects, those who can choose among different components, and so on. He or she will have to design a system that will deliver the project. Unfortunately, no standard, well tried and tested methods have evolved on how to go about this. Program management also needs skills like anticipation of changes. For instance, a client might want an interactive system that allows people to carry out on line transactions. After a few weeks, the client might come back and say the user must be able to cancel a transaction. If this requirement had been anticipated and suggested up front to the client, it would have saved a lot of rework. Another way of tackling the same problem is to 'over engineer' by using more powerful, and possibly more expensive, off the shelf components. Such a component can deliver more options and features than the customer initially asks for. Later changes can then be incorporated easily with minimum effort and loss of time. Parallel development of different modules is another powerful method that could be used in some situations. Thus, the program manager's job is more complex than managing traditional projects.

Indian firms typically use very young project managers with two to three years of experience. The average age is around 25 years. Similar US based firms use people with seven or eight years of experience. One major reason for this is the shortage of manpower to meet the needs of a rapidly growing market. Indian firms have succeeded with this approach, but largely for low value traditional projects. US based firms also use a more top heavy project management structure. There is a more senior project or program manager. There are two people reporting to him or her. One is a technical head of the project, and another is the project manager who looks after delivery and milestones. The program manager has overall responsibility, acts as an arbitrator for conflicts between technical and management issues, and maintains close links with the customer. For high value, complex projects, Indian firms might need to re-examine their approach.

The challenge for Indian firms seeking to penetrate entry barriers higher in the value chain is to simultaneously acquire higher levels of capabilities on all three dimensions. One key question here is, how do we build these capabilities on these different dimensions (see Figure 3). Initial lateral recruitment or carefully chosen acquisition would have to be followed up with careful internal nurturing to create a large pool of highly trained people. This is no doubt a big challenge, and would in many ways change the organization including internal processes, systems and structures. Apart from that, retention of scarce, high value talent, large salary and compensation differences between individuals and between different types of skills and knowledge would also need to be managed. As discussed later, knowledge would also need to be recognized and rewarded, in addition to more traditional rewards for sales, delivery, and project management.

Building Capabilities

How does a firm acquire these different capabilities? In today's context, we assume that market opportunities are not a constraint to growth. However, the number of people with high value, scarce skills we can recruit is limited. For manpower based growth, a firm might be able to start off with lateral recruitment. However, for knowledge based growth, it seems the only possible way initially is by acquiring some other company. This is because a large number of people with higher capabilities is required. As mentioned earlier, these capabilities cannot be gained only through classroom training (although it might also provide some useful inputs). Mentoring is a powerful method used in law, medicine, and in the top consulting firms.

Assume a firm can recruit at most r high value people per year. Suppose each value added project needs two such people to execute. The number of new people an Indian firm can recruit limits its growth of consulting income. Let us call this the *zero model*. Suppose, further that it takes one year for a project, by which time n other people can be used as understudies, who can be mentored to pick up value adding skills. However it would require $m_2 > 2$ experienced people per project. Let this be the *mentor model*. In both models, the constraint is the number of people with high capabilities. If we look ahead over the next five years, the zero model provides 250 consultants if the firm can recruit 50 consultants each year, and the mentor model could provide anywhere between 1000 and 3000 consultants depending on the effort put into mentoring and investment in understudies. The reason is that in the mentor model, growth in the number of consultants is geometric. The firm can do many more high value projects and generate much higher revenues. However, in the initial two years, the firm would do fewer projects in the mentor model since some of the consultant's time is spent in mentoring rather than in revenue generating projects. The trade off is between today's revenues and much higher revenues later. It is the equivalent of long term investment in the knowledge industry (see details in Appendix 3).

This is a simplistic model, but shows that internal mentoring, though initially limiting the number of projects that can be handled, quickly generates a large pool of highly capable people within a short time. In fact, it is not possible to recruit several thousand high value from outside. That is because an Indian firm would compete with other top international firms for them. At the same time, the number of people available is limited, since these are not entry level software developers or programmers, but people with experience and higher capabilities. Acquisition of another firm looks attractive, and is possibly a good option, but it is unlikely that an Indian firm today can acquire several thousand consultants merely by taking over another existing overseas firm. Perhaps there is no other way except in house high skill development through mentoring, especially for scarce human resources. Thus it might be necessary to identify high potential younger people and use them as trainees or understudies to learn architecture or consulting skills.

