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CONTRIBUTIONS OF NON-PROFIT STARTUPS TO EDUCATION AND HEALTH SECTORS

Fakih Amrin Kamaluddin[*] **and Kala S Sridhar**[**]

Abstract

Recent years have seen a surge in the emergence of non-profit startups who are harnessing the power of technology in order to benefit the marginalised and under-privileged sections of society. Given their significance to society, this paper studies the contributions of non-profit startups to social sectors—education and health. We take six cases and describe their impact on these two sectors. Interviews were supplemented with information on startups' websites. Our findings in this research are that the non-profit startups create value for education and health sectors in diverse ways. Edtech startups create value by providing age- based competency to students and by exposing them to challenging experiments which push critical thinking, design and problem-solving skills. Healthtech startups create value by providing access to unused capacity, reduction in the workload of hospitals, reducing waiting time and kilometres travelled to seek consultation. Raising funds was a severe challenge for these edtech and healthtech startups which solely relied on government projects for survival, although they assist the government too.

Introduction

Recent years have seen a surge in the emergence of non-profit startups which are harnessing the power of technology in order to benefit the marginalised, and under-privileged sections of society. Startups in the social sectors – education and health are revolutionising the fields by providing off-beat solutions to mainstream problems. Edtech startups provide diverse yet simple solutions to areas which not only help them provide quality education but also keep up with the inadequate infrastructure. For instance, these startups provide smart classes and tablet-based learning to areas which face constant electricity disruption. Startups in the healthtech sector too contribute by making healthcare accessible and affordable. This paper's attempt is to study the contributions of non-profit startups to the social sectors – education and health.

The edtech sector has emerged as one of the significant sectors of the Indian startup ecosystem. Failing to grab investors' attention in the earlier phases, the edtech sector is dominating the investment scene today. According to an analysis featured in the Government of India's Economic

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Survey 2017-18, which studied the behaviour of the Indian consumer in relation to select commodities across varied income levels, the income elasticity of education is estimated to be 0.95 (Inc42plus, 2020). 'Health is the first and education is among the top five fastest growing commodities in India in terms of consumer expenditure' (Inc42plus, 2020). With the growing disposable income of Indian citizens, and young age of the population (more than half of the country's population is below 25 years of age), education expenditure is expected to rise. This poses high potential for edtech startups to flourish.

At $63.6, India has one of the lowest healthcare per capita expenditures globally (Nasscom 2018). India has the lowest healthcare expenditure as a percentage of GDP compared to China, Brazil and South Korea (Nasscom 2018). Among the BRIC countries, India has higher incidence of communicable diseases like tuberculosis, and higher mortality rate for NCDs like heart diseases and cancers (Nasscom 2017). With a high proportion of the population not having access to timely and adequate healthcare, Indian healthcare is indeed looking for remediation. The challenges are many – 1. Poor education and awareness of health related issues; 2. Inefficient primary healthcare centres; 3. Lack of access to affordable healthcare; 4. High costs relative to per capita income (Nasscom 2018) and 5. Poor public health infrastructure. Today, healthtech startups have emerged to provide innovative solutions to healthcare problems. Startups are creating low cost solutions for managing ailments like diabetes and blood pressure and also provide a mobile platform for doctors and patients to connect.

Given their importance, in this paper, we assess six edtech and healthtech non-profit startups to learn about their impact on the two selected sectors. We focus on how startups, through their business model and technology, improve learning abilities of students and make the healthcare system effective and affordable. The objective of this paper is to examine the broad contributions of startups to the chosen two sectors, using the concept of value creation.

We, at first, review literature on edtech and healthtech startups. Following the literature review, we elaborate the framework through which we examine the process of value creation, then apply the framework of value creation to edtech and healthtech startups. We then present the methodology, and our findings. We end the paper with discussion and conclusion.

Literature review

There is an absolute dearth of research on the contributions of non-profit edtech and healthtech startups. Given the lack of literature, we rely on literature related to the edtech and healthtech sector in general.

Startups in the edtech sector contribute through creating value by providing three types of solutions, namely 1. School solutions 2. Student solutions; and 3. Teacher solutions. Value is created whenever needs are met (Dohrmann, Raith and Siebold, 2015). The startups in the school solution segment create value by allowing schools to manage learning (for instance, content authoring, assessment, reporting and analytics) and assisting in their administration (enrolment management,

attendance management etc.). The startups in the student solutions segment create value by providing online lectures, learning apps and downloadable student materials. In addition, they enable students and parents to discover schools, tutors, offline classes etc. The startups in the teacher solutions segment create value by providing resources and tools for professional development of teachers. Through these services, the startups endeavour to improve learning outcomes and psychological attributes of students and reduce the administration workload on teachers and schools.

