LEADERSHIP IN THE FOURTH INDUSTRIAL REVOLUTION

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Abstract: The Fourth Industrial Revolution heralds a series of social, political, cultural, and economic upheavals that are unfolding in this century. Building on the widespread availability of digital technologies that were the result of the Third Industrial, or Digital Revolution, the Fourth Industrial Revolution is driven mostly by the convergence of digital, biological, and physical innovations.

It will bring about systemic change across many sectors and aspects of human life. It brings many challenges to leadership styles that organizations all over the world need to grapple with. In this paper, we illustrate the critical leadership skills that are needed to thrive in this fast-evolving, uncertain, highly interconnected and deep technology-enabled world.

Keywords: Fourth Industrial Revolution (FIR), IOT,VR, AI, Cloud Computing, Cyber Physical System, agile leadership.

1.0 Industrial Revolutions: Past, Present & Future

The fourth industrial revolution is the current and developing environment in which disruptive technologies and trends such as the Internet of Things (IoT), robotics, virtual reality (VR) and artificial intelligence (AI) are changing the way we live and work.

The third industrial revolution sometimes called the digital revolution, involved the development of computers and IT (information technology) since the middle of the 20th century. The fourth industrial revolution has grown out of the third industrial revolution but is considered a new era rather than a continuation because of the explosiveness of its development and the disruptiveness of its technologies.

The first industrial revolution, in the 18th and 19th centuries, involved a change from mostly agrarian societies to greater industrialization as a consequence of the steam engine and other technological developments. The next technological age, the second industrial revolution, was driven by electricity and involved expansion of industries and mass production as well as technological advances.

According to Professor Klaus Schwab, Founder and Executive Chairman of the World Economic Forum [2] and author of *The Fourth Industrial Revolution*, the new age is differentiated by the speed of technological breakthroughs, the pervasiveness of scope and the tremendous impact of new systems.

2.0 Industry 4.0

Industry 4.0 comes right on the heels of The Internet of Things (IoT) phenomenon. In July 2015 [2], Stanton Chase published *"The Internet of Things: Adapting Corporate Culture to Reflect the Connectivity of IoT"*. IoT highlighted a shift in workplace culture by recognizing the exponential growth of devices has become normalized in today's society. This phenomenon has continued, and in today's world, IoT is just a small piece of the current Fourth Industrial Revolution *(FIR)*. The "Internet of Everything" has replaced the "Internet of Things" to encompass things, data, services, and people. The basic principle of Industry 4.0 is that entire value chains are interconnected by autonomous systems created by intelligent networks of machines and data. Cloud computing is a key feature of this revolution. This new environment includes four components: the internet of things, the internet of data, the internet of services, and the internet of people; these parts have come together in the Fourth Industrial Revolution and have witnessed growth and changes at an unparalleled pace.

The rapid rate of change has necessitated a reevaluation of corporate structure and workplace business practices, particularly within the leadership realm. At its core, FIR strives to reduce the need for human labour, and leaders are grappling with how this changes business dynamics, strategies, and their roles. The effects of the FIR and the paramount importance of the right leadership style during this pivotal time cannot be underestimated.

In Industry 4.0, technical assistance and cyber-physical systems are designed to enhance the performance of autonomous tasks. This minimizes the role of human involvement from everything from product production to decision-making. With the decentralization and automation of decision-making comes a fundamental shift in hierarchical roles. Leadership is changing. Industry 4.0 is blurring the boundaries between humans and technology as a new landscape emerges, and leaders need to be at the forefront of adapting to these changes.

2.1 Artificial Intelligence

Artificial intelligence is the rapidly growing field of computer science focused on creating intelligent software tools that can replicate critical human mental faculties. The range of applications includes speech recognition, language translation, visual perception, learning, reasoning, inference, planning, decision-making, and intuition.

The really transformational impacts arise [1] when AI is combined with accelerating science and technology developments in other key fields such as neuroscience, large scale databases, super-computing hardware, network communications, hyper-connectivity, blockchain distributed ledger systems, digital currencies, the Internet of Things (IoT),3D / 4D printing, and cloud computing.