However, if this model has to work, mentoring has to be a part of the organization culture. People must also know how to mentor. Some preliminary suggestions are incentives for mentor and trainee, 'certification' by mentor or by customer, trainee feedback on mentors, self appraisals, formal exam type evaluations for trainees at the end of the project, and so on. This is like the guru-shishya Indian model. To make it more realistic, people who have been mentored can be tested rigorously either within the firm or even by an external agency to assess how much they have learnt. At the same time, mentors would need some incentive to spend time to train other people. Perhaps some aspect of this could be a part of a mentor's personal annual evaluation.

A key question here is how do we deploy manpower? This is important when there are all kinds of market opportunities, from low to high value projects. What do you do if a person with 'rare' management, consulting or technical skills is on the bench and there is a low value project that is short of people? How do you deploy people with 'high' knowledge? Do we keep him or her in reserve for a future value added project, or do we deploy them immediately? It might be preferable to deploy such people only for their unique expertise, and for mentoring. This means that some people will be earmarked for certain types of work only: something that is currently not part of the culture of Indian firms. If several projects compete to get the same person, how do we resolve it? How do we ensure that people are released from a project quickly, since much of the value added work might be done in the initial stages? These are issues that might become important in the future, and mechanisms to resolve them would have to evolve.

The real and obvious benefit is that when it is difficult to increase manpower significantly, the KBG model with a high proportion of consulting revenues, combined with mentoring, would

considerably reduce the number of people that need to be recruited. Other possible benefits are that it could attract talent to the firm once it gets a reputation for being a premium service provider with a large pool of talented people. Already, there are indications that talented young Indians do not find routine software work challenging or interesting enough. Another benefit might be related to the 'hit rate', i.e., the proportion of proposals that result in projects. Even the very top Indian firms have a low rate. This is surprising since the low cost model they have used should have resulted in a higher rate of conversion of proposals to projects. Moving to a knowledge based model of growth is likely to increase the hit rate as more experienced consultants and technically capable people get involved in pre-sales to top executives of client firms. However, this sales approach is going to be more resource intensive.

Building a culture of knowledge

Bell Labs and similar knowledge based organizations seem to have put in place an excellent system for recognizing and rewarding knowledge. For instance, a leading researcher might only be designated as a 'Senior Scientist', and not necessarily as a Vice President. He or she however has other forms of recognition, including awards and research grants. However, such organizations have built up a culture where knowledge is highly valued. Another example is the Massachusetts Institute of Technology, where there are three types of people in teaching and research. The first, and most well known are the tenure track faculty, who are required to do research and teach. The second are course Instructors who are designated as Lecturers and Senior Lecturers. They are only required to teach. The third are 'Research Scientists', who do not teach, but carry out applied research for which they raise grants from outside, and in fact pay an overhead to MIT. The culture of these organizations is unique since it has a dual hierarchy even among the tenure track faculty. Thus, there are Assistant, Associate and Full Professors, Provosts, Associate Deans, Deans and a President. This is an administrative hierarchy. At the same time, there are 'Chair Professors' and the less widely known, but far more eminent 'Institute Professors' There are Nobel Laureates, and well respected up and coming young Assistant Professors who have received external recognition. This is some kind of a knowledge hierarchy, or more appropriately a knowledge recognition system. To give a formal touch, Harvard University pays a University Professor (like Michael Porter or Amartya Sen, when he was there) slightly more than the President of Harvard. The point is that a knowledge based organization might have to evolve a culture where knowledge of the right and appropriate type, would be recognized and rewarded, along with rewards for more traditional capabilities. However this requires a method to value knowledge and performance, something which is difficult to do.

Fixed Price Projects and Productivity Led Growth

Another model for growth could be based on fixed price projects and productivity improvements. More precisely, if delivery times can be cut for a project using fixed time, fixed price terms, then productivity improvements would mean that more projects can be done every year. There are several benefits of moving to a fixed price model, provided the market is ripe for it. First, project revenues can be based on the notion of value, allowing Indian firms to effectively charge higher rates for projects. Second, it will force them to improve productivity since it gets the entire benefits of doing so. The time and material method of doing projects in fact has no incentive to improve productivity, since the benefit goes entirely to the client at the cost of the service provider. As stated earlier, the automobile industry shows that Japanese car makers could bring out a new car twice as fast, and at half the cost compared to US car makers like GM, Ford and Chrysler. Similar benefits might be possible in the software industry if firms pay enough attention to productivity improvements. There are other benefits as well. It allows a firm to identify high potential younger people who can used as understudies in complex projects, and builds up

capabilities in a larger set of people. It may not be as expensive as it seems since fixed price projects would generate much higher revenues, and hence can bear the cost of understudies. In a time and material project, there is no incentive to do so since revenues are based on number of productive people on a project, and a client will not pay for an understudy. In principle, a firm could still use an understudy who is not paid by the client. But in practice, this does not happen.

