D1.2 National Research Reports

T1.2 National Research report

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Abbreviations and Acronyms

Abbreviation	Full name
Acronym	Full name
EACEA	Education, Audiovisual and Culture Executive Agency
EC	European Commission
EU	European Union
GA	Grant Agreement
HEI	Higher Education Institution
ICT	Information and Communication Technologies
PC	Project Coordinator
WP	Work Package
WUD	World University of Design
UAEGEAN	University of the Aegean
NID	National Institute of Design
ICSID	International Centre for Settlement of Investment Disputes
UNIDO	United Nations Industrial Development Organization
UN	United Nations
WTO	World Trade Organization
BRICS	Brazil, Russia, India, China and South Africa.
SAARC	South Asian Association for Regional Cooperation
SCO	Shanghai Cooperation Organisation

1. Literature review on design and innovation

This is a review on Design and Innovation in India from the early days of Independence to the present and beyond. It is based on the identification of existing literature about design and innovation in general and in the case of India specifically. Focus is given to innovative methods for research and design, extreme affordability principles for product design and development, community-based programs for design and innovation and educational practices. The scope of design covers industrial design, design of human-computer interaction and design of services

1.1 Modern India

India gained an Independence status (as a Dominion of the Commonwealth) in 1947 and in 1950, following a period of tensions, a war with Pakistan and major change, it became a Republic with its own new democratic and secular Constitution. Design in India has a history of thousands of years, however for all practical purposes, independent design policies have been here reviewed since Independence, as this can be linked to sovereign national policies primarily aimed at servicing the national economy and not any former imperial planning.

India spreads from just a few degrees north of the equator to the 35th parallel and has a rich landscape ranging from tropical jungles to glaciers. It is multicultural, multinational and multilingual country with an overall population exceeding 1.3 billion people. In terms of religion, Hinduism (79.80% of the population) is dominant and then comes Islam (14.23%) while Christians, Sikhs, Buddhists and other religions have a share of less than 3% each. English is widely used in Administration, Education and Business, while Hindi is popular and spoken by a large part of the population. There are several other languages and dialects all over the country that give a distinct identity to several groups; however, English is still the preferred language of communication when it comes to design, realization and delivery of products and services. Urbanisation is not very high, despite the existence of megacities in India. Currently it is estimated at about 34% and it has been increasing fast since the days of the British Empire, when only 12% were city dwellers. On the other hand, population increase in cities seems to slow down. Even then, it is expected that urban population will increase to 40% by 2030. Several megacities exist in India: Mumbai (21.3 million), a major financial and entertainment centre, Delhi (16.8 million), the key administrative centre and transport hub with strong IT and Telecommunications sectors, Finance, Media and Sports, Kolkata (14.1 million), a major port, Chenai (8.6 million), the "medical capital" of India having also a strong automotive industry and other heavy industries, Bangalor (10.4 million), heavily industrialized with activities ranging from fast moving consumer goods to aerospace technology, Hyderabad (9.7 million) with strong presence in electronics, nuclear technology, IT and pharmaceutics, and Ahmedabad (6.4 million) with strong chemical, automotive, textile, pharmaceutical and transport sectors. In cities, a significant part of population (sometimes exceeding 30%) is working in "informal" economy (e.g. street vendors and offering all sorts of petty labour and services). Slums are a reality in some cities e.g. Kolkata; their existence demanding solutions to several everyday issues and the inevitable application of extreme affordability principles when designing products, services and IT applications.

The population pyramid is well balanced corresponding to a life expectancy of 68 years and a Median of 28 years. Therefore, it is considered a country with a growingand dynamic young population that are the major recipients of products and services in the country. Literacy rate is currently at 74% and it is improving, with improvements being much greater in rural rather than in urban areas.

India is signatory to the UN, WTO, BRICS, SAARC, SCO, G8+5, G20 and the Commonwealth and this drives, as well as limits, the industrial and external trade policy of the country. In this globalised context, export-oriented products and services have to compete on design, besides cost and quality. The same applies also to products within the Indian markets.

1.2 The historical context of Design in India from the Independence to the present day

The Indian government decided to develop a policy on Industrial Design in 1957 (Balaram, 2009). The Prime Minister of that time, Jawaharlal Nehru invited the US designers Charles and Ray Eames, as advisors to support the planning and management of industrial design, as best fit to the reality of the Indian economy and societies and not as a mere imitation of practices of industrialized nations. The Eames couple drafted their now well known "The India Report", in 1958 and they recommended "a sober investigation (by designers) into those values and qualities that Indians hold important to a good life" It was suggested that a National Institute of Design be established to train the future generations of Indian designers while maintaining "an alert and impatient national conscience that is concerned with the quality and ultimate value of the environment" (Balaram, 2009).

