Introduction

Information Technology (IT) is about all that automates systems in industries to efficiently deliver products and services through technological handling of information. All that was performed through human resources is now being performed through IT resources with some or no human intervention. Many examples can be considered in order to justify this claim. Technological landscapes have changed the way tasks are accomplished. Examples that follow represent various technologies and innovations and how they have impacted businesses. There are bigger motives and incentives under the umbrella of which it would be beneficial to discuss the impact of technology. Before getting into that it would be helpful to discuss the key component based on which any enterprise can succeed and find its strong hold, and that is, Dharma.

Dharma

It may sound a bit philosophical to discuss dharma in the very beginning of a book on Technology, Innovation and Enterprise Transformation but in truth that which provides a base for everything cannot go without being discussed. “Dharma” as has been used by Hindus and Buddhists, and by other religions with different names and in different forms, is the key factor in every endeavor or enterprise we establish and run. Without following dharma, be that at personal level or at the level of big enterprises, no endeavor can succeed and stay established for a long time. There is a possibility of momentary success by not following dharma, but there is no possibility of holding on to that success for too long. Anything that doesn’t have a foundation will fall, even if it could stand in the first place. The Sanskrit noun “Dharma” is a derivation from the root “dharma,” which means to protect or to sustain. Thus, that which protects and sustains is dharma. Dharma has been given various meanings but righteousness, law, virtue and order are often attributed to this word.

How then is dharma important in enterprises? Dharma is like a blind man’s staff. If we do not hold on to it there is always a danger of fall. In various enterprises, one has to take decisions that have strong consequences. In those situations it becomes more and more important to follow the right action, even if in short term it may seem counterproductive, in long term it will always succeed. Ethical treatment and behavior must be at the heart of all the enterprises, be that with the employees, colleagues or administrators. Dharma is the guiding light that serves not only the wellbeing of those involved in the undertaking but also in the wellbeing of all the creatures and the whole world. In the end, only dharma wins, and one who walks the path of dharma, wins.
Figure 1 shows the three major components of an enterprise, and dharma is at the base of all, as the supporter and protector. On the solid foundation of dharma stand money and speed (efficiency). If money and speed become the only motivation without the foundation of dharma, then one starts encouraging unethical treatments, lies and deceptions to support one’s enterprises, which lead to their fall. Money is an important component for the growth of businesses but without the foundation of dharma, it can lead to destruction.

Not only at the individual level, dharma is the guiding force of the whole universe, and it thus becomes important to see the whole picture than just a small pixel of this picture. The more we become supportive of the wellbeing of the whole world, the more conducive it is to the well being at the individual and enterprise level. We have destroyed the whole earth with our efforts that are leading us only towards our own downfall. Various enterprises have been established that base their foundation on the destruction of natural resources for small monetary gains. What we do not understand is that these small term gains are destroying us in such huge ways that we cannot imagine when we look at only a small instance of time or even the small lives that we get to live.

What then is “dharma” for an enterprise? It is to support the wellbeing of all those who are a part of this enterprise as well as the wellbeing of those who get impacted by it and the world at large. For the short-term gains for one’s own country, one cannot decide to loot other countries and their resources. This kind of behavior is based on greed and power, and it only leads towards destruction sooner or later. Various food enterprises have been establish that provide slow poison in the form of processed, junk and chemically treated foods to everyone that eventually make people obese, sick and prone to death. Inhumane treatment of animals and plants are leading us towards global and climate changes that can
be easily rationalized and justified if kept on the taste buds of our palates or on the ever expanding scales of our greed. All our justifications fall apart if seen in the light of dharma. Medical industry has become a moneymaking machine without the base of dharma or ethics. Money, as stated previously, is the second important component of enterprises and not the first; dharma is always the first component and the foundation of all the enterprises.

Here, dharma is not being used in the sense of religion, as lately, its usage has become prevalent in the sense of religion. It is being used in its rightmost spirit in which it must be used. It thus becomes important to think of consequences of any enterprise before embarking on the journey. The other two major components in businesses and more specifically in today’s enterprises that use technology in some way or the other, that is, money and speed are discussed as follows.

**MONEY**

Money is a major motivation for any business. The ways transactions are done in businesses have changed a lot from the time when money was seen solely as something that could be touched and felt. In this era of information handling and delivery, money transactions are seen more in terms of information delivery than the actual tangible delivery.

