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Highlights

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IMI Konnect, published quarterly from International Management Institute Kolkata, is an open access Scholarly Magazine in Management. It started its journey in December 2012, and publishes original research articles (non-technical) by scholars in the field of management and firsthand perspectives from business thinkers and practitioners on contemporary issues. ***IMI Konnect*** provides an intellectual platform for the national and international scholars and the industry experts to discuss and debate their opinions and thus contribute to the knowledge of management. It also publishes interviews with eminent personalities in the field of business.

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The article should be non-technical and should be of around 2500 - 4000 words. The research articles may be upto 7000 words. But no mathematical expressions or technicalities of methods should be contained in the main text. It should be typed in MS Word in Times New Roman 12 with paragraph spacing 1.5. Figures and simple, small tables can be incorporated. There should not be any notations or equations, at least in the main text. If required, it may be put in Appendix. The article should also contain a short abstract of 150 – 200 words. Full forms of each abbreviation should be mentioned at first instance. All figures and diagrams should be in black and white. Send your manuscript along with your name, institutional affiliation, email ID and contact number to the editorial office at imikonnect@imi-k.edu.in mentioning the area viz. Marketing, Finance, OB & HR, Economics, Strategy, IT & Operations, Management Education, Others or Themed Issue.

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Developing Responsible and Reliable Artificial Intelligence Algorithms

Harshad Khadilkar*

Abstract

Much of the debate surrounding artificial intelligence (AI) is centered around the binary decision of using or avoiding its use for specific applications, such as autonomous cars[1], facial recognition in law enforcement[2], and the automation of manufacturing jobs[3]. While the debate continues, AI technology itself is already making inroads into these (and several more) applications. This article assumes that the final outcome of the arguments is moot; AI is already a part of our lives, and will continue to be for the foreseeable future. Nevertheless, the doomsday scenarios[4] painted by even respected individuals such as Stephen Hawking and Elon Musk need not materialize. The designers and users of AI algorithms have the responsibility of ensuring that future machines are reliable, take transparent and fair decisions, and use the earth's resources sparingly. Challenges on the road to reliable AI, and current research efforts aiming to solve them, are reviewed in this article.

Introduction

Artificial Intelligence (AI) is a catch-all phrase, which comprises of a host of technologies that automate processes hitherto requiring intensive human effort. Programmatic solutions to most industrial and economic problems already exist, from robot-driven manufacturing to automated telling machines (ATMs). The key difference between AI and computer programmes is the fact that AI systems do not operate using a fixed set of rules (called conditional operations in computer science, or if-then-else statements in common parlance). Instead, AI-driven systems learn these rules – implicitly or explicitly – from prior data or through their own experiences. This process closely mimics the one followed by humans, when they learn

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[1] https://www.nortonrosefulbright.com/-/media/files/nrf/nrfweb/imported/20180206—autonomous-vehicles-artificial-intelligence-and-the-law.pdf?la=en&revision=5b0de312-a58a-4e77-b5a4-f0fddf16c423

[2] https://www.usatoday.com/story/tech/2019/05/21/facial-recognition-your-face-may-key-unlock-future/3679717002/

[3] https://en.wikipedia.org/wiki/AI_takeover

[4] https://en.wikipedia.org/wiki/Open_Letter_on_Artificial_Intelligence

an occupation for the first time. Therefore, the process by which an AI system learns operating rules is also known as *training*.

This flexible approach significantly reduces design effort in new systems. If one can develop a high level 'trainable' system (much like a student entering college), the raw capability can be automatically used to solve different problems by training it on the relevant data sets (much like a student chooses a specific major and takes relevant courses to become an expert in it). However, the flip side of this story is the far-reaching socio-economic consequence of automating human-intensive activities by a set of algorithms. Several studies predict that close to half of unskilled and semi-skilled jobs are at risk of automation by 2035[5]

We have already witnessed significant penetration of AI in sectors such as manufacturing (in the form of cobots[6] i.e. collaborative robots), insurance[7], and credit[8].

Retraining of the workforce to handle the changed nature of skill demand is a critical undertaking, with several corporations taking up so-called 're-skilling' efforts[9]. Social and economic consequences of AI are certainly important considerations, but they are not the focus of this article. Instead, we will take a look at an issue that has received relatively scant attention from governments and policy makers – that of ensuring that AI is doing what we expect it to be doing. We will describe the technical challenges to the development and deployment of AI systems in the real world, and also the potential solutions to these problems.

Risks and Challenges

Criticism and fear of AI technologies – notwithstanding the socio-economic issues outlined in the previous section – mainly center around the perception that "AI has a mind of its own"[10]. This makes people feel uncomfortable, especially when such systems start to be deployed in critical situations such as car driving or medical diagnosis. Some of the criticisms levelled at AI are justifiable from a technical point of view, while others are not. We cover some of the most important ones, and attempt to separate the rational from the irrational fears. This section describes the potential problems; recent work on finding solutions to these problems is covered in the next section.

Black Box Nature of AI

The canonical definition of a black box is a system that can be observed in terms of its

[5] https://www.pwc.co.uk/services/economics-policy/insights/the-impact-of-automation-on-jobs.html
[6] https://www.forbes.com/sites/bernardmarr/2018/08/29/the-future-of-work-are-you-ready-for-smart-cobots
[7] https://emerj.com/ai-sector-overviews/artificial-intelligence-in-insurance-trends/
[8] https://becominghuman.ai/how-ai-has-impacted-the-credit-card-industry-be2db758cce9
[9] https://www.mckinsey.com/featured-insights/future-of-work/retraining-and-reskilling-workers-in-the-age-of-automation
[10] https://www.bbc.com/news/technology-35761246

inputs and outputs, but whose internal workings are not known. To the untrained eye, the fact that AI systems do not have fixed rules of operation and instead rely on their own experiences puts AI algorithms squarely in this bracket. This perception is partly justified, especially for a class of algorithms known as Deep Learning[11]. These algorithms use artificial neural networks (a highly simplified computer representation of the biological brain) to perform a multitude of tasks, from recognition of objects in images to automated language translation. The key building block of neural networks is the neuron, a simple unit that outputs a 1 if the sum of its inputs exceeds a certain threshold, and outputs a 0 if it does not exceed this threshold[12].

Since this single unit is too simplistic for practical applications, individual neurons are connected in chains from the input of an algorithm (where new data are received) to the output (where decisions are generated). Chains of neurons can join up or branch out, and the final pattern is known as a neural network. The purpose of training in deep learning methods is to tune the thresholds at which individual neurons should 'fire' (output a 1), and also to compute a set of weights (multiplication factors) for connections between pairs of neurons. The number of parameters (thresholds and weights) to be computed explodes as networks become complex. Consequently, it becomes very difficult to understand how a set of inputs is manipulated within the network to produce the final output. This is the black box effect.

The human brain is estimated to contain 80 billion neurons[13], while most deep learning algorithms range from a handful of neurons (about 100) up to a million or so neurons. Clearly, it is much easier to understand what shallow networks (with fewer neurons) are doing, compared to truly deep networks. The black box nature of deep learning is thus not a blanket problem, but has gradations. Furthermore, it is important to remember that not all AI systems are driven by deep learning algorithms. Many other machine learning approaches such as decision trees, statistical classification approaches, and clustering algorithms are used in real-world applications, and they are much easier to understand and to explain. There is also recent work on making deep learning itself more accessible, which we shall cover later.

Lack of Robustness

AI-driven systems, especially ones based on deep learning methods, have been observed to be highly sensitive to small changes in the input data. This makes the systems less robust, in the sense that a small amount of noise (or change) in the input can result in outputs that are very far from the desired ones. Deep

[11] http://neuralnetworksanddeeplearning.com/

[12] There are many variations on this concept, but these are not required for the current discussion.

[13] https://www.verywellmind.com/how-many-neurons-are-in-the-brain-2794889

[14] http://www.evolvingai.org/fooling

learning algorithms have been known to confidently recognise noise as actual objects[14], and conversely completely fail to recognise familiar objects containing a small amount of noise[15]. The lack of robustness is particularly dangerous in critical applications. For example, it was noted that small pieces of tape stuck to a 'Stop' sign in the road caused an image recognition algorithm to classify it as a 45 mph speed limit sign[16]. The results of such a mistake could be catastrophic.

Does this mean that we should not trust AI systems at all? Not really. First, many instances where AI is easily fooled exist in the domain of computer vision. It is notoriously difficult to recognise objects and colours efficiently, even for a biological organ like the human eye. Recall the vast number of optical illusions that everyone is familiar with[17] [18]. Other applications are much less prone to such anomalies. Second, the field of deep learning itself is relatively new, and researchers are still coming up with technical fixes for the robustness issues. We cover some of these in the next section. Finally, the problem is partly a result of the unreasonable expectations from AI systems. People tend to assume that these algorithms will learn effectively even if they are left to their own devices. This is not true; not even humans are efficient learners if they are not given proper guidance.

