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Smart Universities for Smart Cities

Abstract

In the transformational world that we live in, change has become a necessity. Today, cities are becoming smart and are getting future-ready. That is why, there is much discussion on how cities are promoting sustainable development and financial or social inclusion. The creation of smart cities, however, requires smart institutions – institutions that apart from maintaining quality in teaching/research and community engagement also make serious efforts to become sustainable.

Keywords: MOOCs, community engagement, social equity, institution sustainability, beneficiary contribution

Introduction

Mumbai, in India, made it to the list of smart cities in 2014, partially on the strength of its artistic airport. The peacock designed airport allows enough natural light to seep in and save energy costs. Around the world, different cities have earned the 'smart' tag on account of different reasons, ranging from emphasis on public transport or ban on plastic bags or the more visible high digital connectivity. This also means that cities can be ranked on different criteria to determine their smartness. In fact, there is vast literature on the evolution of the definition of a smart city. Vito Albino et al (2015) have compiled the different metrics of urban smartness from existing literature with hard infrastructure or ICT being the starting point to gradually including the soft infrastructure such as education, culture, social inclusion, quality of life and community well-being. Thus, the human capital has gained prominence over physical capital in the definition of urban smartness. Further, urban smartness is now referred to as being future-ready and, therefore, implies dynamism, innovativeness and open to disruption, including in the policies that govern our cities. A city's institutions have to show these same qualities to steer forward the energy of its citizens. The OECD Study (2008) on Higher Education for Sustainable Development had concluded that though universities are progressively incorporating sustainable development values and practices into their core activities, concerted action for wider and transformational adoption is still missing. There is no doubt that a city's institutions give character to the city and the more robust and future-ready these institutions are, the higher will be the smartness index of the city. Educational institutions, thus, need to be not only seen as flexible and vibrant centres of ideation but also centres of efficient use of resources and economic and social inclusion – something that alone can ensure best management of earth's resources. Smart educational institutions defined by such characteristics are a prerequisite to smart cities and smart nations.

Contribution of MOOCs towards Economic and Social Inclusion

MOOCs or the Massive Open Online Courses, no doubt, have had a huge impact in improving the access to such courses to all sections of society. Inbuilt quality parameters, introduced gradually, also ensured that the quality of these courses was at par with that of the on-campus courses. And increasingly, student assessment including quizzes to check their

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pace of learning was being introduced in these courses. A study by Maria Joseph Israel (2015) showed that MOOCs have been useful not only as independent courses but that their utility has been enhanced when integrated into traditional classroom settings as it provided additional educational resource to students. A lot of universities, therefore, actually purchased MOOCs from the developers like Udacity, Coursera and EdX. Some, though, say that universities would have been better off investing money in faculty rather than the MOOC courses developed by these firms. It is obvious that if MOOCs had to be continually relevant, they would have had to be constantly updated. This means that developers would have to continually invest either with or without the patronage of universities. In recent years, many say that the utility curve of MOOCs is on the decline with some of the stalwarts like Udacity who were the early pioneers of MOOCs now deciding to move to targeted corporate training only. Truly, social inclusion through MOOCs is proving to be a tough task. The limitations of MOOCs were evident in their initial stages too, as some had feared that they serve only those already well-motivated and having access to technology. But the problem of inadequate investments after the initial burst of funds is proving to be a bigger barrier in their continued success.

