4IR and the Unleashing of Creative Disruption: Implications for Strategic Management

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Abstract

The Fourth Industrial Revolution (4IR) is the latest in a series of paradigm shifts in man's industrial trajectory, unleashing a tsunami of disruption which impacts across a broad spectrum: blockchain, artificial intelligence, machine learning, big data and IOT (Internet of Things). This articles examines the nature of the impact as well as the implications for strategic management.

Keywords: *paradigm shift, Fourth Industrial Revolution, strategic management, digital disruption, blockchain, artificial intelligence, machine learning, big data, IOT*

4IR and the Meshing of Domains

The Fourth Industrial Revolution (4IR) is the latest in a series of paradigm shifts in man's industrial trajectory that began with what is generally known as the First Industrial Revolution. 4IR is defined by a fusion of technologies where we witness the meshing and overlapping of domains—the physical and digital realms are interfacing with the biological sphere across a vast spectrum encompassing the internet of things, high-speed mobile internet, big data analytics, cloud technology, artificial intelligence, robotics, machine learning, and deep learning. This synthesis of digital, physical and biological systems transforms our industrial and commercial processes and transactions. In manufacturing, for example, we can use more natural building blocks for manufacture—natural organisms to design product building parts; only instead of very material properties, we are varying biological functionality.[i] In services and commerce under 4IR, we are looking not at end products but as outcomes of what we buy. Hence, the outcome economy.

To put things in perspective, let us back track to 1784 and the First Industrial Revolution, where the overriding feature was the power loom and steam power

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to aid in the production cycle. This led to the mechanization of production and a boost in speed and quantity. This paradigm shift impacted society across the board and led to unprecedented growth in income and population. Towards the latter part of the 19th century, thanks to the harnessing of electric power, the Second Industrial Revolution saw a huge leap into the assembly line and mass production. Showcased by advancements in manufacturing and production technology, this paradigm shift is also seen as a Technological Revolution. Electric power or electrification was hailed as the greatest engineering achievement even as the revolution trundled into the 20th century with the advent of more powerful locomotives in line with the rapid development of rail transport.

The 1960's saw the onset of the Third Industrial Revolution which was and still is marked by automation in production, the matching of electronics with IT and the leap from analogue to digital reliance became the game changer. The harbinger of this phase was the instrumental role in the invention of transistors and the mushrooming of electronics. The overriding feature is that software is driving automation. This Revolution continues today— as we mentioned earlier—even as creeping in to overtake it is 4IR. Here, we are entering a new paradigm of the world of cyber-physical systems where the lines of demarcation are slowly but surely fading and the boundaries are more porous. This amalgamation of domains is accompanied by an unprecedented impact in terms of velocity, scope, and systems. It is said that aside from speed and breadth, "the Fourth Industrial Revolution is unique because of the harmonization and integration of so many disciplines and discoveries … digital fabrication technologies can interact with the biological world."[ii]

Further, that technology is a status quo disrupter comes as no surprise but what stands out here is its sheer pervasiveness in our lives and the speed and scope of change. Couple this phenomenon —the impact of processing power and connectivity—with the data revolution, the upshot is the placing of "unprecedented amounts of information in the hands of consumers and businesses alike."[iii] Where man's endeavours for advancement are still very much tied to the manufacturing and services process locked in mind sets about the concepts of value chain, logistics and distribution, 4IR looms across the horizons of the economies of the world carrying its arsenal of advancements in digital technology, the internet of things, and artificial intelligence. The paradigm that is effected also impacts the economic system taking us away from merely the bi-polar discourse or encounter between the socialist and non-socialist systems or Marxist-Communist and capitalist system to the debate

between neo-Keynesian and libertarian schools.[iv] Be that as it may, the creative disruption that has been unleashed with the advent of 4IR, and which continues to be unleashed, is manifested in several key areas of human endeavour in the 21st century as the following discussion will show.

Digital disruption

This term has over the years become associated with the changes impacting technology markets particularly and other markets generally. In strategic marketing it is "the change that occurs when new digital technologies and business models affect the value proposition of existing goods and services."[v] Examples abound in this regard: email (disrupting and virtually eliminating conventional 'snail' mail), the rise of electronic reading and then e books (disrupting traditional reading off the printed page) and from reading to just listening, and the proliferation of digital channels (Netflix, YouTube, and other streaming video services.) If we recall Porter's Five Forces, what this disruption means is that the doctrine on threats of new entrants and conversely barriers to entry in the market need to be re-examined, if not altogether ditched.[vi] Across the board, innovators can expect other competitors to jump on the bandwagon. The only way to compete is to evolve, adapting to the breakthroughs in hardware and software.