A simple issue that arises from improper design is that of *overfitting*[19], which happens when an algorithm is too clever (contains too many parameters) for the problem at hand. Think of this as having too many possible explanations for a given set of observations. Just as humans descend into superstition when faced with such a situation, AI-driven systems try to tune their parameters too closely to the data observed during training. Subsequently, new and unseen data points cause the more tenuous assumptions to break, leading to large errors. The workaround to overfitting is to design AI algorithms with care and to train them thoroughly.

Bias

One unfortunate corollary of improper design or training of AI algorithms is the introduction of bias in decision-making. While difficult to credit, AI has been shown to be racist and sexist in some instances[20]. The problem is obviously not any inherent prejudice held by the algorithm, but a result of insufficient variety in the training data given to the system. Other forms of bias also exist in AI, just like in any statistical approach. These

[15] https://www.bbc.com/news/technology-41845878

[16] https://www.caranddriver.com/news/a15340148/researchers-find-a-malicious-way-to-meddle-with-autonomous-cars/

[17] https://en.wikipedia.org/wiki/The_dress

[18] https://www.grand-illusions.com/einstein-hollow-face-illusion-c2x21140056

[19] https://en.wikipedia.org/wiki/Overfitting

[20] https://time.com/5520558/artificial-intelligence-racial-gender-bias/

may be less socially objectionable, but they are just as important from a mathematical perspective. A well-known form of bias is introduced by data imbalance, especially in applications where AI is being trained to detect rare events. Imagine that we are training an algorithm to recognise weapons hidden inside check-in baggage at an airport. If we were to use real images from the airport scanners, it is obvious that the vast majority of images would not contain weapons. As a result, the algorithm would not see sufficient relevant images (weapons) to be able to understand how to detect them.

Ecological Footprint

The major successes of artificial intelligence found in popular literature – from AlphaGo[21] to autonomous vehicles[22] – are based on the concept of throwing a tremendous amount of computational resources at the problem, without worrying about the cost or energy demands. This is a feasible strategy for research, but it is not viable for large scale deployment. For example, one study found that training a large neural network to understand human language could generate five times the lifetime carbon emissions of an average American car[23]. We must keep in mind that this application contains no moving parts whatsoever, existing only as a software solution. Autonomous vehicles are already plying in some cities, but it is estimated that the onboard computers consume more than 40 per cent of the total fuel burnt by the car, and the added weight of sensors contributes another 15 per cent to this number[24]. More than half the consumption of the car is by components that help it navigate autonomously.

Even if we assume that computing hardware will keep getting cheaper at the rate it has done in the last few decades, we (the earth as a whole) definitely do not have sufficient energy and other natural resources to sustain this level of consumption. High energy demands are not just unsustainable in the long term, but are also a limiting factor to the deployment of AI on small devices such as remote sensors in machinery. Wherever such sensors are deployed – think of weather stations in the arctic, earthquake monitors on the sea bed, or navigation units on satellites – there is a dearth of energy resources (batteries), and a need to make them last as long as possible. If AI substantially reduces the life span of such devices, it can easily outweigh the benefits of having it in the first place. Therefore, a new branch of research has begun to address this problem at source, i.e, how to make AI technologies more efficient, run on cheaper hardware, and yet be more reliable than the best available at the moment. In the next section, we look at a few possible solutions.

[21] https://en.wikipedia.org/wiki/AlphaGo_versus_Lee_Sedol
[22] https://venturebeat.com/2019/04/26/5-companies-are-testing-55-self-driving-cars-in-pittsburgh/
[23] https://techxplore.com/news/2019-06-glare-energy-consumption-deep.html
[24] https://www.therobotreport.com/self-driving-cars-power-consumption/

Technical Solutions and Design Responsibility

Many of the technical challenges described above have been known about for several years, while others have been identified only recently. The black box nature and high energy consumption of deep learning methods have become important because of their increased use in practical contexts. Their computational demands – both in terms of training effort and the real time complexity – have given rise to a new branch of research in explainable artificial intelligence. As we shall see, improvement in one aspect frequently kicks off a virtuous cycle that helps to simultaneously solve more than one problem. However, the onus is on the people designing these algorithms and the users who decide how they are trained, to ensure that the right set of techniques are utilised for the problem at hand.

Explainability

Since the key technical objection to the use of AI is its black box nature, this should be the first point that we address. Some algorithm designers have a tendency to dismiss these objections, resorting to a defence such as, "We do not know exactly what happens inside a car engine, but we nevertheless use them all the time". This is a fallacious argument for multiple reasons. First, the general public may not understand what happens inside a car engine, but the design engineers certainly do. In the case of AI, even the designers of the algorithms do not necessarily know how the algorithms arrived at particular answers. Second, car engines have been empirically proven to be safe for over a hundred years, while AI is only just beginning to enter the real world. Finally, whether the fears are unfounded or not is to some extent irrelevant; as long as policy-makers and the public are not comfortable with these technologies, they will not find wide use.

The best approach to solving the trust issue is to make artificial intelligence easier to understand. Explainable artificial intelligence (XAI) is a set of technologies aiming to make AI more interpretable and transparent. This is not a topic that finds support from everyone[25], and there certainly are instances where it is not achievable or even desirable. For example, in settings such as gameplay or auctions, it makes sense to keep AI decisions difficult to fathom (think of AI playing poker). Additionally, the whole point of using AI is that the problems these algorithms address are inherently difficult to solve; explaining their workings is consequently difficult. However, XAI is required in cases such as legal liability (why did one reject this insurance claim?), morality (are people of specific ethnicity being rejected visas?), and healthcare (why has this patient been prescribed this medicine?).

Approaches towards XAI can be classified into three main categories.

First, there are efforts towards building a

[25] https://hackernoon.com/explainable-ai-wont-deliver-here-s-why-6738f54216be
[26] https://arxiv.org/pdf/1901.04592.pdf

theoretical understanding of techniques such as deep learning[26]. These are typically mathematically complex analyses, but they are critical for forming a common basis on which AI can be evaluated. The key metrics used for evaluation are *prescriptive* accuracy of the methods (how accurate they are in the long term), *descriptive* capability (how well they can be understood), and relevance of the explanations (ease of understanding by humans). For example, if a medical imaging analyser indicates existence of a tumour in a CT scan, it should not only be an accurate assessment, but should also describe what parts of the image it based this diagnosis on, and how the area of interest relates to previously observed patients.

The *second* set of efforts in XAI are about **probing into deep learning**[27] algorithms to understand their workings. Recall that deep learning is based on the firing of individual neurons within a network. If we can trace the 'pathways' of neurons that fired for a given input, we can hope to understand which inputs were considered more important by the algorithms. Interesting results have been observed in the case of image recognition algorithms: analogous to the human brain, successive layers of neurons appear to specialize to specific tasks. Early neurons focus on detecting simple shapes such as straight lines and curves, while later neurons focus on more abstract concepts such as shapes or faces.

Finally, the *third* category of XAI aims to **reduce the size and complexity**[28] of the algorithms themselves. In the case of deep learning, this would mean using smaller networks with fewer neurons rather than deeper, more esoteric ones. This approach involves a reduction in the accuracy of the algorithms, but it has several other benefits, as we describe below.

Reliability

The issue of repeatable accuracy of AI algorithms comes a close second to concerns about their black box nature. The underlying criticism is that successes of AI tend to be marketing accomplishments based on a few good results, but this high performance level is not achieved repeatedly, in different settings and with real-world disturbances. This is a justified concern, and several researchers have focussed on the aspect of reliability of algorithms. One of the ways of addressing the problems is to keep the machinery (neural networks, for example) as light as possible, relying on the principle of Occam's razor[29] (use the simplest approach that works). Not only does this protect against overfitting, but it also improves the explainability of the algorithms. However, very small neural networks are not viable in all applications, for the precise reason

[27] https://ai.googleblog.com/2018/09/the-what-if-tool-code-free-probing-of.html

[28] https://arxiv.org/abs/1806.01363 (Playing Atari with six neurons)

[29] https://en.wikipedia.org/wiki/Occam%27s_razor

why single neurons had to be joined up to make networks: their modelling capabilities are too simplistic for complex problems.

Alternative ways of ensuring reliability of AI algorithms again fall into three categories.

First, research has proposed the use of **regularisation** during training of the algorithms. This is a technique borrowed from statistics, and encourages the algorithm to use small parameter values in preference to large ones (mathematical version of Occam's razor). Regularisation terms act like the finance department in a corporation – they impose a restriction on the spending (magnitude of parameters) in order to stay within the budget, but they do allow essential expenses to go through.

The *second* technique is called **dropout**, and involves training only part of the neural networks on every data point. Think of this as training a human to perform different tasks with one hand tied behind their back at any given time. It ensures that each hand becomes as skilled as possible, without relying on the other hand (neurons).