International Efforts at Budget Transparency and Gender Diversity

Governments and universities traditionally have responsibility towards those who are totally excluded from the system. The attempt through MOOCs to reach out to the disadvantaged and the excluded has been only partially successful. The challenge remains on reaching out to the rural poor where school infrastructure is generally inadequate. The International Budget Partnership (IBP), a program of the International Development Association (IDA) is trying to meet this challenge through enhancement in budget transparency, especially with regard to rural programs. In India, there are organizations like Samarthan, Center for Budget and Analysis, Center for Youth and Social Development, Centre for Budget and Governance Accountability, etc. that work closely with IBP to increase transparency of budget formulation and monitoring. IBP creates the Open Budget Index (OBI) for each country based on the information it makes available to the public throughout the budget process. Similarly, the government of Nepal introduced gender-sensitive budgeting under the IBP program. In 2015, approximately 20% of the budget was devoted to activities that were targeted at women welfare. In many African countries, use of simple technology such as mobile phones or cloud computing has helped people get crucial information regarding the functioning of the different arms of government. Fortunately, schools and universities have also been beneficiaries of IDA assistance. In Cambodia, for example, from 2011-2015, training was provided to 5,487 staff of the Ministry of Education in higher education accreditation, assessment and financial management matters. Nonetheless, budget transparency of public institutions, particularly the universities, is some distance away from the desired levels. Surely, this hampers efforts towards making our cities smart. In fact, our universities have to go beyond transparency and excel at making gender-sensitive budgets. Gender issues have to be mainstreamed in all activities of the universities followed up with regular gender audits. Globally, there are some good examples of this. The University of Graz, Austria, for example, has developed instruments of gender impact assessment and has set up three exclusive institutions at the faculty and the administrative level for the promotion of equal opportunities of men and women. Equal opportunity criteria were introduced by the university in 1994 as part of the reforms process in the quality assurance (review procedure), the internal distribution of funds and the reporting system. The University of Dortmund in Germany has had a similar reforms process towards gender-reporting and assessment around

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the same time. The main criteria adopted by this university to measure gender impact includes share of representation (share of men and women among the personnel and boards), resources (time, money, power..), realities (societal norms and values) and rights (direct and indirect discrimination). Some governments, too, have focussed on these issues despite severe constraints of public finance. The study by Monica Costa et al (2009) showed how adoption of gender-sensitive budgeting could strengthen the efforts of the Timor-Leste government in adopting strategies for women empowerment and gender equality and thus serve to promote effective public expenditure. Similarly, the Inter-Parliament Union (IPU) has done some amazing work in building capacity of members of parliaments the world over in gender sensitivity and mainstreaming and highlighting the importance of women in decision-making roles. The IPU has also achieved fair amount of success in developing countries in both Asia and Africa.

All these actions, laudable as they are, still remain sparse. In almost all developed and developing countries, the task of achieving basic goals like ensuring 100% literacy continues to be rested greatly on central/provincial governments. Perhaps, it is time that existing schools and universities also take upon themselves the responsibility of reaching out to communities and ensuring increased enrolments at least at the primary level. The National Policy of Education 1986 in India, as revised in 1992, had indicated three thrust areas in elementary education: (i) Universal access enrolment;(ii) Universal retention of children up to 14 years of age; and (iii) A substantial improvement in the quality of education to enable all children to achieve essential levels of learning. Despite huge progress over the years, the task is still incomplete. Many other developing countries are facing even greater challenges. This points out to the need not just for privately funded schools but also for existing schools and universities actively working together to increase primary school enrolments, chiefly from the disadvantaged sections of society. The OECD Report on Equity and Quality in Education ~~(2012)~~ stresses on the importance of investment in primary school education to bring about equity in education. The report urges governments to prevent school failure and reduce drop-outs both by tackling systemic issues as well as targeting disadvantaged schools. Disadvantaged schools especially need support in strengthening school leadership, stimulating a supportive school climate and environment for learning, attracting and retaining high quality teachers, ensuring effective class room learning strategies and prioritizing linking schools with parents and communities. As per the report, building links with communities around schools including business and social stakeholders serves to strengthen schools and their students. Existing schools and universities can take the lead in providing the support needed to build these links with disadvantaged schools. Such links will contribute significantly towards urban smartness.