The literature on the contributions of edtech startups in improving learning outcomes is limited; nonetheless, we borrow literature from the domain of 'mobile devices' and state the impact of technology on education. Mobile handheld devices are used by teachers, students as well as researchers (e.g., Backer, 2010; Jones &Issroff, 2007; Pachler et al., 2010), but evidence of an improvement in learning outcomes is limited (Pegrum et al., 2013). Some studies have shown significant improvements in student learning (e.g., Cristol & Gimbert, 2011; Ernst & Harrison, 2011; Hwang, Chen, & Chen, 2011). Conole et al. (2008) attempted to investigate the learner's current experience and expectations from e-learning. One of the stark observations of the study was that most of the students felt the need for face-to-face communication with the tutors. Face-to-face contact created a sense of community and belongingness. The students indicated that such personal meets cannot be substituted by online environments. Similarly, Pegrum et al. (2013) attempt to assess the effect of the adoption of mobile handheld technologies in ten Western Australian independent schools. In consensus with the m-learning literature (mobile learning), the study found that the use of mobile handheld devices for learning, imbibed motivation and enthusiasm among students. Two schools found significant improvement in learning outcomes among their students. On a similar note, Ernst and Ernst and Harrison (2011) attempted to assess the effect of mobile learning on class participation and the engagement level of students. The results showed that there was a positive effect on the learning outcomes of students. Therefore, we find that the evidence of the impact of technology on learning performance of the students is mixed.

There are papers which study the impact of the Covid-19 pandemic on the performance of edtech startups. Covid-19 provided a thrust to the edtech industry by increasing the demand for its products multi-fold (Kakkar, Sofet and Kaur, 2021). It broadened the portfolio of products provided by the startups, from online resources and vocational training applications to B2B (business-to-business) products which enabled automation of work (Kakkar, Sofet and Kaur, 2021). The Covid-19 pandemic transformed the global economy into a testing ground for the products developed by the edtech startups where they gauged the response for their products and received feedback (Ulanova &Suoranta, 2021). Nonetheless, edtech startups were severely hit by the pandemic. Projects were instantly stalled and partnerships and on-going sales deliberations were paused (Ulanova &Suoranta, 2021). Only those companies survived which had a strong customer base and strong relations with their business partners (Ulanova &Suoranta, 2021).

The contributions of technology oriented businesses in the healthcare sector has been highlighted in numerous papers (Aweisi 2022, Chaudhuri et al., 2021, Florescu & Florescu, 2020, Gehde et al., 2022, Gleiss and Lewandowski, 2022; Hermes et al., 2020, Iakovleva et al., 2021, Lai et al.,

2021, Morgenstern-Kaplan et al., 2022, Truong and McLachlan 2022, Velayati et al., 2022, Visconti, 2020).The papers state that healthtech startups contribute by providing telemedicine services, remote monitoring and enterprise applications to hospitals. The challenges faced by the healthtech sector have been substantiated by the existing literature too which states that scarcity of resources, high costs, finite experience, scalability, data privacy, leadership issues and a hostile regulatory environment are some of the significant challenges faced by technology oriented businesses in the health sector (Chaudhuri et al., 2021, Gleiss and Lewandowski, 2022; Sprenger and Mettler, 2016, Truong and McLachlan 2022, Vannieuwenborg et al., 2017 and Visconti, 2020).

The report published by Tracxn (2019) shows that startups in the healthtech sector contribute while creating value in the following ways: 1. Enable booking doctors' appointments online; 2. providing enterprise software solutions to healthcare professionals and organisations like hospitals, pharmacies, health insurance companies, clinics and health systems in all the processes involved in preventive care, healthcare delivery and health care financing; 3. providing technological products and services to consumers to maintain their physical and mental well-being; 4. providing technological solutions to life sciences industry including pharma, medical devices, diagnostics and life sciences instruments and reagents, for developing products, research and development, manufacturing, sales, marketing, supply chain and distribution; 5. Providing healthcare analytics services; 6. Providing online health information; 7. Providing technological solutions that improve the functional capabilities of people with disabilities or elderly people; and 8. Offering digital solutions and healthcare products related to animal health (Tracxn, 2019).