The *third* and most powerful solution is to use as **diverse data sets** as possible, to train AI algorithms. Broader training sets have several good effects on AI algorithms, including reduction in bias, protection against overfitting to a small number of samples, and more robust learning. An interesting recent method to obtain a large training data set is to let AI algorithms generate it themselves. This is a concept based on the idea that "it takes a thief to catch a thief". Known as Generative Adversarial Models (GANs), these algorithms consist of two algorithms competing against each other. One algorithm, called the generator, is tasked with creating synthetic data that can fool other AI algorithms. Its rival, called the discriminator, is tasked with separating the fake data points from the real ones. As these algorithms train against in each other in something called a 'zero sum game', they both improve on their own capabilities. When the generator model is sufficiently well trained, it can be used to create a large artificial data set for other AI algorithms to train on. Not only does this help to train excellent discriminator models (our primary goal), but generators themselves produce some interesting results. For example, a painting produced by a generator network recently sold for close to half a million US dollars[30].

The key takeaway from this description is that it is now technically possible to solve the problems of bias and robustness, if one is willing to spend sufficient effort to do so rigorously. The decision for the designer is how much hard work to put into training AI algorithms, so that the results are usable in good faith.

Sustainability

The one aspect we have not yet covered is not

[30] https://www.christies.com/features/A-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx

only about solving today's problems, but also about making sure that AI can continue to solve tomorrow's problems. The energy consumption of AI algorithms is an outstanding issue. We have already seen that the power requirements for driving deep learning algorithms are orders of magnitude higher than existing software that does the same job (obviously, with less accuracy). The following solutions have been proposed for reducing the long term energy consumption of AI, and also to make its deployment feasible in low-cost, low-energy devices.

The most obvious option is to make the models smaller. As we have seen, this has other benefits for reliability and explainability, apart from the reduced consumption. However, it sometimes comes at the cost of reduced accuracy.

A more radical approach is to replace the hardware on which neural networks run, right at the microchip level. One of the largest consumers of energy in AI algorithms are the Graphics Processing Units (GPUs). These chips were originally designed to efficiently render high-resolution graphics, but researchers in machine learning found that they were ideally suited for the kind of operations that neural networks demand. As a result, they are the standard hardware enablers for contemporary AI. However, it is possible to perform these computations even more efficiently, leading to a new branch of hardware research known as **neurodynamic computing.** Some bespoke hardware has been shown to reduce the energy consumption of neural networks by up to 95 per cent[31]. The disadvantage of these chips is that they are not efficient for the normal types of operations that computers do – but for single applications such as remote sensors, they could be the ideal solution.

A third option that offers a compromise between smaller models and radical new hardware, is to use **Field-Programmable Gate Arrays** (FPGAs) to run deep learning models[32]. This is a well-known type of hardware that is composed of a large number of logic gates, whose interconnections can be progammed or changed as required. It requires significantly lower computing power and is faster than GPUs, but has two drawbacks. First, one requires knowledge of hardware to be able to deploy solutions on FPGA, unlike in the case of GPU where software instructions are all that are needed. Second, one may sometimes need to use lower numerical precision, leading to small errors creeping into the computation.

Conclusion

We began this article with the bold claim that AI was 'an idea whose time had come'. The subsequent description of challenges and solutions shows that the fundamental

[31] https://singularityhub.com/2018/02/26/putting-ai-in-your-pocket-mit-chip-cuts-neural-network-power-consumption-by-95/

[32] https://www.datacenterknowledge.com/edge-computing/why-microsoft-betting-fpgas-machine-learning-edge

obstacles to large scale deployment of AI are not insurmountable. What is required for policy-makers and stakeholders (whether they are end-users of the technology, or the people whose jobs are being affected) to ensure that the right solutions are applied to each problem. This can be achieved through a system of rewards and penalties. On the positive side, the researchers aiming to solve these problems need support – in terms of time, funding, and data availability. The workforce should also recognise reality and aim to adapt their skills to an AI-enabled environment, rather than try to block its progress. At the same time, strong regulatory policies need to be enacted to ensure that the inner workings of AI systems are observable and justifiable. The only way to enact balanced policies is for the policy-makers to educate themselves about the technology, rather than to be swept up by public perception.

Voice of Marketing

V. S. Ramaswamy*

V. S. Ramaswamy, an eminent author of the best-selling book "Marketing Management" is a marketing practitioner turned academician and is associated with numerous management institutes. In this conversation with IMI Konnect, he candidly speaks on various current and emerging issues pertaining to Marketing Management as a subject and stressed on "relevance" and "excellence" being two significant criteria of management education today, especially in India. This interview also emphasizes on the various transitions that Marketing as a discipline has been going through. In addition, it brings forth some valuable insights on Rural Marketing in India and several daunting challenges inherent to it.

IMI Konnect: *As an author of the best-selling textbook on "Marketing Management" and as an observer of how the subject is taught at MBA level in our country, do you think that teaching of Marketing Management today warrants some change? What are the issues on this front?*

VSR: In order to deal with the subject properly, we need to first place it in the right perspective. Marketing teaching can be discussed only within the framework of Management education. Management education in our country does warrant a change. The fundamental question is: Does an MBA degree bring the "value" it is supposed to bring to the main stakeholders, i.e. the graduating youngsters and the corporates who are going to employ them? One pertinent question here is, why does one go for an MBA degree – for value or vanity or lack of alternative? Years ago I used to contribute to a column in *"NEWDELHI"*, a magazine of substance started and edited by Khuswant Singh. One of the pieces in the column, bearing the caption *"MBA Mania"* had satirised the craze for an MBA degree, among our middle-class youth of those days. The quality of management education imparted by the B-Schools then, with the exception of the top rung, was far worse than what it is today. Still, there was the craze. Many seekers of the three letter qualification were over-valuing it, while many others opted for it because it was a status symbol. The era under reference is the early 1980s. The description *"Mania"* aptly fitted the prevailing context. We are now into the 2020s. Four decades down, has anything changed in this regard? Yes, but not anywhere to the desired extent, especially in the key aspects. Actually, the situation had worsened in the 15 years that followed the early 1980s,

*Best-selling author and marketing practitioner turned academician

before it became a bit better. The description *"Mania"* fitted the new context even more. In this period, there was an endless mushrooming of institutes offering MBA degrees and PGDMs, accompanied by continuous lowering of the quality of the education imparted. The trend as we enter the 2020s can be described as a "positive shift" in one major respect! I refer to the closure of quite a few of the already functioning management institutes!

IMI Konnect: *Given this, what would be your take on quality vs. quantity in management education?*

VSR: Here, I would first elaborate whether the closure of institutes can be referred to as a "positive shift"? Given the context, the answer is Yes. The pertinent question is: Has the value and utility of our average MBA degree gone up at least in the more recent years? The answer is "Yes, but nowhere near adequacy". One may come across comments that quality-inadequacy in MBA education applies on a global basis, especially when specific aspects are considered for assessment. We all will recall the popular, light-hearted publication, *"What they don't teach you at Harvard Business School"*. While it may not have constituted a wholesome and objective critique of the MBA education offered by the world's leading B-School, it did reveal the education's lack of relevance. A number of top B-Schools the world over have gone for many change initiatives in order that their MBA courses remained grounded to the emerging realities of business and society. The inadequacy of MBA-education in the case of India, however, is in a different league altogether. It is reported that even after the closure in recent years of so many institutes across India, there are still more than 5000 management institutes in India offering MBA/PGDM. Yet, not even a handful figure in the Global Top 200 B-School ranking.

IMI Konnect: *What is the most important factor in management education nowadays?*

VSR: We need to assess with seriousness, where our MBA education stands today and why it is where it is. Two criteria seem most important here: a) Relevance and b) Excellence. I am placing Relevance above Excellence, because, the MBA education must first meet the criterion of Relevance. And, in my view, the criterion is not being met to the required measure in the MBA programmes offered by many of our B-Schools.

IMI Konnect: *Bringing the focus back to "Marketing-Teaching", could you elaborate, how, the Criterion of Relevance is not met to the required measure in many of our B-Schools?*

VSR: Marketing-Teaching has to recognise that "readying the students for marketing in the real world" is its true purpose. And, such readying involves several ingredients. I shall concentrate on one key ingredient, viz the requirement of teaching the subject in the backdrop of the environment of the given country. It is an established fact that marketing being an environment-driven

subject, its teaching needs an environment-specific treatment. In the case of India, the teaching must be India–specific, equipping the students with a sound knowledge of the marketing environment of India and teaching the various concepts, theories and practices of marketing against the backdrop of this environment.