**Money: From Coins to Bitcoins**

The way money is handled and saved, and transactions are performed these days through Automated Teller Machines (ATMs) is something that we can see in terms of virtual transactions than actual physical transactions. Not only this, the virtualization of money has been taken one step further through the concept of virtual money, one of the most popular examples of which is “Bitcoin.”

The purpose of the virtualization of money is motivated by the factor that, in this world of information technology, we cannot rely only on physical delivery, which is slow and slows down the way transactions are performed. Money and speed are the two major driving factors for businesses. If speed of delivery needs to be accomplished, businesses need to find ways to make monetary transactions as speedy or even faster than the actual delivery of products and services. In the following section is presented the second major motivation for thriving IT based companies and that is the speed of delivery.

**SPEED**

The speeds with which products and services are delivered have changed the way businesses are done these days. No company can afford its competitors to provide faster goods or services than it does. This is the reason various companies spend lots of money on research and innovation, in order to come up with new ways to tackle problems as well as the speed with which services are delivered. This is indeed important in which firms sell and provide homogeneous goods and services. In the marketing and strategic management literature, the speed to market can be a competitive advantage with increasing profits and market share.
Speed of Information: The Internet and WWW

Information delivery through the Internet and World Wide Web (WWW) based services has changed the way transactions and businesses are done these days. Who would have thought in the past that money could be transferred to someone living in a foreign country in just a matter of hours? Who would have thought that just by clicking few virtual buttons online, they would be able to see the goods delivered outside their houses? This is the world where speed of information delivery has opened a totally new frontier where things are possible at a moment’s notice, and this all happened through the dawn of information age.

Speed of Goods: From Trucks to Airplanes to ET3

Information delivery has become so fast that the clients expect matching speeds when it comes to delivery of goods and services. With the use of trucks, airplanes, drones, and now with the suggestions of evacuated tube transport technologies (et3), there is a push towards quicker and quicker delivery of goods and humans. How much speed we can accomplish when it comes to actual delivery of the goods, only time will tell, but this is sure that we are not limited anymore by the limitations that come without the use of technology.

TODAY’S TECHNOLOGY AND BUSINESSES

Today’s businesses cannot survive as well as thrive without implementing technology. They are co-dependent and are highly tied together. Various businesses are implementing technology as is clear from Figure 2. Various branches of Information Technology (IT) are coming together to provide highly sophisticated systems to support automation for businesses. Logistics deal with such highly complex systems that cannot efficiently work without implementing technology. Distribution centers have automation systems working all day long to efficiently and quickly move goods around. Without implementing sophisticated networks there is no scope of quick and accessible communication possible for businesses. Various transactions taking place day in and day out are not possible without these networks and a complex infrastructure of databases. Security is a big challenge for these enterprises as a single breach in security of the network may mean huge losses of millions or billions of dollars. Growing demands of various industries have created a mesh of interconnected technologies that things happen at lightning speeds. As discussed above that money and speed are the two driving factors and only technology and technological innovation can continue this trend. Let’s now move our focus towards a constant drive to accomplishing and creating more, and that is, innovation.

INNOVATION

Innovation, as defined by, New Oxford Dictionary is “a new method, idea, product, etc.” It is thus clear that an intangible idea and a method are as much a part of the innovation process as a tangible product. Every new innovation brings its own set of problems and various researchers, scientists and innovators get busy solving those problems. Through the solutions of these problems come out further innovations
and further problems to solve, and this cycle continues. Figure 3 shows this cycle of innovation. This cycle also shows intermediate problems that may further branch out and give rise to different set of innovations. This is true for intermediate solutions as well; these intermediate solutions give rise to a process of continual research that creates ideas and problems for further innovation.

**Technological Innovation and Business Innovation**

When it comes to innovation, technology and business are co-dependent. If there is no demand for technology, it does not live for too long, and if businesses do not implement new and thriving technologies to support the money and speed aspects as discussed above, then they suffer and eventually die. The concept of innovation finds its fertile ground in academia as well as in industry. At the conjunction of both is research. Academia and Industry are pushing the envelope towards more and more innovations. Below is discussed innovation from two perspectives, one is from technological perspective and another is its application from the business perspective. Both perspectives drive the innovation process and hence are independently discussed.
Technological Innovation

Technological innovation derives its fire from human brain, which takes in the information and processes it to generate various ideas and thoughts. These further develop and fructify into tangible products. The consistent need of humans towards ease and betterment of their lifestyle has further driven this process and also since in this information age, it has become easier to accomplish this goal. Figure 4 shows such a process of innovation. In humans, first we sense our environment through our sensing faculties, which takes in the information received from surroundings and then we perceive this environment. We then base our decisions on this perception, and before taking those decisions we may use reasoning, which is further based upon our intelligence. In robotics artificial intelligence is implemented through such a process. Information is at the heart of all these faculties.