Let us try to quantify the benefits of productivity based growth for our hypothetical company with target revenues of $2000 million in the future. Currently Indian firms generate less than 30% of revenues using fixed price projects. This proportion could change in the future. Another parameter that could vary is the extra revenue generated as a result of value based pricing. A third parameter is the extent of productivity improvement. The following table shows the benefits at different levels.

Extra Revenue ($ million)						
			Total extra revenue from percent productivity improvement			
Fraction of fixed price and time projects	Fixed price and time revenues	Extra revenue from rate increase	5%	10%	15%	20%
Zero rate increase over time and material projects						
10%	$200	-	$10	$20	$30	$40
25%	$500	-	$25	$50	$75	$100
50%	$1000	-	$50	$100	$150	$200
20% rate increase over time and material projects						
10%	$240	$40	$52	$64	$76	$88
25%	$600	$100	$130	$160	$190	$220
50%	$1200	$200	$260	$320	$380	$440
50% rate increase over time and material projects						
10%	$300	$100	$115	$130	$145	$160
25%	$750	$250	$287.5	$325	$362.5	$400
50%	$1500	$500	$575	$650	$725	$800
Assumption: Total revenues $2000 million at time and material rates						

The table shows that most of the increase in revenue actually comes from moving from a time and material based pricing to a fixed price, allowing Indian service firms to effectively charge higher rates for similar projects. The increase in revenue from productivity gains is relatively low. It seems tempting to move to a fixed price model without substantial investment in improving productivity. However, the ability to effectively charge higher rates in the fixed price approach might depend on higher productivity in terms of being able to deliver projects faster. It might also force service providers to take responsibility for technology recommendations since customers are willing to pay more for it. It is clear from the table that unless a substantial fraction of revenues, say around 50%, come from fixed price fixed time projects, the extra revenue generated is not very high. Closely linked to this is how to obtain these productivity improvements. Using components off the shelf and writing glue code is one method. Using parallel development wherever possible is another. There is a need to examine these issues in greater depth. At the same time, using components would increase the cost of development, but moving to a fixed price, fixed time model of business would probably generate enough extra revenue using value based pricing to offset the extra cost.

Growth based on fixed price and productivity improvement can be combined with either the MBG or the KBG model of growth. Doing it while pursuing manpower based growth is perhaps easier to implement, since the challenge of substantially increasing capabilities is not there.

Conclusions

Unprecedented market growth, worldwide shortage of manpower, and access to high quality, low cost manpower in India has placed service providers in an enviable position. Perhaps no other industry in India has ever been in such a happy situation. However, their recent spectacular success could be an obstacle for sustaining the same levels of growth. That is because success has been based on low cost delivery of relatively low end work. The major challenge Indian firms overcame was mastering new technology. This success might lead to a confidence that they would somehow be able to achieve even better results in the future. But the challenge they overcame in the past was a technical one, and that too, involving mastery of a new technology, whether it was mainframes, two tier or three tier client server architecture. Thus they did not build abilities on technology choices, architecture and decision making, or on consulting or high level project management. In the future, these capabilities would be crucial. But this continues to be a blind spot for these firms, although they are aware that a manpower based growth strategy is not sustainable in the long run.

Firms can increase revenue per person in two ways. At one level, Indian firms could charge higher rates for existing type of work. This is being done for new clients, although it is difficult to do so for existing ones. Some limited amount of consulting, perhaps less than 5% of total revenues, would also be done. Thus growth would heavily depend on the ability to recruit a large number of people, perhaps several thousand, each year. There are limits to the number of people that can be recruited. However, this model of growth does not require major efforts to change the organization or enhance capabilities. Some effort to improve rates is all that is needed. It is in that sense, easier to do. However, without providing value added services, the firm would face price based competition from new and upcoming Indian firms, and perhaps those from China or Philippines or other countries.