IMI Konnect: *While on environment specific treatment of the subject, what do you think about the textbooks?Should they be relevant to the specific marketplace?*

VSR: For teaching marketing in a relevant way, we need marketing teachers who are aptly qualified and trained and marketing textbooks that are content-specific towards meeting this need. Speaking of "apt textbooks for marketing-teaching", it may be pertinent to mention that Theodore Levitt, marketing visionary and *Guru,* and doyen of Harvard, had the clairvoyance to foretell this requirement thirty years ago. He wrote the following words in his Foreword to the marketing textbook "Marketing Management: Indian context" authored by me and Ms. S Namakumari:

"Marketing has to respond to the conditions in the marketplace. And, the conditions will differ from place to place in important respects depending on the stage of development of markets and countries. It will certainly be more useful for people to learn their marketing lessons from a book that mirrors the conditions of their society than one that reflects conditions in a much different society".

Professor Levitt had elaborated further in the Foreword that *"such India–specific textbooks will provide an opportunity to the student and the teacher to make a choice, and to make it with the knowledge that such a book has the specificity that makes it relevant to the student and teacher in India".*

From the above, it will be evident why an Indian text will best meet the criterion of "relevance" and thereby hold a unique position in the teaching of marketing to Indian students.

IMI Konnect: *What specific attributes do you advocate in textbooks that could be used in marketing teaching in India?*

VSR: We can, obviously, think of several attributes in this regard. I would like to focus on a few key ones, like linkage to India, integrating the theory and India-specific elaborations etc.

First, picking the threads from your previous question, let me say, 'linkage to India' is the most crucial requirement in any marketing-textbook meant for students in Indian B-Schools. It must enable the future marketing managers of India to thoroughly comprehend the Indian marketing environment and Indian business landscape. This requirement of 'linkage to India' cannot be met with the mere addition of a few Indian examples here and there in the book.

Second, to be more specific, any book with the mission of "teaching marketing in the specific

context of India", must include some special chapters on the marketing environment of India. In fact, the book should commence with this topic and then move on to the various marketing lessons. The Indian environment introduced at the beginning should serve as the setting for the text as a whole; and it is on this canvas of Indian environment that all chapters/lessons in the text should unfold. Knowledge on the marketing environment of India should be an integral component of the book. The marketing theory and the India-specific elaborations that are taught must be thoroughly integrated with each other, ensuring that the marketing-lessons and the India-setting are woven like warp and weft.

IMI Konnect: *Apart from the focus on India, would you like to emphasize on any other aspect of textbook for effective teaching?*

VSR: Yes, the book must be a dynamic source of knowledge. Here again, two sub-points need to be highlighted. The marketing environment of India, or, for that matter, any country on the globe, is in perpetual change. In the case of India, the change is all the more rapid in current times. So, the book we are talking about must be dynamic enough to cover the continuous changes happening on the marketing environment front. Second, it can easily be seen that marketing environment is not the only entity that is changing all the time. Changes are also happening in the marketing discipline itself. The book must be dynamic enough to cover these changes as well. Juxtaposed to this requirement is the fact that textbooks are static for at least three years (no one brings a newer edition of the book earlier than that period).

Another important aspect, in my opinion is how updated the book is! The question to be addressed therefore is: How could the changes happening on the environment front and on the marketing discipline front be transmitted to the students and faculties who are using the book? A perpetual "Update Service" is the answer. The author/publisher of the book must keep providing periodical 'Updates'. The aim of this should be two-fold: to help the students remain updated all the time about the 'emerging India' (***"new India"***) and also on the dynamic changes taking place in the 'Marketing' discipline as such. The 'Updates' must tap every transition and change taking place in the marketing environment as well as in the marketing discipline.

IMI Konnect: *Turning to the 'Marketing' discipline as such, what are the major developments impacting it in the present times?*

VSR: Marketing management is a major subject. As markets expand and new marketing platforms emerge in rapid succession, the science and practice of this discipline is being transformed by the minute. What we consider today to be the fastest way to reach our customers might be obsolete tomorrow. Therein lies the beauty of this discipline-***Change.*** Though Marketing has been changing all along, currently, it is changing in an unprecedented manner.

IMI Konnect: *Would you like to throw some light on the types of such transformations?*

VSR: First, I would like to speak on the **external changes.** I would like to project disruption, ascendancy of customer experience, digitisation, and ascendancy of technology in general, as the major external factors impacting marketing in present times. If we see contemporary moves of corporates on the strategy front, we will be tempted to believe that there are just two strategies in marketing—the "disruptors' strategy" and the "defenders' strategy" (defending against disruption). Disruption is comprehensively encompassing marketing and business in present times. While 'disruption' is an issue today for the world as a whole, for India, the present times are the veritable 'age of disruption'. Disruption has become the *'new normal'* for India, and uncertainty the only certainty. It poses special challenges for business/marketing. Similarly, today, customer experience is occupying the centre stage in marketing. You win markets if customer experience votes for you and lose them if your competitors score over you in this regard. Customer experience has now become the pivot in the entire value delivery process. The third is Digitisation. Digitisation is permeating India, altering the way business is done and the way people live and carry out transactions. Digital transformation is no longer an option; it is the imperative—for corporates, marketers, and consumers. The fourth is ascendancy of technology in general. The way technology is changing every aspect of life currently, has no historical precedent. As a combined effect of all the above and other related factors, marketing has been changing currently in an unprecedented way.

There is also the second part of changes, which is **internal to marketing.** Emergence of new methods of marketing, transformational changes in retailing, spread of online marketing and online marketplaces/ platforms, etc, and more fundamentally, the new compulsions on marketing professionals to manage the "dilemma of choice", simply in view of the fact that multiple ways have become available for accomplishing the given set of marketing goals, belong to this second part. Today, marketers are required to operate in an environment characterized by a frenzied pace of innovation, advancements in communication— communication technology as well as methods, and a greater degree of social connectedness, largely through social media. In short, marketers are required to operate in a new, layered, and non-traditional setting. They are required to be the Jack of several trades.

Finally, I would mention that as Marketing is changing, the requirements of success in marketing have also been changing. The requirements have become a lot more complex than earlier. Marketing leaders need to work, excel and succeed, staying 'relevant for the times'. This leads to the importance of creating content that prepares the marketing leaders to accept disruption as the new-

normal and adopt change-management in the place of traditional marketing and status quo. Marketing teaching needs to reflect all this. What we actually need today is a new, re-imagined marketing education. It has to keep evolving continuously, challenging the status quo.

IMI Konnect: *In the fifth edition of your book you had introduced a new philosophy/concept of marketing, describing it as "Value-Philosophy of Marketing". How important is this as a basic tenet?*

VSR: In all the editions of our book, we have been highlighting the pivotal role which *'**customer-value**'* plays in marketing. In the fifth edition, we expanded the idea and offered a new philosophy of marketing centred on the idea and named it the ***Value-Philosophy of Marketing***. It just corresponds to a specific way of understanding and treating marketing. A firm practises this philosophy when it displays a specific orientation towards marketing. When a firm is totally centred on the idea of *'giving value to customer'*, then it is believing in and is practicing the Value Philosophy. By learning marketing through this new philosophy/orientation, the students, would become better marketers in real life and be able to handle the various issues in marketing more effectively. We also explained that while the various prevailing "concepts of marketing" were inadequate in helping the students understand with ease the core of marketing, the *Value-Concept* through its focus on value, served this purpose very well.

IMI Konnect: *How is the 'Value-Concept' related to the 'Marketing Concept'?*

VSR: We further explained how the *'Value-Concept'* is considerably different from the *'Marketing Concept'/ 'Customer Concept'* which has been in vogue. This exposition received the acclaim of faculties and students in our B-Schools. In fact the enunciation of the idea in the form of a new *"Philosophy of Marketing"* made this book a unique and a break-out textbook on Marketing. The edition had devoted a full, exclusive chapter towards this philosophy of Marketing.

'Value' is not a new idea in marketing. The new Value-Philosophy of Marketing upgrades its importance and dins into the students that 'delivering value to the customer' is the crux of marketing. We shaped the already known idea of 'Value' into a new philosophy of marketing. The "value philosophy" affirms that marketing is out and out a value-delivering task and delivering value to the consumer is the be-all and end-all of Marketing. Marketing is all about creating, communicating, and delivering value. And, we structured all marketing lessons in the book around this important tenet. We also introduced the new *'value in marketing'* exhibits in all the chapters, in each of the sections. Consisting of about 250 exhibits, the new series explained how high-performing companies, Indian as well as Global, excel through the value route, in the various aspects of marketing. They also explained how the value-idea can be taken from the concept-plane to the practice-plane

and be made into an action process in every aspect of marketing. We called it 'the value-delivery process'. Selecting the value, creating it, delivering it, capturing the value back from the market, communicating the value, and enhancing it, are the components of the value-delivery task.