AI combined with the IoT is already giving rise to the new world of smart cities, where the physical infrastructure gathers and feeds back data via to the cloud to inform planning, service provision and even policing. This, coupled with AI in autonomous vehicles (AVs), will lead to a new category of self-owning assets, including buildings and public

infrastructure. Vehicles may change from being unused resource drains, sitting idle for most of their lives, to sources of income. An AV may be able to go out to work for you, earning a supplementary income or own itself and share the revenues with its manufacturer, servicer and refueller.

The power of AI to gather massive amounts of data, analyse, interpret, draw inferences and make predictions has applications in every industry sector. Smart infrastructure, powered by AI and linked to the IoT, could revolutionize estates and facilities departments. For example, we may see the rise of smart hospitals, where all types of resources, from medicines and medical equipment to the actual fabric of the hospital – beds, walls, partitions are deployed where necessary based on AI predictive analytics. We may see a time when an AI is running an entire hospital.

Task automation is a key area for AI applications. Roles that have been traditionally thought of as requiring a high-level human intellect are now being automated. The legal profession is seeing such disruption: legal precedent and case review can be automated, contracts can be created and adapted, case outcomes can be predicted, and an AI can organise workload.

As task automation becomes commonplace, and increasingly applied to chatbots or social media output, simple query responses and content delivery in social channels are being delivered by AI. Whilst it boosts efficiency, decision-makers must be mindful of how this may impact brand identity and user experience – and where it is still critical to maintain human involvement.

As competing businesses deploy similar smart automation, there is a risk of commoditisation – and how firms stand out and maintain personality will be a critical consideration – deploying the technology to unleash human potential and take our businesses to the next level – rather than merely automating what we have to reduce costs.

The structure of entire businesses may be revolutionised; for example, the number of decentralised autonomous organisations (DAOs) is growing; these organisations exist entirely in software and therefore require no human employees. Currently, DAOs exist in a hinterland – it is as yet unclear what their legal status is, this in itself raises questions as to how we perceive a business. In the near future, as DAOs may increase in prevalence, questions will be raised over the necessity for human involvement and influence in business at all.

All these areas of potential disruption evidence the growing need to focus on the human dimension. How will staff respond when their jobs are drastically changed or eliminated? How will we mitigate worries or stress that AI may cause? What new skills might employees need? What responsibilities do employers have for those displaced by technology –some analysts estimate that 80% of current jobs could disappear within 20 years and others project that for each job created in new firms and sectors, three will be eliminated elsewhere.

2.2 Advanced Manufacturing in Industry 4.0

Industry 4.0 will have definite advantages to the manufacturing sector in India, including cost reduction, higher efficiencies, safer factories and faster speed to market.

The capital goods policy envisages formulation of a national policy for advanced manufacturing, which would include advanced materials, modern manufacturing like advanced robotics and 3D printing, among others. The National Capital Goods Policy, approved by the government in May, envisages increasing production of capital goods from Rs 2,30,000 crore in 2014-15 to Rs 7,50,000 crore in 2025 and raising direct and indirect employment from the current 8.4 million to 30 million. The policy also aims to facilitate improvement in technology depth across sub-sectors, increase skill availability, ensure mandatory standards and promote growth and capacity building of MSMEs.

'National Policy for Advanced Manufacturing' is designed to advance India's position as a global competitor in terms of manufacturing. The policy also evaluates the threat that 'smart manufacturing' could pose through the loss of jobs. The outcome could be significant, given that India is the 6th largest global manufacturer according to data published by the UN. DIPP Secretary, Ramesh Abhishek, commented: *"There are many concerns, lot of opportunities. There are also threats particularly on jobs so how to make our policies, how to tailor our industry, how to get ready for this in a manner that the transition is seamless and our people are skilled enough, maybe to other areas."*

National Investment and Manufacturing Zones (NIMZs) are an essential instrumentality of the Policy. These zones have been conceived as large integrated industrial townships with state-of-art-infrastructure; land use on the basis of zoning; clean and energy-efficient technology; necessary social infrastructure; skill development facilities, etc. to provide a conducive environment for manufacturing industries. So far Fourteen NIMZs have been granted in-principle approval outside the DMIC region, out of which NIMZs at Prakasam in Andhra Pradesh; Medak in Telangana and Kalinganagar, Jajpur district in Odisha have been granted final approval.