Incompleteness of University Rankings

This sensitivity towards communities and society in general should play a significant role in the ranking of institutions. The ranking of educational institutions has usually remained confined mostly to criteria such as student/faculty ratio, proportion of teachers with doctorate degree, academic reputation of the university, median salary of students offered during placement season, number of research papers published by faculty and citations thereon, proportion of international students and faculty, physical infrastructure including library and IT facilities, etc. The universities' outreach to the less privileged and the disadvantaged and their own ability to be lean on different fronts rarely gets reckoned in the rankings. As a result, universities ranked high on traditional criteria may continue to get other privileges such as free or concessional land from state governments for opening new campuses and

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branches; thus, widening the lead they have over other colleges/universities. An inclusive society must reward the incremental efforts of all towards bettering their own organizations and those around them. And that is why, we need to place these criteria above the traditional criteria in university rankings as well as grant of government and non-government privileges. When that happens, an engineering college or a medical college, for example, may first run a free primary school at a backward location before applying for more land for campus expansion. The quality of teaching at these free primary schools will then be also embedded into the quality of teaching in their main courses at the universities. Certainly, it is not enough for universities to run courses on ethics, sustainability or environment management; rather universities have to be seen practising their own teachings. The schools and universities of today need to be forward-looking, take up societal responsibilities and address growing challenges meaningfully and in a just manner. Many students will like to intern at their own universities if they see them as paying heed to the challenges faced by society.

Washington Monthly – an organization based in the United States has now started ranking schools based on their contribution to public good through social mobility, research and service. According to USA Today, Stanford University devotes more of its funding to community service and outreach, with 22.3% of its work study funds going towards such programs. Since 1985, the Haas Center for Public Service has engaged faculty, staff, students, alumni and the global community in a varied range of stimulating activities such as autism awareness and bringing dance to prisoners and greening up South African schools. One of the most notable contributions to the world of the Centre for Community Engagement is the (STEM)2 initiative, which mentors math, science and engineering students and challenges them to apply their studies to the common good — both in California and beyond its borders. The school also works towards social justice issues relating to Civil Rights, education and public health. Yet, as mentioned earlier, this has to go mainstream by all ranking houses.

The Youth Economic Partnership Initiative (YEPI) set up in 2005 – an international association of institutions committed to strengthening the civic roles and social responsibilities of higher education – has also identified personal development, community engagement, the understanding of political and cultural contexts, entrepreneurship coursework, mentorship, incubation and disruptive pedagogies as critical success factors for universities to support and enable youth entrepreneurship education. This may require special individual sessions with a personal development facilitator who is a qualified social worker and increased workshops on mission and vision to personal well-being and stress management. This network now consists of 367 engaged universities in 77 countries working on innovations in civic engagement. Many universities in this network are rating faculty on teaching/research and community involvement, although measurement of the latter does have its own challenges.

In India, the urge to undergo English-medium education is so high that they may override over other well-accepted criteria such as quality of teaching, infrastructure etc. in chiefly the less developed areas. A report prepared by Gray Matters Capital in 2009 showed that in India, the English medium instruction in private schools was driving a lot of poor parents to send their children to these schools. In Hyderabad, 75% of families in slum areas were sending their children to private schools at great cost to the family. The debate on whether government schools should adopt English as the medium of education has picked pace and the Government has set up model schools known as Navodaya schools – an experiment that has turned out to be hugely successful. These schools are run by an autonomous institution

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under the Department of School Education and Literacy. Talented children from rural areas get priority in admission and 75% seats are reserved for them. And this is going a long way in increasing the inclusivity index.