IMI Konnect: *What are your views on Rural Marketing in India? According to you, how important is Rural Market growth for our development story?*

VSR: HUL Chairman Sanjiv Mehta said recently, the average FMCG consumption in rural India is just half of the consumption in the whole of India. This means by bringing rural FMCG consumption at par with the National level, we can increase FMCG consumption in the country as a whole by 33 per cent. Is this possible? Yes. We are not talking of matching rural consumption with urban consumption on per capita basis, but on aggregate basis. In view of the larger rural population compared to urban, at the aggregate level, the gap can be closed more easily. And, we will need to close the gap for achieving the goal of US$5 trillion economy. There are two other related aspects. First is the imperative that the rewards of progress should be shared by the rural people in an equal measure along with the urban. Second, over the past few quarters, there has been a slowing of consumer demand in both urban and rural markets, more so in the former. Given the difficulty in enhancing the business in a big way from the urban market in the short term, it is necessary to seek a compensatory quick increase from the rural market. I have cited the FMCG market, as it is a major contributor to growth and also reflects the state of the economy.

Luckily, we are right now in a good position to handle both the above aspects. The contemplated measures such as rural infrastructure, rural housing, electricity, water and healthcare will help achieve the aimed growth in the consumption of consumer products by rural India. The point is while rural economy and rural purchasing power may grow as envisaged, the challenge of marketing (consumer products) will still need to be tackled. An enlarged market potential may not automatically lead to an enlarged market.

IMI Konnect: *Why do you think that the Rural Market in India still holds as an attractive market despite the several daunting challenges inherent to it?*

VSR: The Indian rural market may be marked by daunting challenges; but, there is certainly a very attractive side to it, on account of its size. As Harish Manwani, former HUL Chairman observed, "Rural India is a powerhouse and presents an incredible opportunity.... of course, there are the challenges in agriculture, rural employment and employability and human development to be handled. The significant point is there is an incredible opportunity in the Indian rural market".

The important fact is that rural marketing is developmental marketing and rural marketers must be willing to recognise it. For succeeding in the rural market they need a good "go-to-market" strategy. The strategy must carry built in elements of development of the rural community. Even while keeping the commercial interests of the firm in view, the design/ methodologies of the projects meant for the market must, as a conjoint result of the projects, be capable of upgrading the socio-economic position of the rural consumers. One has also to recognise that rural market is not a ready-to-eat (RTE) fast food. It has to be prepared patiently. HUL's *Project Shakti* stands out as an example of such developmental marketing. It is often said that markets are 'made', not found. This is particularly true of the rural market of India. It is a market meant for the truly creative marketer.

Sustainable Supply Chain through Social, Economic, Environmental and Collaborative Dimensions

Sachin Modgil* and Rohit Singh**

Abstract

This article is developed to propose a sustainable score determination in a supply chain on the basis of four dimensions, namely social, economic, environment and collaboration. The proposed scoring mechanism is based on the practices in these four dimensions. The scores of the experts from the firm in the case, have been collected in three rounds to reach to census and a study has been conducted using five stakeholders in the supply chain. The scores and areas of improvement have been highlighted in the results. This indicates each partner, where to contribute to make entire eco-system of supply chain sustainable.

Introduction

Today's businesses are passing through a tough time where consumer is very much aware about the product and process of product impact on environment [Azevedo et al., 2016; Green et al., 2012]. The environmental factors not only need to be considered locally but also across the supply chain through procurement, production, distribution, consumption and post-disposal of products [Tseng et al., 2013; Eltayeb et al., 2011]. Firms today need to deal with social and environmental issues to be sustainable [Pagell and Wu, 2009]. Environmental management has changed its spread from firm to supply chain instead of focusing on firm's efficiency in customer service, producing quality products, and reducing the costs [Azevedo et al., 2013].

Sustainability is the major issue for most of the supply chains today. 90 per cent of the supply chains are still transactional. Different industries have their own challenges for making their supply chains sustainable. Many authors have proposed various frameworks to address this issue. For instance, Mathivathanan et al. (2018) have used decision making trial and evaluation laboratory method to investigate and assess the sustainable supply chain practices in Indian automobile industry. In another study authors have developed a model to influence

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the sustainable business practices through sustainable modelling and reporting system [Reefke et al., 2014]. In any sustainable supply chain, there can be number of barriers, drivers, mechanisms and outcomes. The grounded phenomenon like institutional theories can advance the adoption of sustainability practices across the supply chain [Jia et al., 2018; Giunipero et al., 2012]. The top management has a crucial role in this to drive the change towards sustainable practices [Chkanikova and Mont, 2015].

There are a number of ways the performance of a supply chain can be measured on the basis of cost, quality, lead time and efficient customer service. In addition to institutional theory[1], the multiple attribute utility theory[2] can be used to assess the supply chain performance [Kainuma and Tawara, 2006]. The firms and government need to view the process and methods of exploiting the earth's resources. Hence, the design of a sustainable supply chain is dependent on the country-specific policies that enable the business to carry out specific activities [Gupta and Palsule-Desai, 2011]. The sustainable supply chain includes the decisions at functional level, decision support systems, modern information systems and federal legal framework. Also, considering the status and emphasis on closed loop supply chains can play an important role towards sustainability [Geng et al., 2017; Govindan et al., 2015]. Therefore to this end, the present study focuses on lean and green initiatives by firms and has studied a pharmaceutical downstream supply chain to understand the sustainable performance and areas of improvement for achieving an overall sustainable supply chain.

Remainder of the article is organized as follows: next section discusses about the literature review. The third section describes the methodology adopted. The fourth section describes the case study done for pharmaceutical SME in India and finally, the last section describes the conclusion and scope for future research.

Literature Review

Any sustainable supply chain needs to balance between environmental, economic and social performance for a business [Frostenson and Prenkert, 2015]. Table 1 summarises the descriptive literature review and the interesting findings.

Methodology

It is essential to work out the individual stakeholder behaviour in the sustainable supply chain. Figure 1 describes the

[1]Institutional theory emphasizes that institutional environment strongly influences the development of formal structures in an organization.

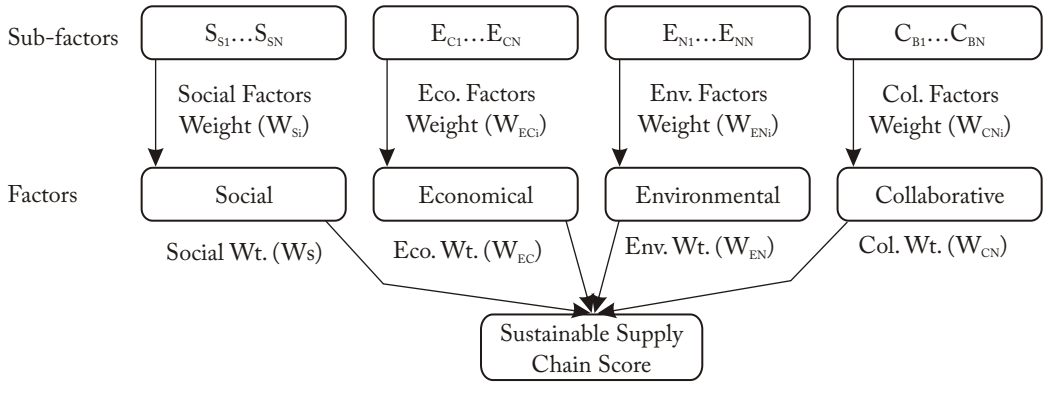
[2]Multiple attribute utility theory was introduced by Fishburn (1965), Keeney (1969) and Raffia (1969) who proposed a decision making technique designed for taking decisions under risk. The basic assumption of this theory is that a decision-maker choses the alternative which yields the maximum multiple attribute utility among various possible alternatives.

Table 1: Review of Recent Literature on Sustainable Supply Chains

Authors & Year	Research Objectives	Level and Tool of Analysis	Setting of the Study	Major Findings
Thanki and Thakkar, 2018 (Approach: Expert View)	Assessment of sustainable supply chain through the adoption of lean and green supply chain paradigms	Supply Chain, Fuzzy DEMATEL	Textile firms from India	• Delivery performance, operational cost and profitability are most important aspects of sustainable performance • Learning and growth aspect help in improving the lean and green supply chain of the textile industry
Barbosa-Póvoa et al., 2018 (Approach: Literature Review)	Investigation of operations research methods in support decisions for sustainable supply chain	Research Articles, Content Analysis	220 papers from the domain of sustainable supply chain	• Sustainable supply chain needs to be practised at strategic, tactical and operational level • The challenges for the sustainable supply chain include resilience, uncertainty in resources availability, demand, costs and life cycle of products
Gouda and Saranga, 2018 (Approach: Survey)	Investigating the impact of sustainability efforts and risk mitigation strategies on carbon footprints and image of the firm	Supply Chain, Structural Equation Model	Six manufacturing sectors from 21 countries	• Strategies of risk mitigation do not always help in reduction of supply chain risk faced by firms • Further reactive mitigation tactics do not reduce the supply chain risk; they can make an impact if used with sustainable efforts • Preventive risk mitigation strategies work effectively for mature supply chains
Faccio et al., 2014 (Approach: Case Study)	Investigate the modern supply chains from closed loop view	Supply Chain, Paramedic Analysis	Case 1- Traditional firm perspective Case 2- Social responsibility firm perspective	• A linear programming model is developed that can minimize the total supply chain cost with closed loop characteristics. The economic sustainability can be achieved with closed loop supply chain

hierarchical relationship for the assessment of sustainable supply chain through social, economic, environmental and collaborative behaviour [Carter and Rogers, 2008]. Each factor in Figure 1 reflects the behaviour of social, economic, environmental and collaborative behaviour towards sustainable supply chain i.e., how the sub-factors under each of four dimensions mentioned above lead to factors which in turn, formulate the final score is presented here. The sub-factor weights are indicated in Table 2 after

Figure 1: Sustainable Relationship for a Supply Chain



consultation with experts. Later, Table 6 presents the weights considered for all four dimensions after three rounds of discussion with experts.