Thus the limited literature on edtech and healthtech startups shows that research on Indian edtech and healthtech startups continues to be very sparse, partly attributable to the lack of reliable data on their functioning and performance. We use the concept of value to assess their contributions by using six case studies.

Conceptual framework: Mechanism of value creation

Value is created every time the needs are met. Although 'value', in conventional economics, is understood merely in monetary terms, it is a much more comprehensive concept (Korsgaard and Anderson, 2011). Value is created whenever consumption needs are satisfied (e.g. education or health in this case) (Dohrmann, Raith and Siebold, 2015). Value is different from economic value creation, where value is understood is terms of value-in-use and value-in-exchange. Social value refers to wider benefits that accrue to society than immediate outcomes to individuals, stakeholders or private beneficiaries (Arvidson et al., 2013).

The figure below summarises the mechanism through which value is created by edtech and healthtech startups.
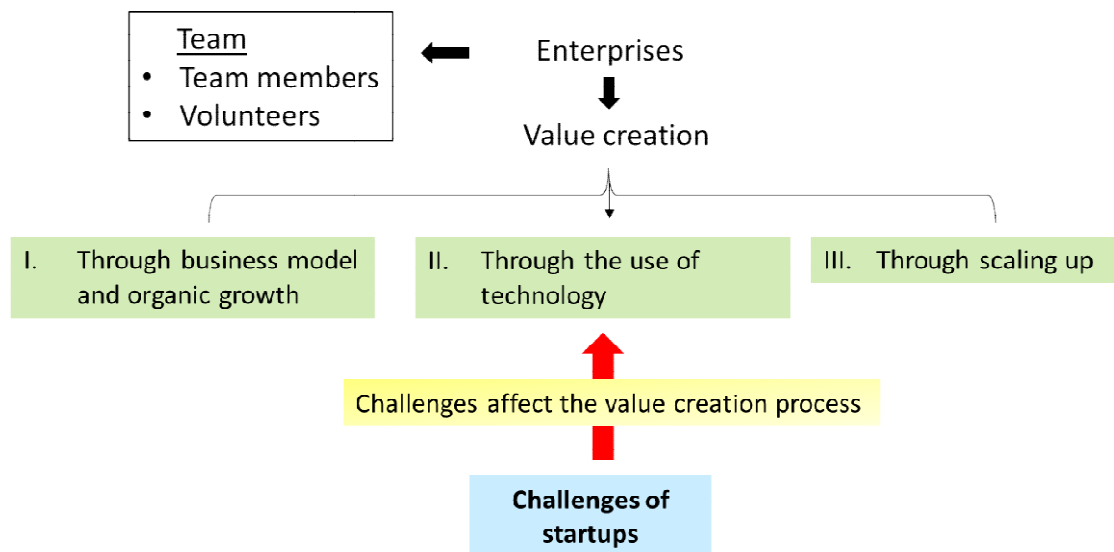
Source: Authors

Enterprises create value with the help of their team members and volunteers. Team members are either employed by the enterprise or own the organisation, through shares, depending on the legal structure of the enterprise. Volunteers not only assist in administrative work but also provide core skill volunteering, in the sense, help in developing technology and prototypes. Volunteers are a significant resource for social enterprises as they persistently face skill shortages (Salamon et al., 2003).

There are three ways in which non-profit edtech and healthtech startups create value: i) By growing organically and through their business model; ii) through the use of technology; and iii) through scaling up. Although we study these aspects separately, they are not mutually exclusive.

When value creating organisations such as edtech and healthtech startups grow organically, they benefit the consumers of such services. Growth of such organisations, therefore, creates value. In addition, the very act of production creates goods and services the consumption of which suffices the needs of people. Through their business models, which utilise local resources, such startups serve the underserved segments of society and make services affordable. They may also seek to correct market failure by increasing sub-optimal supply of a public good (Katz and Page, 2010).

Through the use of technology, startups launch new goods and services which were previously not feasible.[1]

Scaling up of an enterprise, which targets social sectors such as education and health, creates value, given a larger organisation benefits greater number of people. An organisation may follow different scaling strategies which may include expanding geographies, working with the government or

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[1]For example, Muse Diagnostics, a startup based in Bengaluru, created a digital stethoscope which allows doctors to record heart beats and sound of lungs, thereby improving their diagnosis.

working with other agencies on projects; and franchising. Franchising enables the organisation to grow more rapidly as they need not invest resources in staff and plant. It even allows enterprises which have funds but no operational resources to grow (Epstein and Yuthas, 2014).