At another level, they could do consulting. This requires substantial efforts to enhance capabilities through a mixture of acquisition, lateral recruitment, and in house development, largely through mentoring. It also requires several changes in the organization, including building a culture of knowledge, a reward and recognition system for it, and the willingness to differentiate people based on their abilities. A key change would be the ability of its people to take more decisions, whether it is about technology, consulting or project management. Unfortunately, decision making has not yet been delegated to the rank and file in these firms. However, the effort is likely to pay off fairly soon by increasing revenues, limiting recruitment to reasonable levels, and placing the company in a much better position in the future where it can resist onslaught from low cost competitors.

Growth can also come through productivity improvements combined with fixed price, fixed time projects. This can be combined either with the manpower model or the knowledge model. In either case, it requires a major effort to improve productivity and a move towards value based pricing. Combining it with the MBG model is feasible. However, combining it with the KBG model would probably place a lot of strain on the organization since too many changes are needed on too many fronts. Productivity improvements might need to be postponed to a later date, after the KBG model is in place.

One question at this stage might be: is it at all feasible for an Indian firm to follow the KBG model and become a truly world class company? A top Indian firm today is at the centre or confluence of a unique set of events. Its reputation, profitability and market value are very high. It can therefore attract top quality talent, and use it to take advantage of market opportunities. Today, the best graduates from the best colleges in India prefer software firms over finance and marketing companies. In some cases they prefer software to consulting firms. Perhaps for the first time, a 'made in India' label is not a handicap in software. Recently, a few of these firms have recruited some of the best people from well known international consulting firms, including citizens of other countries. They have also set up development centres overseas. Although the cost goes up, response times to customer needs improves significantly. Such companies have usually taken the lead among Indian service providers in moving up the value chain. People are enthusiastic and proud of their recent success. Software professionals can sustain a very high standard of living in India with relatively low salaries because of the low cost of living. The earlier rush to emigrate to the West has come down considerably. In fact, employee turnover at the very top Indian firms is low by international standards. The ability to attract and retain talent gives them an edge in the market place.

This success sometimes leads to a can-do optimism and confidence based on past models of growth that might no longer be relevant today. Compared to US based value added service providers, Indian firms continue to have a unique cost advantage. However, the key advantage is access to some very high calibre manpower from the best engineering and business schools in the country. If this pool of people can be developed, then this model of growth is feasible. After all, it is the best graduates from these schools that are recruited by the best international firms. Other than fresh graduates, there is a large pool of Indians within and outside the country working with multi national firms, with the required background and track record. If they can be high performers in these companies, then they can do the same for an Indian firm. More importantly, these firms are now open to recruiting internationally, and are no longer looking only for Indians or people of Indian origin. Salary is no longer a constraint, especially with stock options, and overseas postings.

On balance, the MBG model is easier to implement, but does not take the best advantage of market opportunities. The KBG model is difficult to implement, but builds a truly world class company. It seems to be a trade off between what can easily be done and what is desirable. The danger is not that the top firms will fail. The real danger is that they might not attain their full potential. Building an excellent company needs a dream behind it. Continuing to achieve revenue and profit growth based on a low cost model does not.

Appendix 1: Manpower needs as a function of consulting revenues

Let the total revenues be fixed at R

Let the fraction of revenues from consulting be c

Let the (premium) revenue per person per year be p

The number of consultants is therefore cR/p

Let the new blended rate for on site and off shore downstream work be b_n (dollars per person per year)

Let the old blended rate be b_o (dollars per person per year)

Let each dollar of consulting revenue generate k dollars of downstream revenue

If $cR+cRk <= R$, the number of people earning this downstream revenue is cRk/b_n.

The remaining revenue, which is $R - cR - cRk$ is earned by $(R - cR - cRk)/b_o$ people

The total number of people is therefore $cR/p + cRk/b_n + (R - cR - cRk)/b_o$.

If $cR+cRk > R$, the number of people earning this downstream revenue is $(R-cR)/b_n$.

The total number of people is therefore $cR/p + (R - cR)/b_n$.