Case Study

The case study conducted involves five companies in the supply chain, two out of them are first-tier suppliers, two are second-tier suppliers and one is original equipment manufacturer (OEM) and their profiles are mentioned in Table 2. Table 3 highlights the factors considered in all four dimensions through experts along with weights. Table 4 presents the social behaviour calculations as a sample calculation; other indicators have been measured similarly.

Table 2: Profile of Firms Involved in the Supply Chain

Company 1	Company 2	Company 3	Company 4	Company 5
Bulk Drugs	Packaging Material	Omega-3 and Ibuprofen	Activated Carbons, Chemicals Powder	Dry Syrup and Solvents
OEM	Second tier -Supplier	First tier -Supplier	Second tier -Supplier	First tier -Supplier

Conclusion and Scope for Future Research

Scores such as social score, economic score, environmental score and collaborative score are presented in Table 5. It is evident that this particular supply chain is strong on collaboration (4.38) and social side (4.33) and need to improve its environmental (3.87) and economic score (3.70).

Individual companies can also be seen performing in all the four dimensions of sustainable supply chain (Table 6). It is clear that on the social front company 5, i.e., the first-tier supplier of dry syrup and solvents is doing well. On the other hand, on the environment front the third company, i.e., the

Table 3: Factors, Sub-Factors and Weights for the Calculations

Factors	Sub-factors	Authors	Weights
Social Factors	S_{F1}=Benefits to the community	Linton et al. (2007)	0.18
	S_{F2}=Number of incidents for violations related to corruption	Seuring and Müller (2008b)	0.17
	S_{F3}=Education, training in prevention and risk-control programs	Gouda and Saranga (2018)	0.15
	S_{F4}=Involvement of local community in the supply chain activities	Tseng et al. (2013)	0.2
	S_{F5}= Management effort in reducing the health and safety impact of products and services produced	Chkanikova & Mont 2015	0.13
	S_{F6} = Role of supply chain practices in the development of public policy	Preuss (2009)	0.17
Economic Factors	E_{C1}= Competitiveness in the supply chain	Seuring and Müller (2008a)	0.19
	E_{C2}= Process innovation	Ageron et al. (2012)	0.16
	E_{C3}= Product innovation	Ageron et al. (2012)	0.14
	E_{C4}= Ability to respond to the changes	Barbosa-Póvoa et al. (2018)	0.18
	E_{C5}= Waste reduction in the supply chain	Rao and Holt (2005)	0.16
	E_{C6}= Economic dependency	Ageron et al. (2012)	0.17
Environmental Factors	E_{N1}= Consideration of environment in sourcing	Varnäs et al. (2009)	0.18
	E_{N2}= Consideration of environment in conversion	Bala et al. (2008)	0.17
	E_{N3}= Consideration of environment in delivery	Hassini et al. (2012)	0.15
	E_{N4}= Consideration of environment in consumption and usage of products	Eltayeb et al. (2011)	0.19
	E_{N5}= Recycle, reuse and rerun	Hassini et al. (2012)	0.14
	E_{N6}= Consideration of environment in value proposition	Hassini et al. (2012)	0.17
Collaborative Factors	C_{F1} = Rapid financial payback	Attaran and Attaran (2007)	0.14
	C_{F2} = Collaborative planning, forecasting and replenishment	Simatupang and Sridharan (2002)	0.16
	C_{F3} = Able to develop joint business plan	Attaran and Attaran (2007)	0.18
	C_{F4} = Improved productivity and profit	Simatupang and Sridharan (2002)	0.17
	C_{F5} = Improved product quality and customer positioning	Attaran and Attaran (2007)	0.19
	C_{F6}= Trust between collaborating partner	Carter and Rogers (2008)	0.16

supplier of omega-3 and ibuprofen is doing well and in collaboration OEM and fifth company are doing well. The individual companies can also be viewed in terms of their contribution in sustainability of the supply chain. Future studies can be conducted in applying and exploring the other dimensions of sustainable supply chains such as green, lean and ethical factors. Further the interrelationships between these dimensions needs to be investigated and validated with different case studies.

Table 4: Sample Calculations for Social Behaviour

	Practices Implementation Level (PL)				
	Company				
Weight (w)	1	2	3	4	5
0.18	2	2	4	3	5
0.17	4	3	5	5	5
0.15	5	4	5	4	5
0.2	5	5	5	5	5
0.13	5	4	5	3	5
0.17	3	4	5	5	5
	Weighted Average				
S_{F1}	0.36	0.36	0.72	0.54	0.9
S_{F2}	0.68	0.51	0.85	0.85	0.85
S_{F3}	0.75	0.6	0.75	0.6	0.75
S_{F4}	1	1	1	1	1
S_{F5}	0.65	0.52	0.65	0.39	0.65
S_{F6}	0.51	0.68	0.85	0.85	0.85
Social Behavior Score (B_{Social}) = Sum of Weighted Average Scores	3.95	3.67	4.82	4.23	5

Table 5: Sustainable Supply Chain Score for Social, Economic, Environmental and Collaborative Dimensions

	Practices Implementation Level				
	Company				
	1	**2**	**3**	**4**	**5**
Social Behaviour (B_{Social})	3.95	3.67	4.82	4.23	5
Social Score	**4.33**				
Economic Behaviour ($B_{Economic}$)	3.98	3.49	3.59	3.25	4.2
Economic Score	**3.70**				
Environmental Behavior ($B_{Environmental}$)	3.72	3.71	4.24	4.17	3.53
Environmental Score	**3.87**				
Collaborative Behaviour ($B_{Collaborative}$)	4.67	4.11	4.21	4.21	4.68
Collaborative Score	**4.38**				

Table 6: Sustainable Supply Chain Score Evaluation

	Companies					Behaviour of Supply Chain	Weightage after 3rd Round of Interview		
							Weight		
Factors	1	2	3	4	5	Average	Weights	SC behaviour	SSC Score
Social	3.95	3.67	4.82	4.23	5	4.33	0.25	1.08	4.072
Economic	3.98	3.49	3.59	3.25	4.2	3.70	0.25	0.93	
Environmental	3.72	3.71	4.24	4.17	3.53	3.87	0.25	0.97	
Collaborative	4.67	4.11	4.21	4.21	4.68	4.38	0.25	1.09	
Sustainable Score - Individual firm	4.08	3.75	4.22	3.97	4.35				

Sustainable supply chain score in all the four dimensions have been calculated through Table 6.

SSC Score = f {(W_S * B_{Social}), (W_{EN} * $B_{Environmental}$), (W_{EC}*$B_{Economic}$), (W_{CN}* $B_{Collaborative}$)}

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Union Budget 2019-20: Underscoring the Trickle Up Strategy

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Abstract

The Union Budget 2019-20 has been largely perceived to be a welfarist's budget emphasizing on issues like inclusivity, egalitarianism, equity in access etc. This budget prioritizes on the importance and achievement of stringent SDG targets that India needs to meet by 2030. The budget has interestingly given more impetus to the growth building structural factors like infrastructure, connectivity, capacity building etc. rather than on the growth boosting factors. The "trickle up" approach has been adopted which is believed to have significant multiplier effects on income. Over the fiscal sustainability concern, the budget mentions of continuing with the fiscal consolidation path set by the FRBM Act.

Introduction

The Union Budget 2019-20 was tabled by India's first full time woman Finance Minister Nirmala Sitharaman on July 5, 2019. It has largely been perceived as a welfarist's budget emphasizing issues such as inclusivity, egalitarianism, equity in access and the like. Amidst lots of expectations from the industry and at a time when the global and national economic growth factors started slackening, the budget underscores importance of catalysing self-sufficiency and livelihood at the base level-the agrarian economy, the unorganized sector, and the small and tiny start-ups, which typically remain at the back burner in policy designing. Quite understandably, the impetus have been on growth building structural factors - infrastructure, connectivity, capacity building etc., rather than on the growth boosting factors.