3.0 Leadership Skills

It is essential to understand that constant acceleration is now, in fact, "normal." Ready or not, leaders must grapple with the subsequent challenges: the impact of technology and the digital world, new and unprecedented socioeconomic implications, and significant geopolitical upheavals. All of this forces companies and their leaders to reexamine the *whys* and *hows* of their businesses — and to do so at a much faster pace than ever before. It also forces leaders to reexamine themselves. Traditional leadership skills, including the ability to effectively lead, manage, and inspire others, are now considered the minimum essential requirement for the role.

The complexity of the new dynamics requires a changing approach to leadership. The days of leaders having complete command over their organizations are gone. Today's leaders must be **inspirational yet calming, visionary yet down-to-earth, "right" and yet not afraid to "not know."** They must be monarchs but also very human and able to navigate their organizations through multiple, often paradoxical demands emanating from an increasing and increasingly active array of stakeholders.

3.1 Balance between Collaboration & Singular Leadership

The key is moving from a single-minded "command and control" mentality to a more **agile form of leadership that balances command with purpose, nimbleness, adaptability, and collaboration** — all features of the Fourth Industrial Revolution. However, further reflection suggests that CEOs often struggle to find the right balance between collaboration and singular leadership. One Fortune 500 CEO described the task as similar to balancing on two parallel tram- lines, where it is easier to bounce from one to the other and hardest to stay on both. Certainly, this CEO concludes that collaboration is vital, yet it paradoxically threatens to weaken his leadership when tough decisions are required. Since unilateral decision making often leaves organizations and stakeholders cold, CEOs need to develop a toolkit of significantly more nimble and multidimensional leadership capabilities and self-awareness of when, and how, to use them.

There is a growing demand to empower the employees to drive their objectives flexibly. We need leaders who are emotionally intelligent and able to model and champion co-operative working. They will coach, rather than command; they will be driven by empathy, not ego. The digital revolution needs a different, more human kind of leadership.

3.2 Handling Speed, Scope & Significance

There is a real danger that leaders will get lost in the clamour of disruptive technology and the speed at which it is changing businesses and even markets. Speed is a challenge, and it is impossible — indeed unnecessary — to respond and react to every changing circumstance.

Smart leaders must instead be **attuned to the scope and significance of the change**. Consider the tens of thousands of pieces of space junk that hurtle around the Earth's orbit. It is the job of the space station astronauts to track the largest and most dangerous lumps, and manoeuvre their craft accordingly, rather than deal with every possible threat. The question for leaders is: how deep and broad is the impact of change on the organization and its stakeholders? Is it a fundamental change, or a technological one? Leaders must discern the most appropriate response and remain versatile and adaptable, ready to handle the unexpected.

3.3 Leadership with Mission & Purpose

Succeeding in the Fourth Industrial Revolution requires authentic leadership, building trust, and genuine transparency — all grounded in an abiding sense of purpose. Companies need to answer the question, "What do we stand for?" and be free to define themselves more broadly than simply "value companies" or "growth companies." Increasingly, stakeholders expect companies to have a greater purpose and a clear understanding of how to achieve good in the world in ways that extend beyond the company's direct business activities.

This creates another paradox for leaders — how to find a balance among the greater good, a sense of mission, and the ability to deliver products and services in a cost-effective, profitable way. This paradox creates friction among meeting the expectations of investors, satisfying the needs of quarterly or half-year market reporting, and the longer-term, more purpose-driven values of the business.

3.4 Ripple Intelligence

One of the core skills for a leader's mindset is cultivating a way of thinking called "ripple intelligence"[1]. Peter Tufano writing in the *Financial Time's Boldness in Business* magazine, says leaders who have honed ripple intelligence "appear to see around the corners and connect the dots". This skill that leaders can develop to get perspective and distance and essentially above the clutter and noise of the day and look down from above at the intersecting changes affecting the business, like observing ripples on a pond. The leader can view the intersecting ripples and anticipate disruption, allowing time to plan and protect the organization against unexpected events. Such ripples could be impending business trends, disruptive technology, geopolitical events, or environmental incidents. Each ripple has an impact on decision making and how it is interpreted by the smart, agile leaders.