Blockchain—New Kid on the Block

Much of the discource on 4IR has missed the new kid on the block and its societal, economic and global implications which in turn must impact modern approaches to strategic management, the conduct of commercial transactions and fidelity in the acquisition of data. We may look at blockchain as a phenomenon that could unleash disruptive change to the economy impacting the role of centralisation of power and control of information, underscoring a shift from the pivot of state authority to the periphery of individual human actors. In the value equation, this will automatically shift the locus of value creation and determination as well. As blockchain technology challenges in a fundamental way and expands the spectrum of value, an entire new ecosystem will evolve. It is in this context that the repercussions of blockchain technology should be, not just the technological leap but a paradigm leap with multi-dimensional impact on society.[vii]

Artificial Intelligence, Machine Learning and Big Data

Exponential disruptions are being witnessed in the manufacturing and services sectors on account of the revolution in robotics and industrial automation. When it rains, it pours because with deep learning, advances in machine sensors, and artificial intelligence, the robots are disrupting jobs across the board. And in just one decade, advances in autonomous vehicles are disrupting the conventional culture of both private and public transportation. It is predicted that by 2025, driverless ground and airborne vehicles could well be the rule rather than the exception. That said, even though the robots are coming in droves, it is the product of a new generation with enhanced capabilities, dexterity, and intelligence, and hence, cannot be seen as totally destructive or harmful. While massive jobs will be lost initially, human adaptability, resourcefulness and inventiveness in overcoming adversity and finding solutions will eventually see the resolution of outstanding issues. Much R&D of technologies that facilitate new tasks, for which humans are better suited, is already underway that could markedly enhance the future prospects of workers, even as the new tasks in associated industries provide new occupations. No doubt, technology displaces jobs but it also creates new ones.[viii]

As for Big Data, detractors say that the underlying empirical micro-processes and strong assumptions about mathematical properties are still very much shrouded in ignorance and do not reflect what is really going on at the level of micro-processes.[ix] Furthermore, doomsday prophets raise the specter of "the end of theory" and "science neglecting principles such as choosing a representative sample.[x] And there is indeed an insight deficit, where "big data" must be complemented by "big judgment."[xi] More disruption is also caused with Google Translate being able to do the job of an army of translators soon rendering them irrelevant except for specialised cases. The combination of Big Data with cloud computing makes remote storing and processing more economical, flexible and secure, thanks to cloud technologies making the digital world faster, more powerful, and more efficient which in turn will spur growth of new business models that are asset flexible, highly mobile and scalable.[xii]

Internet of Things

Finally, among the greatest of disruptions is the Internet of Things —embedded sensors and actuators in machines and other physical objects that are being

adopted for data collection, remote monitoring, decision making, and process optimization in everything from manufacturing to infrastructure to health care.[xiii] In the 1800's we had "wireless telegraphy" while in 1900 the first radio voice transmission took place. It would take another five decades before mankind developed computers and another decade before the first workable prototype of the Internet came into the picture. By the 1980's information experts finally wove the "network of networks" known as the Internet and in 1990, thanks to Tim Berners-Lee, the World Wide Web was finally spun. The impact of IoT is so disruptive that it is fundamentally reconfiguring industry. Because 4IR is powered by the Internet and Web-enabled software applications capable of processing streams of manufacturing data, IoT may be regarded as its sine qua non. As the basic communications for much of the IoT comprise the convergence of wireless technologies, MEMS, microservices and the internet, the IoT therefore embodies the meshing of operational technology with information technology.[xiv]

Gap between Educational Output and Industrial Needs

It is clear that the Fourth Industrial Revolution will herald a new era of job opportunities in myriad fields opened up with creative innovation at the expense of a trade-off in the loss of jobs. Basically, this is also a function of the gap between educational output and the demands of industry. These trade-offs are therefore not inevitable but must warrant changes in the modalities of instruction as well as syllabic content in the university faculties and schools. Tactical measures aside, the strategic thrust must be geared towards transforming from a labour-intensive economy to a knowledge economy where creative innovation plays a central role. Innovation is the ability to "change the rules of the game", deliver new products and services and apply ideas that are creative, novel and useful. However, in light of the disruptive nature of 4IR and the rapid pace of change, strategic management must in all circumstances factor in the anticipated impact of the changes that will result. At the macro level, this would require a new workforce strategy of which a major requirement will be "skills evolution." Though some skills relevant today may still be relevant tomorrow, the trend that comes along with the Fourth Industrial Revolution will see the re-prioritization of skills gearing increasingly towards a knowledge economy with skills such as creativity and emotional intelligence becoming more important than before.[xv] While technical know-how relevant to a specific job is a prerequisite, employers are also looking at problem-solving and communications skills. Not surprisingly, a recent Hays survey showed most of the skills in highest demand are soft skills while technical skills actually ranked