Careful investigation of the budget priorities reveals that the pattern of public expenditure budgeted for different centrally sponsored and central sector schemes resonates prioritization of expenditures needed towards achieving the stringent Sustainable Development Goals (SDG) targets by 2030. In the recent times, as recognised and reverberated by the governments and experts in many other emerging economies, immediate strategizing and policy interventions are imperatives to meet the SDG targets. As for example, the Indonesian finance minister and former World Bank chief of Indonesia have prioritized on engaging private sector to meet

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the vast investment requirements of the SDG goals. In India the NITI Aayog has mapped all the SDG goals on the existing centrally sponsored schemes and related interventions with the concerned ministries and departments. With the 17 sustainable development goals and 232 indicators set by the UN over socio-economic, environmental and other cross-cutting dimensions the budget has rightly prioritized on the longer term perspectives of economic development: the 'sustainability' issues over the myopic vision of maximizing 'economic growth'.

If one looks into the evolution of any country's government budget proposal it has been by and large, an economic instrument to plan public policy interventions. Long back it was perceived only to be a tool for indicating how much the state is expected to earn from communities and citizens. Later on, with the economic transition and societal transformation besides providing details of a revenue collection forecast, it has become a mechanism of showing how much the state would like to spend on, and on which component. Government budget is now a customary policy dissemination of tentative spending and revenue collections of the state for a particular financial year. Budgets can be balanced, can be surplus or can be deficit; typically deficit budget strategy is practised globally in most of the economies, not to speak of the emerging economies and those who are less developed having greater developmental concerns to prioritize on. Government deficit and eventually, debt management becomes an intrinsic part of such deficit budgeting. Budgetary spending stimulates aggregate demand and hence trigger growth, therefore, deficit budget eventually leads to opening up of new avenues of earning revenue, while inducing growth sustenance and creating capacities to pay back past debts.

Two big concerns that any budget addresses are growth and equity; quite often they are in conflicts. The trickle-down hypothesis of budget provisioning underscores the 'growth' aspect by a skewed allocation towards the key drivers of industrialization and growth– the entrepreneurs and the industry players, while assuming that eventually this growth will "trickle down" to the people at the lower economic rung; thus, 'equity' dimension will be taken care of automatically. On the other hand, while prioritizing on the budgetary allocations the "trickle up" hypothesis looks through the equity lens; it believes in strong positive income multiplier effect that triggers growth and development from bottom up. Studies show that cash transfer programs and budgetary allocations with trickle up hypothesis in poor economies does indeed have positive and significant multiplier effects.[1] There are very recent studies that show that inequality have both positive and negative impacts on economic development; but that differs according to the stages of economic development and levels of

[1]Thome et al., 2016; Handa et al., 2017; Filipski et al., 2016; Taylor et al., 2015.

inequality. The Gini coefficient 'tipping points' are defined to be the threshold level of Gini at which the relation between inequality and growth changes from positive to negative. Following the findings of Balcilar et al. (2019) it is 36; and as per this threshold Van Kesteren et al. (2019) calculate that there are 84 countries that are at a stage of economic development where increased inequality would contribute to economic development which endorses trickle down hypothesis. However, there are much more countries where it will hinder economic development, endorsing the trickle up hypothesis.

Nonetheless, no-one-size fits all; therefore, to gain edge and reap the maximum benefit over its cost, trickle up budgetary strategy has to be certainly tailor-made on both time and spatial dimensions. The 2019 Union Budget envisions creating a US$5 trillion economy by 2024, driven by a virtuous cycle of investment while at the same time transforming the rural agrarian lives with an equitable distribution of this economic pie. From governance angle, 'engaged governance' is defined as an institutional arrangement that links people more directly to the decision-making processes of a State in a manner that does not bypass the institutions of representational democracy but complements it. It is expected that such a process would strengthen people's capacity to influence public policies and programmes more positively.[2] This budget stressed upon facilitating peoples' participation in the productive activities with minimal governance.

Inclusivity of Sectors and Economic Entities in Policy Decisions

Inclusivity in policy decisions of India Inc. implies involving hitherto neglected and laggard sectors and economic entities in the mainstream of policy designing, ensuring access to basic amenities such as safe drinking water, clean and affordable energy, sanitation infrastructure, housing, credit access, productive employment and decent work, among many others.

Agro Sector

The stressed up and laggard agrarian sector has received specific importance in this year's budget by several laudable initiatives towards ease of living for the farmers and by aiming to go back to the basics of "a zero budget farming", i.e., zero credit to agriculture while ensuring minimal chemical usage. This not only aims to make small scale farming viable pulling out the farmers from potential debt traps, but also targets to make least possible damages to soil productivity. A cluster based development scheme with focus on specific clusters, bamboo, honey and khadi and setting up of 100 new clusters to enable new artisans and 100 business incubators have been proposed. To boost 75000 entrepreneurs ASPIRE scheme has been recognised. On water security and farmers' welfare 1592

[2]http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN020213.pdf

critical and over exploited areas are to be identified and worked upon under Jal Shakti Abhiyan. As a step towards blue revolution, a new scheme has been launched to address critical gaps in strengthening the supply chain, building and modernising the infrastructure of fishing industry. If we look into the inter-departmental allocations within the ministries of rural development and agriculture it is noticeable that the BE allocation proportion of the Department of Agriculture, Cooperation and Farmers' Welfare (MoAFW) to that of the Department of Rural Development (MoRD) has increased to 1.1 from 0.6 in 2018-19 RE, and 0.3 in 2017-18 (Actuals). Delving deep into the schemes under agriculture, it is observed that the scheme that constitutes a sizable share of this increased allocation is the PM-Kisan scheme. This is an income support scheme which has been extended to support all the farmers with ₹6000 per year; concern is: will this ensure increased agricultural productivity that remains at the staggering level of 1.86 (CAGR of total foodgrains Kg/hectare in 2017-18), and help correcting the sharp drop in the area sown under Kharif in 2019 as compared to that in 2018? How will the climate change issues and their adverse impacts on agri-productivity be handled, and what are the mechanisms to ensure doubling of farmers' income by 2022 remain to be sorted out by follow-up policy interventions? Clearly, increased budgetary allocations will not be able to resolve the structural problems in agriculture single-handedly, states' cooperation and NITI Aayog's advisory role are absolutely crucial.

Small Scale Industries and Start-Ups

The Economic Survey 2018-19 has also emphasised on the focus needed to nourish India's ailing MSMEs in order to create productive jobs and trigger capital accumulation therein. Some of the steps taken in the budget inter alia, are proposals to build specific e-verification mechanisms to facilitate identification and verification of pending assessment, smoothen grievance redressal, alongwith creating platforms for promoting the growth of start-ups to eventually becoming larger business units, and linking them with the suitable venture capitalists, facilitating their tax planning etc.

Informal Sector

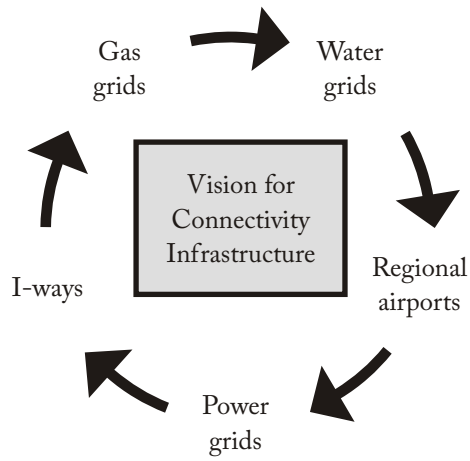
Over 3.2 million informal sector workers have enrolled under the Pradhan Mantri Shram Yogi Maan-dhan Yojana (PMSYM) as on 6th August 2019 (The Hindu Business Line). As a major step towards the SDG goal of creating decent jobs, rationalization of labour laws into 4 labour codes have been proposed. It is well documented in economic research that stringent labour laws, inefficient incentive designing and strict clauses in Indian labour laws (e.g., Industrial Disputes Act 1947 with all its subsequent amendments) have led to massive dwarfing of our business units - referred to as 'missing middle' in the literature, and a low level equilibrium trap, characterised by inept politico-economic nexus.

Towards Catalysing Growth and Gradual Removal of Structural Rigidities

Boost to Infrastructure and Connectivity

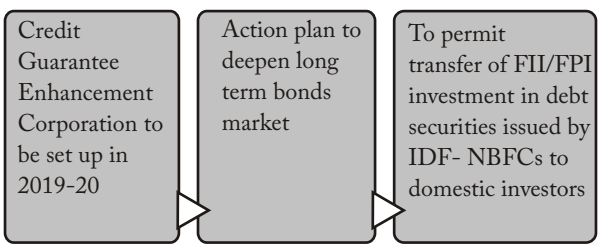
The budget emphasised on extending and developing further connectivity networks that were launched recently. The dedicated freight corridors were aimed to mitigate congestion on railway network and for the ease of living for common man, and dedicated industry corridors were meant to facilitate infrastructural investment in industry catchment regions. Bharatmala project aims at building national roads and highways for extending road corridors while Sagarmala project aims at connecting ports and facilitate port-linked industrialization and trade. The other objectives are to improve logistics and increase trade competitiveness by facilitating reduction of transportation costs, both time and economic costs. In railways public-private partnership (PPP) for infrastructure development has been given a big boost. On the other hand, the UDAAN project aims at linking small towns and cities and reduce the burgeoning rural-urban divide. Rapidly growing number of cities and towns in India and increasing urbanization are major challenges identified since these pose increasing demand for connectivity, logistical and related physical infrastructure, electricity, also growing employment concerns, growing requirements for necessities such as building up of houses, water connections and widening up of health sector networks for rapidly expanding demand for health related services (Figure 1). A snapshot of the immediate measures taken up as preparation for the action plan and facilitation of credit requirements is depicted in Figure 2.