The four ways to build ripple intelligence include:
(1) **Innovation Jams:** There is a tendency for leaders to get caught in status quo bias rather than embracing new ideas and accepting new ideas for change. Innovation Jams can transform the leader into being smarter and more innovative by helping to pull ideas together or looking at problems from a fresh perspective. Focus limited sessions around Innovation within an organization will help the stakeholders drive innovation strategy effectively.
(2) **Outside-in Thinkers:** Outside thinkers from different fields (art, science, technology) are invited inside companies to fire up the imagination and develop outside-in thinking skills – the ability to look objectively at your organization from the eyes of an outsider or competitor. Some companies organize improvisational leadership classes for their team to think on their feet more quickly. Improvisation boosts trusting your own instinct and being open-minded enough to try something different.
(3) **Future-Proof Teams (FPT):** Inspired by the scenario planning work at Shell (oil and gas company), the aim for future proof teams is to explore plausible scenarios in the future and assess preparedness w.r.t the various scenarios and make better decisions today.

(4) **Hedgehogs & Foxes:** Leaders must tap into different thinking styles to learn quickly and cope in a world of flux; for instance, developing both big-picture thinking as well as detail thinking. The key is to adapt right style for the right context and being able to perform left-brain thinking (hedgehogs) for running a tight ship and perform right-brain thinking (fox) which is opportunity-driven and led by ideas to drive innovation.

3.5 Lead with Empathy & Authenticity

Leaders must invariably use their judgment to make critical decisions that others in an organization cannot make. The paradox of the demands for leaders to be authentic and empathetic and to display their personalities, while at the same time playing the role of the bold figurehead that people will follow and admire, continues to be a tension. Increased pressure on companies to do the right thing in the world only compounds this challenge. Leaders must have a heightened awareness of their social responsibility and the impact they have on society's well-being and the environment. Leaders are expected not only to be "real people" but also to infuse a sense of direction, purpose, and meaning into the organization. Employees, clients, customers, and other stakeholders (now including social media and bloggers) want to understand what companies stand for. If the company's behavio
ur is not coherent and beneficial to society, strident and opposing voices become galvanized more effectively than in the past.

3.6 Diversity

Creating a diverse environment is critical to successful leadership in the digital age. Diversity does not merely mean ensuring a work environment with both genders, multiple nationalities, etc.; it means welcoming and embracing a wide array of opinions, perspectives, and backgrounds. Great leaders intentionally surround themselves with those who disagree and can offer new and varied insights. This methodology for diversity ensures richness in the work environment and leads to a better understanding of the issues as well as better knowledge of the leader.

3.7 Agile Leadership

Agile leadership is essential in leading today's revolution. Agile leadership comes from the concept of "learning agility" coined by a set of researchers at Columbia University's Teacher's College.21 The authors note, "Adapting to new business strategies, working across cultures, dealing with temporary virtual teams, and taking on new assignments all demand that leaders be flexible and agile." They delineate five facets of agility: innovating, performing, reflecting, risking, and defending, all of which play an important role in the leader's success. Agile leadership also includes the ability to manage a multi-generational workplace. The new generation of millennials tends to expect flexible working arrangements and a more cooperative and communicative structure. Successful leaders must recognize and adapt to the varying needs of the changing workforce.

3.8 Ethical Responsibility

Finally, ethical responsibility is an increasingly key factor in determining a leader's success. Many companies focus on soft skills and experience that individuals bring to an organization. An explicit examination of ethics is not often seen as a fundamental feature of the hiring process. Nonetheless, considerations of leadership ethics can make or break the career of C-suite leaders.

3.9 Continuous Learning

Leaders will always need to be strong leaders in the traditional sense. However, they must also be students, continuously acquiring experiences that are outside of their traditional career trajectory, and they must remain open and attentive to insights from an increasingly broad set of information sources. Very often, technical and work experience aren't enough; the missing skills are often the "soft" skills.

4 Conclusion

Workplaces are experiencing dramatic transformations, unlike anything before, and companies are challenged with recognizing and adapting to these changes. Fourth Industrial Revolution is particularly unique in the way it challenges current notions of hierarchy and leadership. Industry 4.0 affects all societies around the globe – from the United States to Zimbabwe to North Korea, nations are confronting the realities of the new digital world. It is important for leaders and aspiring leaders to stay abreast of the changing landscape and maintain an enlightened and flexible approach to guide businesses into the future.

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