7th. The rationale: As technology continues to displace human/manual tasks, greater need is placed on skills for engagement and building relationships which are key elements required for collaboration. Digital proficiency, innovation, critical thinking and emotional intelligence continue to be priority skills while adaptability cuts across all categories. [xvi]

4IR and Strategic Management

In light of the impact of 4IR, the question is what remains of the tasks and scope of expertise of strategic managers. Research suggests that four strategic management trends may be discerned, the most important being emerging technology proliferation. The challenge here is how managers will address emerging technology and how will they accept it, reject it, or integrate it into business operations.[xvii] According to one view, because markets are fast moving toward global emersion, emerging technology must top strategic management priorities. Acceptance of the right technology can mean the difference in a business moving forward, changing with future product and market requirements or becoming irrelevant. Furthermore, because technology mushrooms at breakneck speeds, innovations may already be outdated by new advancements.[xviii] Creative destruction is unleashed by gales or storms, never breezing in. The only way to deal with it is to be ready with the latest technology because it is integrated into the system in all its myriad manifestations.[xix] As for the other three trends, namely, environmental controls, time to market of new products, and management of the workplace social environment, while considered critical to the future of strategic management, are not germane to the discussion at hand, and on account of space constraints, will not be pursued. Nevertheless, the four trends are to be viewed and applied holistically in any comprehensive discourse on strategic management.

Yet another dimension needs a major relook at the conventional wisdom that regards operations as not being part of strategic management in as much as strategy is about long-term planning for competitive advantage or sustained success. With the advent of 4IR, that notion has to be reviewed. According to this school of thought, whereas previosly the head of operations is only good for implementation of the business strategy, now, on account of the rate of change in operational capabilities, operations is becoming a strategic role. With the mushrooming of new functional technologies, “operations is where change is going to happen” as the head of operations has “a 360 degree view of the scope of change” and “the tools to lead the organization through this change” making the operations function “a change leader.”[xx]

Among others, the change process can be seen in delivery which is now “a key differentiator” rather than just a link in the value chain. As time is of the essence, speed of delivery is no longer an option but a condition precedent to satisfying the buyer’s or customer’s expectations. With the on-set of 4IR, “new infrastructure and delivery coordination industries” will come into existence ushering a new transportation ecosystem.[xxi] According to this view, operating models and platforms need to be redesigned and core processes must be digitized and modernized “to achieve operational excellence, whilst always putting the customer first.”[xxii] This is inevitable as, with continuous innovation and change in market conditions, there will always be fresh competition or a new killer app, “new customers whom you have never served, new global partners that you can’t understand, new generations you need to communicate with and new ideas of doing business.”[xxiii]

Further, in view of the preponderance and increasing pervasiveness of automation with cognitive technologies on account of artificial intelligence, 4IR strategic management must find ways of striking a balance between our increasing reliance on high-impact automation and the disruptive consequences on workforce, as discussed earlier. For the bigger firms, there has to be balance also in the various cost components including R&D, innovation, and corporate social responsibility so as to minimize the trade-off impact. A clear example can be seen in the case of traditional banks as against the FinTechs, the Goliaths against the Davids that are smaller and more agile. This immediately brings to mind Blue Ocean Strategy where the value proposition here is innovative technology as differentiation plus lower cost without the legacy infrastructure, thus avoiding the trade-off so typical of competitive strategy.

Conclusion

Because strategic management is a function of the response to real-world situations and cannot be decided on a priori theoretical dictates, strategic management of the 21st century must, therefore, be crafted to meet the challenges of the paradigm change brought on by the Fourth Industrial Revolution.[xxiv] Those who insist that the world hasn’t changed will continue to behave like the proverbial ostrich that buries its head in the sand. Those who have fully grasped the magnitude and extent of the changes that are happening and are about to happen, will appreciate how this revolution is opening the gates to greater productivity in manufacturing, speedier levels of service delivery and better fulfilment of the outcome economy.

End notes

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