As an illustration, assume R = $2000 million (future scenario), p = $300,000 per person year, b_o = $100,000 per person year, k = 5. The fraction c varies from 0.05 to 0.4, and the blended rate increase varies between 10% and 50%. The manpower needed under different scenarios is given in the following table, along with the number of consultants. We assume that each person generates $100,000 per year five years from now as a *blended* or average revenue per person between off shore and on site rates, which is optimistic except for the best Indian firms. If we assume lower rates around $85,000, then the manpower required would be still higher.

Manpower needs				
Fraction of revenues from consulting	Consultants needed	Downstream blended rate increase		
		10%	20%	50%
0.00	0	20,000	20,000	20,000
0.05	333	18900	18500	17667
0.1	667	17600	17000	15300
0.2	1333	15900	14900	11000
0.3	2000	14700	13700	12000
0.4	2667	13600	12667	10700
Assumption: Total revenues $2000 million in five years, each consultant generates $300,000 per year, others generate $100,000 per year base rate, which goes up with proportion of consulting.				

Appendix 2: Extra Revenues from Consulting

Let the total manpower be fixed at m

Let the fraction of revenues from consulting be c

Let the (premium) revenue per person per year be p,

The number of consultants is therefore cR/p

Let the new blended rate for on site and off shore downstream work be b_n (dollars per person per year)

Let the old blended rate be b_o (dollars per person per year)

Let each dollar of consulting revenue generate k dollars of downstream revenue

The number of people earning this downstream revenue is cRk/b_n.

If $m \geq cR/p + cRk/b_n$, then the remaining persons earn b_o $(m - cR/p - cRk/b_n)$ dollars

The extra downstream revenue is $R - mb_o$, where $R = cR + cRk + b_o$ $(m - cR/p - cRk/b_n)$

Hence, extra revenue (consulting + downstream) $= mb_oc[p(1+k)-b_o(1+kp/b_n)]/[p- pc(1+k)+cb_o(1+kp/b_n)]$

If $m < cR/p + cRk/b_n$, then those not in consulting earn b_n $(m-cR/p)$ dollars

The extra downstream revenue is $R - mb_o$, where $R = cR + b_n$ $(m - cR/p)$

Extra revenue (consulting + downstream) is therefore $= m[p(b_n-b_o) -cb_o (p-b_n)]/[p-pc+cb_n)]]$

As an illustration, assume that m=20,000, p=\$300,000 per person per year, k=5, b_0 = \$100,000 per person per year, and c varies from 5% to 30% and b_n from \$110,000 to \$130,000. The following table tries to quantify the benefits for a hypothetical company with 20,000 employees five years from now

Extra revenues (\$ million) and no. of consultants for given manpower (20,000)						
Fraction of total revenues from consulting	10% blended rate increase		20% blended rate increase		30% blended rate increase	
	Extra revenue	Number of consultants	Extra revenue	Number of consultants	Extra revenue	Number of consultants
0.05	\$120	353	\$160	360	\$200	367
0.1	\$250	751	\$355	784	\$445	815
0.2	\$520	1719	\$725	1905	\$930	2097
0.3	\$715	3014	\$930	3637	\$1130	4407

Appendix 3: Manpower growth by mentoring

Assume there are N_t people (say architects or consultants) at the start of period t (say year t).

Assume you need m_1 people per project for implementation without mentoring

Assume you need m_2 people per project for implementation and mentoring ($m_2 > m_1$)

Suppose n new people are trained in each project at the end of period t.