Methodology

For the purpose of this study, we define an edtech or healthtech startup as an entity using digital or scientific technology in the delivery of its primary service, i.e., education or healthcare. "In addition, a firm is considered to be a startup if it is established post-2007 (those in the second and the third wave of the digital revolution)" (Kamaluddin & Sridhar, 2021). Given the conspicuous lack of secondary data on startups, we rely on interviews of edtech and healthtech startups. We take six cases of edtech and healthtech startups (whose selection process is described below) and elaborate on their impacts. Interviews were supplemented with information on their websites.[2]

For selecting non-profit startups in the education and health sectors, we checked the portfolio of the only three non-profit incubators in India – The N/Core foundation, Social Ventures Incubator by NSRCEL and Edumentum by Infosys. Having gone through their detailed portfolio, we found sixedtech and healthtech startups relevant to our analysis. Out of the six, four startups provided their interviews which were carried out from January to May 2023. The interviews were conducted online – through Google Meet. The interview schedule was presented to the founders and their resource persons beforehand and they came prepared with the responses[3]. The questionnaire included open-ended questions. The information on the other two startups was obtained through their websites. The interviewees include founders, HR personnel and managers of CEO's office.The questions asked in the interview schedule pertained to the following themes:

1. History of the startup
2. Mission of the startup
3. Team members, volunteers and their profile
4. Business model of the startup
5. Organisational structure of the firm
6. Nature of the beneficiaries
7. Nature of contributions towards the beneficiaries
8. Scaling strategy
9. Government partnerships
10. NGO and other partnerships
11. Challenges faced during the journey
12. Help needed to grow as an organisation
13. Changes in the organisation over time

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[2]The primary as well as the secondary data was coded through the software QDA Miner Lite.
[3]An ethics committee's (which was set up by the Institute of Social and Economic Change (ISEC)) clearance was obtained for the interview schedule, given we interviewed human subjects.

The details of the startups chosen for the analysis are as follows:

Table 1: Profile of the non-profit startups

No	Name	Founding year	Area of operation	Description of the enterprise	Team	Funding
Edtech						
1.	Pi-jam foundation	2017	Karnataka, Maharashtra and a few parts of Telangana	Provides open access hardware/software to school students for experimentation. Develops a curriculum which fosters programming, problem-solving and design thinking through hands-on approach.	55 members	CSR, government projects
2.	iDream Education	2016	U.P., Maharashtra, Tamil Nadu, Kashmir, M.P., Karnataka, Bihar, Uttarakhand, Gujarat, Meghalaya	Provides e-learning solutions through smartclass and tablet based content. Follows aggregator model.	93 members	CSR, government projects
3.	Thinkzone	2015	Odisha	Thinkzone strives to improve foundational literacy and numeracy skills among children in low-resource setting. It uses offline applications and low cost Whatsapp technology to provide learning resources to families.	25 core members + volunteers	CSR
Healthtech						
4.	Dakshas Foundation	2016	Telangana	Dakshas Foundation assists marginalised patients to get non-emergency medical treatment. It does so by connecting patients with NGO and government hospitals which have unused capacity. It also develops innovative technology applications.	Core team – 5 to 7 members / Volunteers – 15 to 17	CSR, online giving platforms. The startup raises funds only for dedicated campaigns.
5.	Intelehealth	2016	Odisha, Jharkhand, International projects in Philippines, Syria, Kyrgyzstan	Provides open-source telemedicine platform that enables health workers to connect to remote doctors.	51 core members	Donations, Government projects
6.	Khushi Baby	2014	Rajasthan	Technology platform to monitor and follow-up maternal and child health at the last mile. Maintains digital record of beneficiaries, provides Android application for planning and point-of care decision making for health workers, dashboard for health officials to remain updated about hospital supplies and high risk patients.	50 members	Government projects

Source: Fieldwork and startups' websites

These startups are widely regarded as successful in their domain and have won awards for their outstanding contributions. These edtech and healthtech startups top the Google search for non-profit startups in India in the domain of education and health.