In the same way, our technology takes this information, which is a precursor to its implementation. This information can be implemented in lots of ways, for example in a computer; the information is generated at the application level, which is implemented through software and hardware. This information can be made to perform various operations on the computer. Various applications, Web browsing, Internet services, databases, etc. take the information and process it in different ways. Implementation generates the need for more, and this triggers the process of research and innovation. Figure 4 shows a dotted line in the middle, which separates the process of development of intelligence in humans and artificial intelligence in machines on the left side, from the process of reaching the state of innovation on the right side.

Technological innovation is at the heart of major businesses. Without consistent effort at bringing innovative products and services, companies like Google, Apple, Amazon, eBay, Facebook and few other such companies that can be counted at finger tips, would not have existed. What makes them unique is the consistent drive towards innovation and what makes them successful is the same factor, Innovation. Many companies like Dell, Microsoft, Nokia are struggling to keep up with the pace of innovation of these companies. What does this trend suggest? It suggests that without innovation, and that too at global level, there is always a struggle to survive for the companies that cannot implement innovative ideas.
Academia is always a big player in pushing further the envelope of innovation. Various companies, hospitals, and organizations work closely with academics to support their research efforts. Accreditation bodies are furthering this work by bringing the component of critical thinking at the undergraduate level. The critical thinking so that it can blossom into innovators of tomorrow is inculcated through consistent revision of the course curriculum of departments in universities. Accreditation bodies set standards that various departments must follow if they seek accreditation and plan to maintain it. For example, Accreditation Board for Engineering and Technology (ABET) sets guidelines for Engineering, Sciences and Technology based programs. To come up with their course curricula these programs must apply a specific “Body of Knowledge (BoK).” These specifications ensure that a program based on a standard set of guidelines and BoK is capable of producing students who can develop skills needed to support the workforce requirements for the ever-changing and evolving field of technology.

**Business Innovation**

Innovation and its impact on the organization as seen through the lenses of technology are ever changing. The role of the CIO (Chief Information Officer) has become very important in the design and the delivery systems that aid in decision-making. Organizations from retailing to banking have begun to use the CIO as a strategic partner to increasing market share and profits within these organizations. Relying on expert systems to identify customer trends, their purchasing habits, and the effectiveness of marketing campaigns, companies are engaging the CIO in the decision making and strategic selection of expert systems. The incorporation of the CIO as a strategic partner is now seen as a competitive advantage.

Innovation is also prominent in the financial markets. The speed of information transfers in the form of buying and selling securities have encouraged the development of asset markets that are efficient where future price movements have become more random and less predictable. Research has indicated that as markets become more efficient, the chances of earning abnormal profits diminish. The role of
the CIO has become very important in the selection and development of trading platforms. The use of modern trading platform software in the stock and futures exchanges that are approved by CIO’s has transformed asset markets and the organizations that engage in these markets.

Where are other business innovations prominent? They are prominent in the cost structure of organizations? One area where business innovations are prominent is when investments in technology allow organizations, if utilized correctly, achieve economies of scale. In the economics literature, economies scale are achieved when unit costs decrease in relationship to increased unit output. Investments in technology impact the supply curve by removing costs thus allowing the organization to become more efficient. One could argue that this has been one of the greatest innovations in American businesses.

ENTERPRISE TRANSFORMATION

Organizations have been transformed as a result of the growth and use of technology. How has the growth of technology impacted enterprise transformation? Technology has allowed the organizations to better understand customers and reach them through innovative ways. For instance, companies are using Facebook and Twitter to gain a better understanding of the purchasing habits of consumers and use this information to design marketing materials and advertisement to influence buyer behavior.

From an operations perspective, RFID (Radio Frequency Identification Devices) allows organizations to track inventory movement in the supply chain. Companies such as FedEx and Walmart find this technology very useful in maintaining inventory controls, improving customer satisfaction and increasing profits.