There are other measures also that are being taken simultaneously in line with research findings. Several studies, for example, such as those conducted by Fisher, D. et al (1999) or Wang, M.C. (1997) Kim Beloin & Michael Peterson (2010) have concluded that students with disabilities learn better and faster in regular, integrated programs rather than in special programs designed for them. Besides, integrated programs bring benefit to other students as well, as they learn to respect diversity. Perhaps for that reason, in India, most of the private schools built on government land in Delhi are mandated to admit at least 25% of total new intake from the economically weaker sections (EWS) of society. And so is the case with private hospitals who must take at least 25% patients from the disadvantaged sections of population. However, the compliances may not produce the optimal results because of the manner in which such compliances occur. In schools, often, these non-fee paying students, with little background in English medium education, are considered as having special needs and segregated into a separate group. Often schools and hospitals consider them as an economic burden and therefore, some fear that the same level of facilities may not be extended to them. The problem may have been the change in the initial terms and conditions formulated for these institutions. But they still need to be more sensitive and conscious of any harmful impact of their actions. As far as students are concerned, this is open discrimination going against the formation of inclusive societies. Thus, the institutions, even in observance, negate the very purpose for which the mandate was issued to them. The government has to work closely with these institutions to not let revenue considerations come in the way of promoting an inclusive atmosphere. These schools, in order to be smart, need to go back to their roots and discover value in the age-old virtues of social equity. In mainly OECD countries, there is much greater consciousness at the governmental and institutional level on promoting inclusiveness. The Slovak and Czech Regional Academy in Slovakia, for example, provides a training program on building inclusive school environments for all with the objective of enhancing competencies of teachers and school leaders for engaging with diversity in the class room and the school, support participants to develop school-based projects which promote a democratic and inclusive school environment for all pupils and provide a forum for debates and exchange of experiences. This helps in taking a proactive approach to diversity and including it in the curriculum. The Ministry of Education in New Zealand, too, in 2013 laid out its vision of making 100% of its schools inclusive and issued guidelines for school boards to show ethical leadership and build inclusive schools. Further instructions were given on the importance of listening to parents and balancing any negative feedback about the children with positive reports of their behaviour/performance to the parents.

Efficient Use of Resources at Universities

Of course, a far more easy way in which some universities are showing greater sensitivity towards society include efforts towards greater efficiency in their own operations that serves to minimise waste of resources. Although many universities are publicly funded, they can still become fine examples of good financial management including cost management and overall resource management, if they choose to walk the talk. This can be facilitated through regular discussions on how lean the university is and the targets for being lean together with accomplishments can be reviewed regularly with internal and external stakeholders. All

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business schools teach inventory management on cost minimization principles but the best way to manage inventory may simply be to be lean and use less resources. This will automatically reduce inventory levels as inventory is a certain function of the inputs in the production process.

At the University of St Andrews in Scotland, becoming lean has been deeply embedded into their culture where goals are set and monitored continuously. Real-time monitoring of student absence data, for example, helps the university to identify at an early stage the students who are at risk of not completing their course. Similarly, there have been vast improvements in student debt management through efficient accounting processes and easier transmission of financial information. Inventory at the school is mentioned not just of stocks, but also files and the number of copies being made of different documents. Overproduction of documents and copies is considered as serious a problem as overproduction of its programs and unutilized skills of its staff and faculty is considered as a huge waste. The St Andrews model of becoming and remaining lean is now closely followed by others.

This ability to be lean crucially helps universities in finding resources for building the appropriate physical infrastructure and increase outdoor activities such as being seen occupying prominent positions at domestic and international stages of decision-making. A smart university is expected to participate in international negotiations, for example, on economic and political issues facing the world. Under the WTO, with the focus on services trade, education and research are increasingly getting included under free trade agreements and many see it as a chance, for example, for UK universities to not only forge as many alliances as possible with universities around the world but also lead the Brexit negotiations with EU. So, a university's role these days has to shift from one of providing research inputs for negotiations to a more active one of actually participating in negotiations. Universities are now expected to inculcate negotiating and leadership skills in the students not through teaching alone but through meaningful projects/experiences. Students allowed to be even observers at international negotiations like the Brexit negotiations or WTO/climate change negotiations will have much to learn and report on which may not be possible through class room sessions alone.