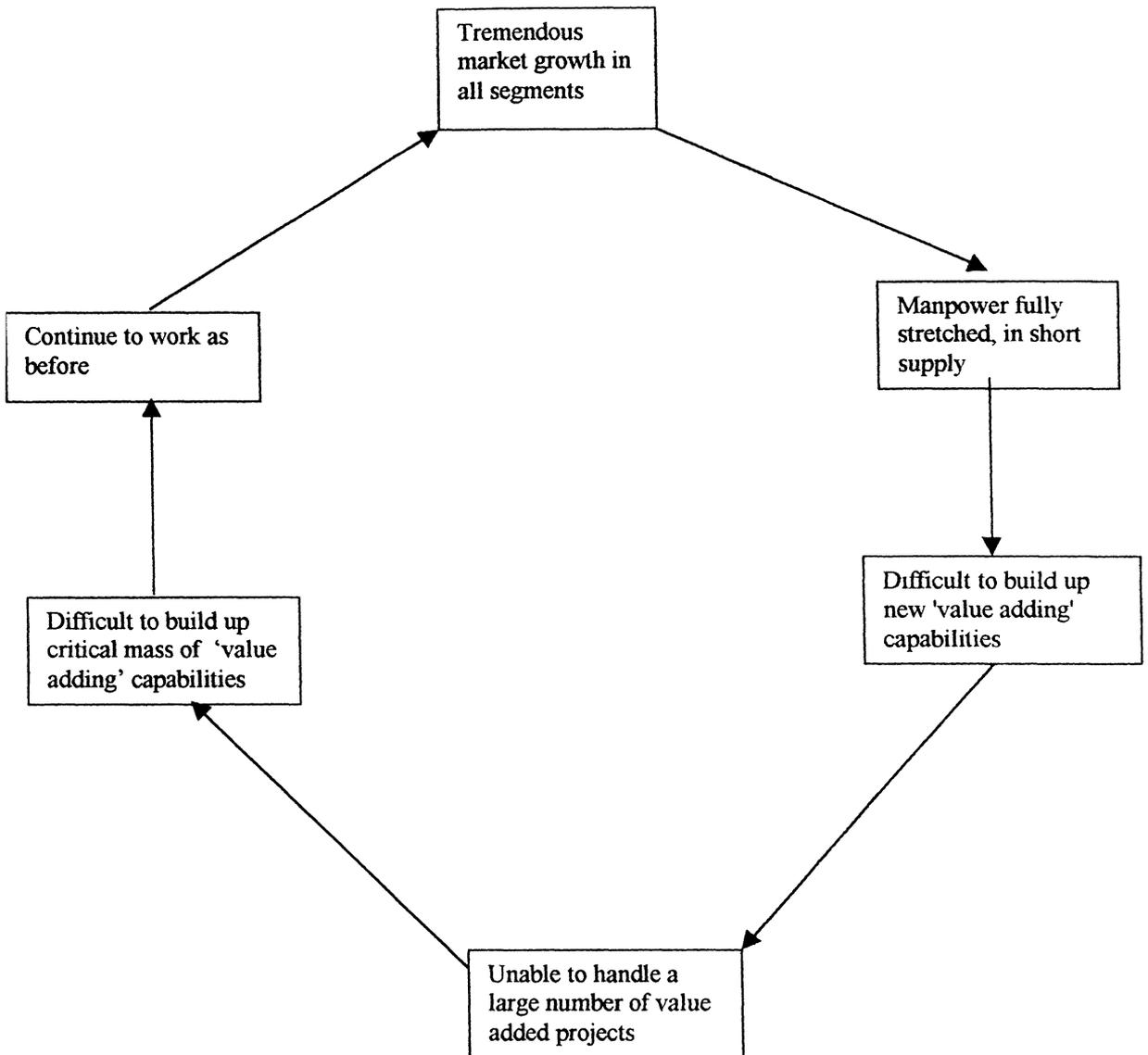Suppose r_t people are recruited from outside in each period

Then at the end of period t we have $N_t+r_t+N_t n/m_2$ fully trained people with mentoring and $N_t +r_t$ without