Usually, a host of tools are used to measure social value and social impact such as Balanced scorecard, Measuring Impact framework, Social Return Investment (SRI), and others but utilisation of such tools mandates the evaluator to possess information on funding, investment, operational and

capital expenditure and internal processes which an entity would be reluctant to share. Given this limitation, we do not focus on economic indicators, but rather opt to study nuanced contributions of startups to the respective sectors.

Findings

Given our conceptual framework, we assess value creation by non-profit startups in three ways: 1. Organic growth; 2. Technology; and 3. Scaling up. The objective of this analysis is to describe how startups create value through what they do. The analysis is arranged thematically based on the services offered by edtech and healthtech startups; we start with organic growth as a source of value creation by the startups we have studied.

1a. Creating value through business model and organic growth: Edtech startups

Non-profits such as edtech startups create value through their business model and by growing organically, thereby benefitting a large number of students and patients. The signature service of Pi-Jam foundation is Pi-labs which installs computers in government schools and conducts workshops, where students explore, experiment, tinker with and create products. Value created here is the exposure to challenging experiments which push the students' critical thinking, design and problem-solving skills. About 60% of the participants in the Pi-jam workshops displayed medium to high clarity in algorithm building and 66% of the girls scored the highest in programming and problem solving[4].

I-Dream creates value by providing syllabus oriented multi-media content to government school students. The startup offers videos, textbooks, storybooks, poems, fiction and comics. I-Dream is among the first few startups in India which has made content in vernacular language available to children. The startup has created value by providing low-cost technological products to government schools. It also witnessed an improvement in learning outcomes of the children enrolled with improvement in their lowest marks scored and a reduction in failure rates[5]. The startup partnered with an NGO to cover the learning gaps of children with a conflicting past. I-dream has worked with 300 government schools as of 2023[6].

Thinkzone creates value by teaching youth to become educators. It differs from traditional non-profits as it uses proprietary application to train youth. It uses voice-based, SMS-based and Whatsapp-based low cost technology to provide resources to children. As per its impact evaluation report (2019-20), the primary grade, in the targeted schools, saw 71% improvement in language scores and 63% improvement in maths scores. In a controlled experiment, the students who were enrolled in the Thinkzone'sprogramme outperformed the control group by 41% in reading and writing and 44% in

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[4]https://www.thepijam.org/
[5]Source: Interview with the founder
[6]Source: Interview with the founder

recognition and counting[7]. During Covid, the startup supported communities by providing at-home learning to children.

The above startups have made reasonable contributions; nonetheless, they have limitations. Teaching with technology has its own limitations. The evidence of technology improving learning outcomes of students is limited. The academic literature has found similar scores of students who were and were not exposed to technology (Baum and McPherson, 2019). In fact, in some instances, lower test scores were observed for students who were fully exposed to online education (Baum and McPherson, 2019). Nonetheless, better learning outcomes were found in hybrid learning where classroom instruction was complemented by technology (Baum and Mcpherson, 2019).

1b.   Creating value through business model and organic growth: Healthtech startups

Next, we analyse startups in the health sector which provide value in unique forms. Dakshas Foundation creates value by making healthcare available, accessible and affordable to all. It partners with NGO and government hospitals in an arrangement whereby the hospitals provide unused capacity to the startup and in return gain patients from it[8]. Value is created for both the hospitals and the patients in the form of access to unused capacity for the patient and increase in revenue for the hospital. When a patient approaches Dakshas Foundation, they screen the patient, obtain his profile and conduct pre-operative processes which reduces the workload of hospitals. The endeavour is to keep 90% of the patients at the clinic itself so that only complex cases are escalated to the higher centres[9]. Value created here is the reduction in the workload of the hospitals and low cost of care for the patients. In addition, Dakshas maintains a common resource pool which helps needy hospitals to obtain equipment, thereby enabling them to continue care of patients. The value created here is the access to heath equipment free of cost.

Intelehealth has developed a telemedicine platform which connects front-line workers and remote patients to doctors. Due to the telemedicine platform, the waiting time to seek consultation has been reduced, there is a drop in kilometres travelled and a reduction in the overcrowding of secondary and tertiary health facilities. Intelehealth saved 21.59 kilometres in travel and Rs. 941.51 per visit, on average in 2021, indicated in the impact report which was assessed from May 2021 to March 2022 (Intelehealth, 2022). All this denotes significant value creation.