Other uses of technology can be seen in the design of expert systems. Expert systems are designed by computer programmers that seek to understand how problems are solved by experts. This information is then written into computer programs by asking a series of questions that guide the decision-maker. Expert systems have been used in identifying and qualifying potential customers who may be credit risk and investment risks faced by decision-makers in many organizations.

Enterprise Transformation and Some Business Functions

Organizations have been transformed as a result of the growth and use of technology. Technology coupled with increased competition and external challenges has made the use of technology even more important. How has the growth of technology impacted enterprise transformation at the functional levels?

Marketing

Technology has allowed the marketing manager to understand customers and reach them through innovative ways. For instance, retailers use loyalty cards with the aid of POS (point of sale systems) in order to gain a better understanding of consumer purchasing habits and use this information to design marketing materials and advertisement to build brand awareness.

Technology has also allowed the organization to develop and refine the marketing mix: Price, Promotion, Place, and Product.
With respect to price, marketers are able to receive pricing information in real time. For instance, retail companies, as well as, all business organizations are faced with pricing pressures. If they price their products to high then they will lose customers and sales. However, if they price their products to low, they could lose profits. Technology has allowed retailers with the ability to understand pricing patterns and the pricing behaviors of its competitors and adjust prices accordingly.

Technology has also changed the promotional aspects of marketers. Facebook, and Twitter has allowed marketers not only the use of traditional mediums of promotion to reach potential customers but to add social media to the promotional mix. This has allowed marketers to further impact the consumer decision making process each step of the way.

Place is defined as having the right product in the right place at the right time. Sophisticated replenishment systems allow marketing managers and retailers to maintain high in stock levels with the use of technology.

Product enhancements and improvements can be seen by the investments in capital generating equipment that streamlines new product innovations and introductions. This process allows many organizations to gain a competitive advantage and build brand awareness.

**Operations and Logistics**

Inventory, whether it is finished goods, work in process or raw materials, are the goods that an organization keeps on hand to satisfy customers. The importance of inventory to an organization cannot be overstated. Inventory that sits idle costs the organization money. A system that helps organizations control inventory is just in time. Just in time inventory systems are designed keep inventory at a minimal and reduce the various costs associated with inventory.

Expert systems are systems that are designed by computer programmers that seek to examine how problems are solved by experts. This information is then written into computer program that asks a series of questions that guide the decision-maker. Expert systems have been used in identifying and qualifying potential customers who may be credit risk and investment risks faced by decision-makers.

Enterprise resource planning (ERP) allows the entire organization to integrate and optimize all of the business functions. This system allows accounting, finance, marketing, human resources and operations with the ability to communicate to each other. Often, suppliers are also integrated into this system. For example, many retail organizations allow suppliers to dial into these systems in order to monitor sales and inventory. How does this process work? Suppliers can monitor sales and inventory movement by examining POS (point of sale) data. This is often done in real time. This allows both the supplier and the retailer the ability to reduce costs, increase sales and satisfy customers by ensuring the product is replenished quickly.

**Human Resources**

Human resource management is concerned with ensuring that the organization has a world-class workforce. Technology has also impacted the human resources functions of many organizations. In the past when applicants applied for employment, they used paper applications. Today this function has been relegated to the use of a computer. For example, in many organizations, kiosks are used to begin the employment process. Potential applicants complete an online questionnaire that screens applicants before they meet with management for an interview. Also, after an applicant is hired, many organizations
conduct onboarding procedures with the use of computers only. This process is prevalent in many retail organizations. The new employee simply completes all employment related documents online with little intervention by a live human resources associate. In terms of recruiting, technology along with the use of social media sites such as LinkedIn is being used to search and qualify potential candidates.

**Accounting/MIS**

This function has become very important in enterprise transformation. Accountants collect, organize, analyze and report financial information about the financial transaction of an organization. It is without question, the importance of accounting, however, when combined with information technology, it becomes extremely important. Accountants have to provide various financial reports to stakeholders. Information technology allows accountants the ability to monitor financial transactions and record these financial transactions so that management can make better-informed decisions. Also, the use of information technology allows the accounting function to prepare a variety of financial reports for investors and governments. Internally, the use of information technology helps management accounts design in house reports that examine productivity, activity base costing, and indirect and direct labor costs.

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