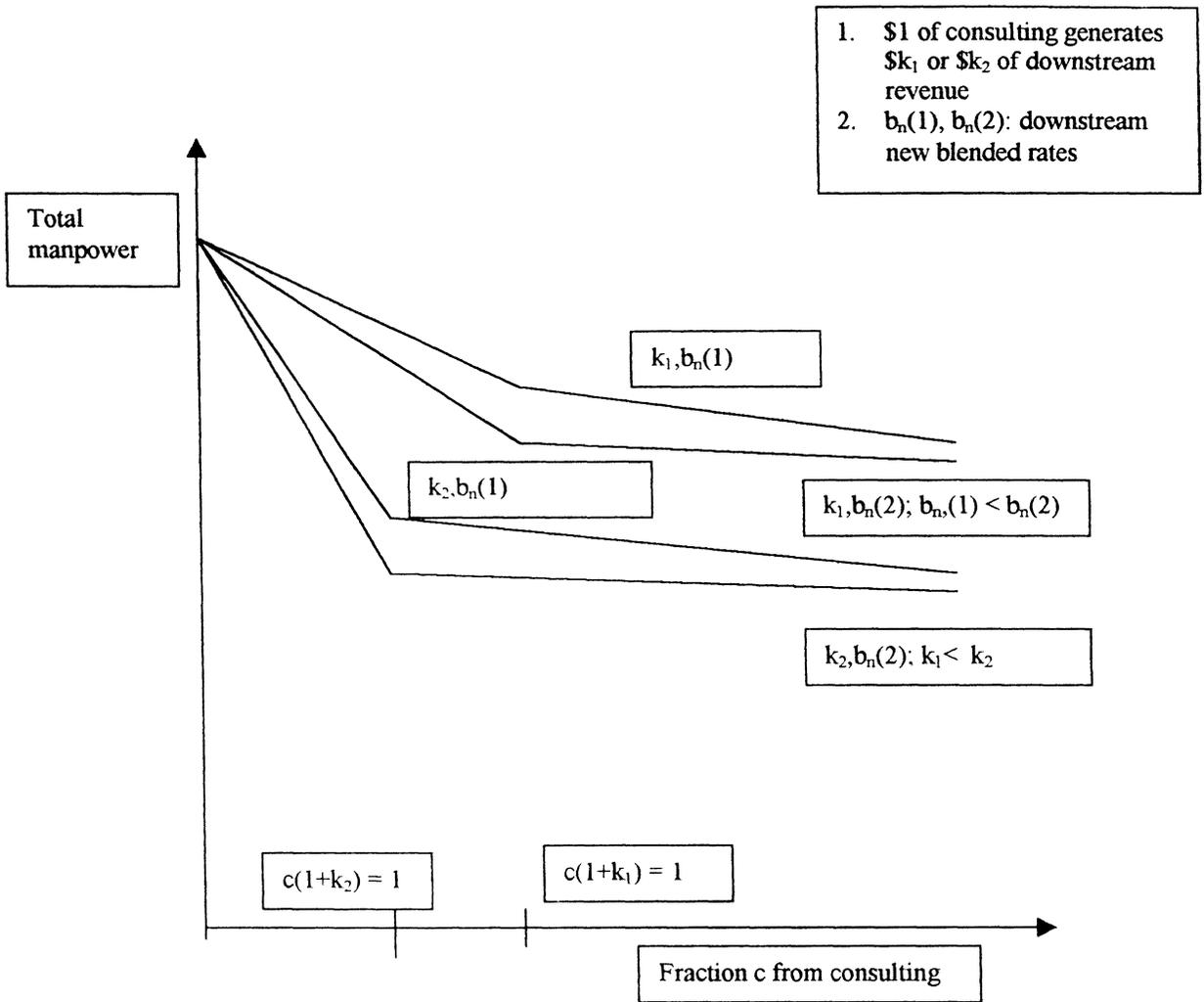We can do only N_t/m_2 projects with mentoring and N_t/m_1 without mentoring

But next year we can do $(N_t+r_t+N_t n/m_2)/ m_2$ projects compared to $(N_t+r_t)/m_1$ without mentoring.

Assuming $m_1 =2$, $N_0 = 50$, and $m_2 = 3$, $n = 3$, or $m_2 = 4$, $n = 6$, we get the following picture, where we assume that the firm starts off with 50 such people who are either available in the company or are recruited from outside

Growth in number of consultants					
	Year 1	Year 2	Year 3	Year 4	Year 5
Zero model without mentoring.					
Consultants	50	100	150	200	250
Projects	25	50	75	100	125
Mentor model, $m_2=3$, $n=3$					
Consultants	50	148	345	740	1034
Projects	16	49	115	246	344
Mentor model, $m_2=4$, $n=6$					
Consultants	50	172	480	1250	3172
Projects	12	43	120	312	793

Figure 1: **The Low Value Trap**

The chart contains the following labels:

Total manpower

1. $1 of consulting generates k_1 or k_2 of downstream revenue
2. $b_n(1)$, $b_n(2)$: downstream new blended rates