Khushi Baby helped the Ministry of Health and Family Welfare in replacing a paper-based record system with a universal health application suiting the work requirements of Accredited Social Health Activist (ASHA) workers, the ANM (Auxiliary nurse and mid-wife-nurses who visit the care centre once in a month) and the Medical Officer. The application has enabled the performing of a digital health

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[7]https://thinkzone.in/impact/
[8]The startup has tie-ups with the following hospitals: Green Leaf hospital, MEDS hospital, DurgabaiDeshmukh hospital, Vasavi hospital and Ramdeo hospital, all of which are based in Hyderabad.
[9]Source: Interview with the founder

census, longitudinal tracking of patients, and surveillance during disease outbreak. Under its Reproductive, Maternal, Neonatal and Child (RMNCH) platform, 45000+ mothers and children are tracked, 150 nurses are involved in giving care, and the platform is active in 400 villages and a 12% rise in immunisation is seen in a controlled experiment involving 3000 infants[10].

Healthtech startups are able to create significant value but face severe impediments. The last mile delivery of healthcare is a serious challenge as it is difficult to reach the population situated in geographically remote areas. Seamless access to telemedicine is typically thwarted by poor internet connectivity and an acute shortage of doctors (Intelehealth, 2022). Patients' history, which is expected to be fed on the platform, consumes a lot of time and is often left incomplete (Intelehealth, 2022). Doctors see a rise in patient load as they have to attend to patients both online and offline. Physical exhaustion is observed in doctors as well as patients. A report published by Intelehealth states that 87.4% of the patients who consulted doctors through telemedicine were referred to in-person consultation (Intelehealth, 2022). The rates of in-person consultation were high as doctors feared legal threats. Of those who were referred, a mere 59% actually visited doctors in person. About 54% of the patients consulted alternative healthcare providers, indicating a lack of trust in the telemedicine model.

Next, we assess the value creation by the selected edtech and healthtech startups through the use of technology.

2 Creating social value through the use of technology

All the non-profit startups invariably use technology to serve people. Pi-jam uses Raspberry Pi which is a series of small single-board computers. Through Raspberry Pi CPU, block based programming is taught to students. I-Dream uses smart class and Android tablets to deliver learning resources to government school students. I-dream invented a rolling trolley where 20-30 tablets can be charged in one go. The trolley has significantly reduced maintenance cost and increased usage. Thinkzone uses its own proprietary technology to train youth educators.

Considering health tech startups, Dakshas Foundation develops technological applications in its model clinic. It uses the clinic to test the prototypes. Once the pilot testing is successful, it hands over the technology to other NGOs. Some of the applications it has developed include a rural logistic delivery system, decision support system for Covid-19 and prescription application for orthopedic patients. The value created here is the availability of novel technology to address issues in healthcare. Technology improves accessibility and lowers cost of services.

In addition to providing telemedicine application, Intelehealth provides a data analytics service to its stakeholders and donors. It helps to evaluate and monitor projects' performance and provides evidence based reporting.

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[10]https://www.khushibaby.org/case-details.html

Khushi Baby provides analytics as a service to the Department of Health, Government of India. The organisation collaborated with researchers from 'Google AI for Social Good' to analyse the performance of healthcare workers in entering health related data in the system. They assigned a 'data diligence' score to each worker to assess their proficiency, and helped in identifying weak performers who could be trained. In addition, its machine learning model predicts key maternal and child health-related outcomes which include ante-natal care drop-out, low birth weight, still birth and severe malnutrition. The predictions enable diligent monitoring of high risk individuals. During Covid-19, Khushi Baby conducted screening of 14 million beneficiaries and through the GIS technology, identified cold and hot clusters. The value created through the activities of Khushi Baby include the availability of big data to predict and draw patterns, identification of high risk clusters and the serving of mothers and children at risk.

Although technology can be used to create value, it is not free from limitations. The edtech startups stated that although technology is introduced in the classroom, there are a lot of psychological barriers around it. Access to technology is not driving usage. Healthtech startups stated that there is an absolute lack of technology based innovations in non-profit healthcare sector. Dakshas Foundation was in a process to make a platform where the needs of all the stakeholders would reflect, for instance, hospitals would list their excess supplies and NGOs would list their supplies and equipment needs and the needs would be met instantly, correcting balance of resources in real time. But the creation of such a platform would require all stakeholders to work in tandem and diligent training of the personnel which is difficult to accomplish. We now discuss value creation through scaling up by the selected startups.