As regards finding resources for building the required physical infrastructure, becoming lean often provides an easy solution. In India, many government educational institutions have vast tracts of land including big-size buildings. Continually, attention, therefore, has to be focussed on optimal land and building use. Many central schools have now built sports facilities for public good on their vacant land. But buildings must also be put to good use. Nowadays, solar panels in India are becoming quite common. Newer constructions such as the Kochi airport complex are completely solar-powered. It is time universities, public and private, also become conscious of their responsibility to produce energy themselves inside their complexes. As per news reports of early September 2017, the UK government has given a grant of 7 million pounds to a consortium of UK and Indian universities to build five sufficient solar-powered buildings in remote Indian villages. While this move is very laudable, universities cannot escape responsibility to make their own campuses solar-powered. Most UK and Indian universities have still to focus attention on energy production through renewable sources. On the other hand, US universities are making good headway in this direction. The top 10 US universities spearheading the production and use of solar power recently are: Northwestern University where students spear-headed the installation of a 16.8

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kilowatt panel and fund-raised $117,000 in 2011; Drexel University which purchases 100% of its energy requirements from off-site wind and solar-powered facilities; University of Arizona with some great innovations in tapping solar power; Butte College producing all its energy needs; University at Buffalo with one of the most publicly accessible solar installations; Colorado State University with about 30 acres of the campus dedicated to solar arrays that generate real-time data that is used by students to envision new ways to benefit the community; Princeton University which can produce more power even on a cloudy day than when the sun shines fully; University of Tennessee, Knoxville that uses solar power to charge cars; University of Utah that was the first university to sponsor a community solar program providing discounts, credits and know-how to community members in 2015 and Santa Clara University that has installed a smart micro-grid that can orchestrate weather reports. These universities have distinguished themselves as they have gone beyond just the introduction of courses on sustainable development.

Similarly, it is important for universities to be drought-resistant. The South Asia floods of 2017, for example, engulfed everyone, including schools and colleges which have had to be shut down for a considerably long period of time putting their mission of teaching and research at risk. Hence, beside the risk to physical property and research reports, there is a much larger risk to the mission of the institutions themselves. It is, thereby, important to construct flood-resistant universities, particularly in flood-prone areas. At present, though earthquake and fire- resistant buildings are being constructed, flood-resistant buildings may still be a novelty in many countries. The study by Sharmin S et al (2013) had concluded that although Bangladesh is a highly flood-prone country, the educational institutions have still not designed courses on disaster risk reduction mechanisms and the school building structures are similarly not ready for floods. Another study by Chang M.S et al (2013) showed that access to safe drinking water, sanitation and health awareness need to be improved upon during such floods. UNESCO, in the World Education Forum's Dakar Framework for Action: Education for All (EFA) had also acknowledged that natural disasters posed significant challenges to countries in meeting their EFA goals. Many schools simply get washed away during floods. Besides, many children have to work when their parents lose their jobs due to flooding. There need to be wider discussions on the role of schools and universities at such times. Japan may be showing the way to building flood-resistant cities. The G-Cans Project, dubbed as the world's largest drain in 1993 connects existing rivers and waterways to overflow pipes and drains which are then connected to underground cisterns and tunnels opening directly into the ocean. Each underground cistern is huge - about 70 metres in height and 30 metres in diameter – big enough to park a space shuttle. In 2008, the system was upgraded and a new Furukawa reservoir built replacing the cisterns with giant-sized tunnels (3.3 kilometres of 7.5 metres of diameter) to carry water from flood areas into rivers that could carry the water to the ocean. This is a huge engineering feat; yet, may be difficult to emulate because of its high cost. Developing countries will have to come up with their own solutions and the universities should spearhead research in this direction.

Concluding Observations

In fact, a smart university's role may not end at just engaging with the community and achieving sustainability goals itself. Smart universities must also ensure that a support infrastructure is in place for the beneficiaries to extend the same service to others. May be

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geospatial technology that enables working with people distributed across a large geographical area could be used in this direction as well. Use of geospatial technology in education is increasing and can easily provide maps of area-specific schools/universities, distance of schools/universities from public infrastructure, type of facilities at such institutions, areas from where students come to such institutions, duration of attendance of students and faculty, flood-resistance or fire-resistance of these institutions, employment facilities in proximity to these institutions, etc. With the help of Geo Information System (GIS), these maps can be stored, retrieved and analysed for any warning signals of any impending undesirable learning outcomes and consequent acceleration of social or economic inequalities.

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