Figure 1: Vision for Connectivity Infrastructure



Aiming Towards Sustainability: Environmental Concerns alongwith Growth with Equity

Figure 2: Measures for Boosting Infrastructure Financing



Source: Union Budget 2019-20

Environment

Environmental sustainability has remained one of the thrust areas in the budget this year; first and foremost has been the conservation of water and incentivising usage of alternative sources of energy. In the automobile sector for example, customs duty exemptions and various incentives on e-vehicles have been introduced. The FAME (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) scheme phase-2 has been commenced to encourage electric buses, three wheelers and four wheelers for commercial purposes. About ₹10,000 crore has been earmarked to set up charging stations for e-vehicles pan India. It was mentioned that depending upon the size of the battery, fiscal support will be extended to boost this sector and encourage non-fuel means of transport.

Ease of Living and Equity Concerns

One of the most welcome moves of this year's budget is to encourage and facilitate social enterprises by taking actions towards mitigating their growing credit needs to carry on developmental activities, and designing initiatives towards their financially viability and sustainability. It was suggested that a social stock exchange is to be built up for listing of social enterprises and voluntary organizations. On the equity front, and to catalyse growth of the start-ups and indigenous manufacturers (and also to boost up the Make in India project) several fiscal measures have also been taken in the nature of rationalization of customs and corrective actions towards inverted duty structure.

Financial Sector and Foreign Investment Related Interventions

India attracted US$64.4 billion worth of Foreign Direct Investment (FDI) in 2018-19; in order to keep the pace of FDI inflows many steps has been taken. In the insurance sector 100 per cent FDI has been permitted for insurance intermediaries. In single brand retail local sourcing norms have been eased, also statutory limits for Foreign Portfolio Investment (FPI) has been increased in a company. One of the remarkable steps towards financial sector reform has been to outline action plans to deepen the bond market. Indian bond market is not at all developed. The ramifications are many; some recent analysis done by CARE finds that 106 large companies sourced almost 47 per cent of their funds from banks and quite several of them have never entered the bond market at all. Naturally, the burden on the banks is huge at a time when they are already struggling with the restructuring of the burgeoning nonperforming assets. Towards the taxation of corporates, extending corporate tax rate of 25 per cent to all the companies with an annual turnover up to ₹400 crore covering 99 per cent of firms, is a welcome move.

Customs Duty: Make in India

Taking note of the manufacturing transition that is taking place in India triggered by several recent policy initiatives such as Make in India or due to other factors, exemptions on

customs duty on certain electronic items have been withdrawn and basic customs duty on certain items on agro-processed products have been increased to create a level playing field for indigenous production. Also, export duty on certain raw and semi-finished leather goods has been rationalized to give a boost to the already stressed manufacturing export sector.

Towards Fiscal Consolidation

This year's budget document, may be for the first time since the Fiscal Responsibility and Budget Management (FRBM) Rule, has not mentioned much about fiscal consolidation per se. Very briefly, and quite unexpectedly, the fiscal deficit (FD) target for the year 2019-20 has been brought down to 3.3 per cent from the 3.4 per cent target fixed last year. Delving deeper into the rationality of such a cut in FD target amidst big boosts towards developmental and key structural factors this year, it can be stated that probably, it is the marginal rise in the revenue-GDP ratio of 0.35 per cent and marginal cut in total expenditure (as per cent of GDP) from 13.34 per cent to 13.2 per cent from 2014-15 to 2019-20 that have secured such a fiscal consolidation move. However, concerns are raised over an unstated fiscal crisis that the economy went through last year mainly due to a massive shortfall of GST revenue as compared to the estimated level. As opined by economists including fiscal experts in the Prime Minister's advisory panel the reality is that GST is not revenue neutral; the Centre had to pay a hefty compensation package to induce the states to participate, which limits Centre's fiscal space. On the other hand, central sector scheme transfer has increased, which was made possible by reducing the share of subsidies, finance commission's (FC) transfer to the states and reduction of states' share in the central taxes, viz. cesses. Rationalization of subsidies and thereby reducing its burden while increasing efficiency is praiseworthy, tapering-off of the states' share following the Finance Commission's recommendation is not alarming but, increasing revenue by the means of increasing non-sharable pool of revenue sources raises concerns. Nonetheless, noticeable and commendable is the Finance Minister's proposal in Budget 2019-20 to scale up the GST simplification process.

On the borrowing front, the Finance Minister mentions that Indian government will partly raise the borrowing funds via foreign currency, which has triggered controversies, debates and discussions on its probable pros and cons among economists. This was however, perceived to be a fundamental shift in the budgetary process that accepts the fact that for sovereign purpose domestic savings are not enough in the Indian economic context, which imparts heavy costs on the economy directly or indirectly. Therefore, seeking external funds makes perfect sense at this juncture. More so, when the current account deficit is in comfortable zone (2.1 per cent of GDP), forex reserves are as high as US$426 billion, India doesn't have outstanding sovereign dollar bonds (most of its debts are

rupee denominated) and both the share and level of sovereign debt in total external debt are low at 19 per cent and US$103.8 billion [end of March 2019, RBI data] respectively. Thus, such a decision might actually help to channelize domestic savings towards burgeoning domestic investment purposes, thereby easing the crowding out effect; there are some caveats though.

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Union Budget 2019

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The Economic Survey presented a day before the budget, acknowledged the challenges facing the economy and had suggested that the private investment will have to be the anchor for the development of India into a US$ 5 trillion dollar economy in the next five years. Our new Finance Minister was well aware of the headwinds that the economy is facing in terms of unemployment, farm sector stress, NBFC crisis and low economic activity. This is further accentuated by the fact that the global economy is also on a slow path with several major geographies including China and the US facing slowdown due to several reasons. On the back of a resounding electoral mandate it was also a huge opportunity for the new government to take bold steps to revive the economy and put it firmly back on track. The budget presentation was a departure from the past format but the Finance Minister certainly used the occasion to lay the Government's strategic roadmap for India to emerge as a US$ 5 trillion economy with ambitious plans on several fronts including very sizeable investments in infrastructure including roadways, railway network, inland waterways, national grids for water, gas, electricity connectivity and several rural and urban projects to enhance the ease of living. Equally important was the focus on a new education policy to enhance the quality and standards of higher education and research and the resolve to review the old labour laws and also address the irritants for start-ups. While the country will wait for the details of the implementation road map, if the Government can adhere to the above vision and finds the finances for implementation, it is believed that a very clear runway to growth in the coming years can be seen.

One of the key challenges for the government would be to raise the finances to pursue the investment aspiration to achieve the US$ 5 trillion economy dream. The revenue plan for the current year has budgeted increase in tax revenue, very significant contribution from the excess surplus of the Reserve Bank and a very large divestment target. For the above non tax revenue options, the divestment target will be the most challenging to meet within the short timeline of about nine months especially if the underlying economy is under strain currently. Given the significant size of capital raising through this route, the rules of the game have to be made clear whether management control will change or Government intervention in management will continue. That would be key for strategic

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buyers and will have bearing on the transaction valuation as well as the future value of the business that is divested.

There were some structural proposals on the corporate side including the nudge to SEBI to raise the public holding levels to 65 per cent. This will certainly become a national debate as to what value does that bring to either the shareholders or corporates at this point of time apart from enhancing market liquidity. The other proposal to tax share buy backs will disappoint and neutralise the efforts of cash rich companies to reward the shareholders compared to the dividend route.

As a priority, the near term challenges have to be addressed first and navigated through to revive the economy on an urgent basis. There were few proposals in that direction including the proposal to recapitalise the banks with ₹70,000 crores and some of the marginal capital should go for new credit growth that the economy badly requires, helping the NBFCs refinance their portfolio with the help of the banks, providing easier access to foreign capital and giving some soaps to the home buyers to kick start the housing segments. But, that may not be enough to stimulate the economy soon. The data points since the budget do not suggest so – the economic slowdown has become severe and now affecting critical sectors like automotive, construction and engineering which in turn is impacting employment and industrial investments. The government spending especially in infrastructure is yet to make an impact. The capital market index has lost significant value since the Budget amidst the economic uncertainty. There is news that the government is seriously looking at a stimulus package to kick start the economy. Time will only tell if this will be good enough to trigger the revival of the economy.

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