3. Value creation through scaling up

An organisation may follow different scaling strategies which may include expanding geographies, working with the government or working with other agencies on projects. Scaling up creates value as a large organisation benefits a large number of people.

Pi-jam is scaling geographically as well as through government partnerships. The startup has adopted a scale plus depth approach where the emphasis of the startup lies not just on growing organically but also on the nature of the impact created. The startup has built competencies of government school teachers by training them.

I-Dream collaborates with the government as well as NGOs. Low-end private schools too, buy from I-Dream. Thinkzone has followed an approach similar to Pi-jam. It formally collaborated with the District Child Protection Unit, Cuttack, to provide age-based competencies to children hosted in child care institutions. In addition, it scaled geographically by expanding its programme to two new districts of Odisha. The fellowship programme is now being implemented across six districts of Odisha.

Discussing healthtech startups, Dakshas Foundation has scaled up by expanding its healthcare network. Since its inception, Dakshas has been working with eight hospitals, five surgeon-anesthetist teams, five clinics and 10 old age homes. It also works with other NGOs. Intelehealth primarily scaled

up through partnering with the government. It was the tech and implementation partner under the Jharkhand Government's e-Sanjeevani programme. Khushi Baby too, has followed a similar model.

The above startups have made reasonable contributions to the sectors in which they operate; nonetheless, they have limitations. Geographically, they are operational in a few towns/villages. Although edtech startups stated that they have improved learning attributes of children, they did not carry out experimental studies. Funding is one of the elementary concerns of startups. They depend on government projects for survival and consider building long-term partnership a challenge. Considering healthtech startups, the uptake of telemedicine is low, digital infrastructure in the country is abysmal and business models in a single institution have kept the cost of primary services high. Studies have shown that separation of business models where institutions specialisein specific services will help in bringing down the cost significantly (Christensen, Grossman & Hwang, 2010).

Discussion and conclusions

One point to note is that the edtech and healthtech startups primarily not only depend on the government to survive and grow, but they also help the government educational and healthcare systems, as demonstrated through the case studies here.

However, access to technology is not driving usage. Smart classes are complicated models and are difficult to set up. A lot of money is being spent on them but no impact is visible. Although emphasis is placed on improving learning outcomes, the first challenge is access to technology. Technology has not reached the remote parts of the country. In addition, startups have to spend tremendously on the last-mile distribution. The startups stated that last-mile distribution is a fundamental impediment and it significantly drives up the cost. Also, once the technology reaches the remote locations, schools face basic challenges such as the lack of electricity, inoperable mouse, crashed windows, etc. The challenges are fundamental but they drive down the usage. It is equally difficult to work with the government. The state governments do not provide appointments easily; they do not let startups exhibit proof-of-concept. Tendering is a long and complicated process. The state governments do not trust startups and provide most of the tenders to big companies. One state government kept a minimum revenue criterion in its tender which no startup could satisfy. In addition, the governments expect startups to make arrangements of the content, hardware as well as funding. It is difficult for small startups to do it. The governments push their public school teachers to perform non-academic work. For instance, under the Swachh Bharat Abhiyan, teachers were made to supervise the construction of toilets. Teachers have to manage the mid-day meal programme too. All these problems, which are not necessarily of the startups, affect learning outcomes.

The healthtech startups highlighted that internet connectivity issues and shortage of doctors are the principal impediments in the seamless dispersal of technology. Also, there is a need for consumer demand of technology. Further, the government workers too must accept technology if it is to be used ubiquitously. There is a need to improve digital infrastructure both at the micro and macro levels. Health impact studies must be carried out to assess the utility of technology.

Given that the technological revolution is still at a nascent stage in India, assessing the impact of any kind of technology is too early. Edtech startups are focusing on access and usage and their uniformity rather than on learning outcomes. Healthtech startups are still battling internet issues. Funding is a challenge for both the edtech and healthtech startups and they are at the mercy of the government to survive, even though they assist them in many ways. Institutional factors like obtaining recognition and registration from the government authorities and legal complications arising out of the innovative nature of the business, too, act as severe impediments. There are no dedicated programmes and policies for non-profit startups in India and the performance of the flagship programme of the government 'Startup India' is not as per expectations (Kamaluddin & Sridhar, 2021). In the absence of a sturdy support system, startups end up relying on accelerators (incubation centres) which too are few in number. So significant support from the government and private operators is necessary to enable such enterprises to create value for basic services such as education and health at large, duly recognising their contributions, as demonstrated here.

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