$k_1, b_n(1)$

$k_2, b_n(1)$

$k_1, b_n(2)$; $b_n(1) < b_n(2)$

$k_2, b_n(2)$; $k_1 < k_2$

$c(1+k_2) = 1$

$c(1+k_1) = 1$

Fraction c from consulting
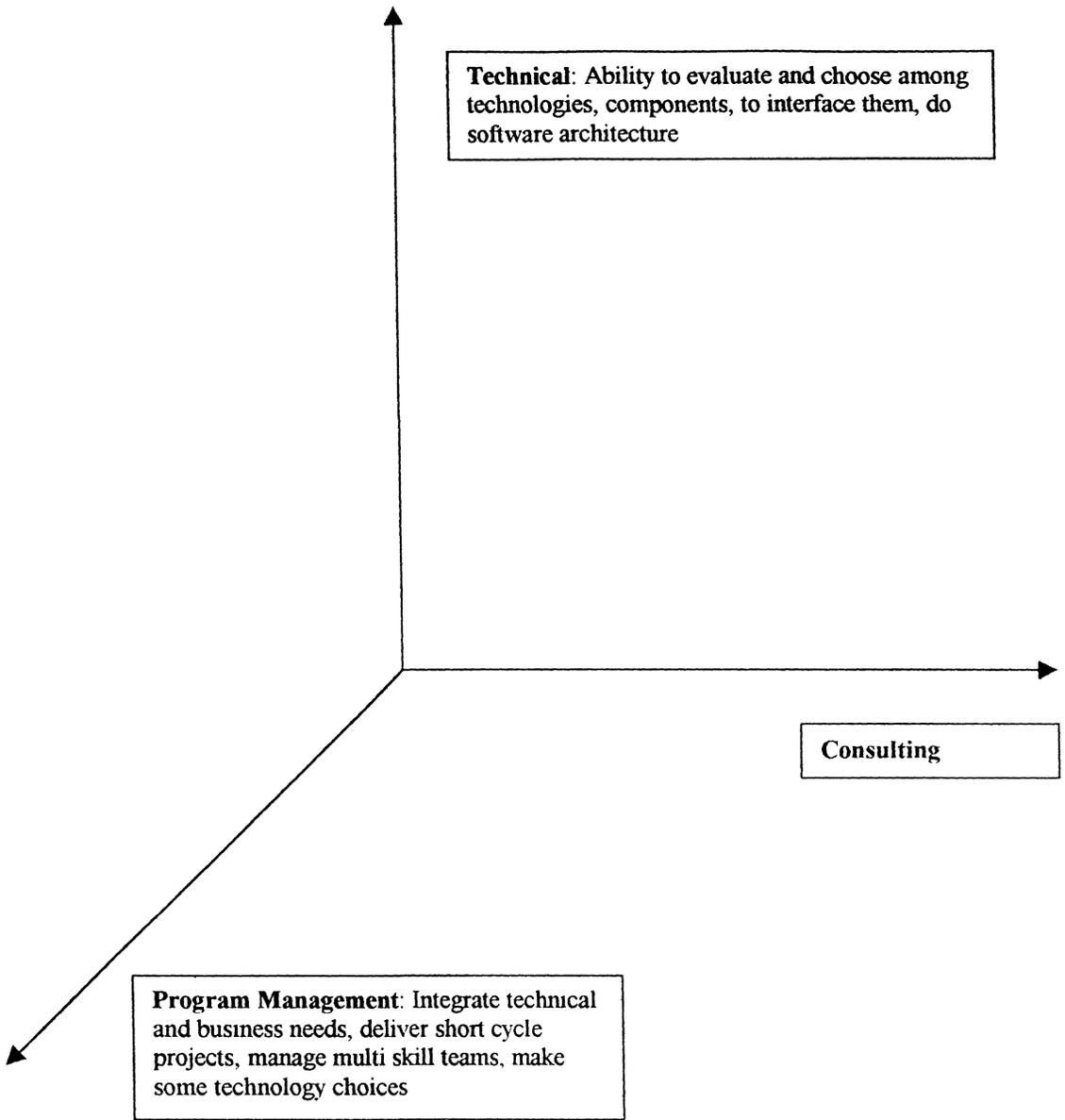
When $cR(1+k) > R$, the entire revenues come from consuting and increased down stream rates b_n; otherwise some portion comes from non-consulting projects at rate b_0. This leads to the breakpoint in each curve. When b_n increases, the manpower needed comes down [$b_n(1) < b_n(2)$], but not as much as the decrease when the downstream multiplier k increases.

Figure 2: Manpower as a function of consulting revenue, increased downstream work, and downstream rate increase

Technical: Ability to evaluate and choose among technologies, components, to interface them, do software architecture

Consulting

Program Management: Integrate technical and business needs, deliver short cycle projects, manage multi skill teams, make some technology choices

Figure 3: **New capabilities needed**