This was the beginning of the National Design policies that shaped Indian Industrial Design and Design Education. The National Institute of Design (NID) was established in 1961 and was put under the auspices of the Ministry of Industries and Commerce and not under the Ministry of Education. This reinforced the industrial orientation of the new Institution. It was also placed in Ahmedabad and not in Delhi, to keep it clear of direct political interference. In 1970, the NID started offering undergraduate courses in Design.

In 1977, during the 10th International Congress and Assembly of ICSID (The International Council of Societies of Industrial Design), in Dublin, Ireland, it was recognized that India was one of the key developing partners that had recognized that design contributed to the development process and it was suggested that the next meeting was held in India. At that time a Memorandum of Understanding was signed between UNIDO (United Nations Industrial Development Organization) and ICSID in order to enhance industrial design in the developing world and address critical needs. These events along with some design awards that companies in India managed to receive, led to the organization of an International "Design for Development", in 1979, in India. The event was managed by NID and the Industrial Design Center (IDC) - Indian Institute of Technology (IIT), Bombay, that had become by that time the second key provider and research facility for industrial design in India. Prior to the meeting, the first review of "The India Report – 1957" took place and the human-centered and extreme affordability principles of Indian Design were reinforced (and have held true since). The meeting was a success and the outcomes were documented in the "Ahmedabad Declaration" and a relevant action plan, following also the Lima Declaration on removing barriers to the industrial development in the developing world. The "Ahmedabad Declaration" though relevant to the local development for the benefit of the local

deprived people, remained a rhetoric rather than becoming the foundation for social change. This is because, in the 1980's and 1990's India was more export oriented, following the gradual removal of Quotas, Tariffs and Barriers to Trade (Balaram, 2009). Design was part of Export Strategy aimed at foreign markets. On the other hand, the reciprocal lifting of protectionist trade policies in India, exposed the local population, both affluent and less privileged, to foreign design. Both consumers and institutional buyers became far more design sensitive and, in the eyes of more and more Indians, design started becoming an important differentiating product factor. Besides, physical industrial goods, the introduction and fast development of Information Technology, Mobile Communications and the Internet, facilitated the development of new solutions to many problems both at home and abroad. Design is less and less seen as a peripheral activity by the Indian Industry and it is now extended to services as well.

In 2004, the NID and the Confederation of Indian Industries, established a series of Design Awards, thus, improving the image of the Design Sectors and attracting interest from many businesses and professionals (Balaram, 2009).

Following the now famous quote by Prof. Robert Hays of Harvard Business School that companies used to compete on price, then on quality and tomorrow it would be design, as well as increasing competition based on price, quality and design from other Asian Countries, it was decided by the government to review the Ahmedabad Declaration and update it, in cooperation with the Industry and other stakeholders (Balaram, 2009). This culminated in the new National Design Policy that was approved in 2005. According to this revised Policy, that does not revoke but rather supplements the Ahmedabad Declaration, the key areas of interest are:

- Design promotion and partnerships across many sectors, states, and regions for integrating design with traditional technological resources;
- Presentation of Indian designs in the international arena;
- Global positioning and branding of Indian designs;
- Raising Indian design education to global standards of excellence
- Making India a major hub for exports and outsourcing of professional design service;
- Creation of awareness of design among manufacturers and service providers, particularly small, medium, and cottage industries; and
- Attracting investments in design services and related Research & Development.

Some of the older Ahmedabad Declaration aspects still apply:

- Developing countries are encouraged to consider the establishment of design institutions, design centres and/or other design-practising and promotional institutions to spread design methodology, awareness and consciousness.
- The establishment of professional design associations which can function parallel to the design promotional institutions should be seriously considered, and such efforts assisted.
- These institutions must work to create national design consciousness. They must communicate that design is concerned with the improvement of our environment through the appropriate use of raw materials, increased productivity, with the protection of health, human safety, natural and cultural resources, with the enhancement of working environments, and with expanding work opportunities and earnings at all levels, including exports. Therefore, design considerations should be incorporated in plans for national development.

The New Policy is now under strict criticism mainly by design thinkers who believe that the policy is narrow focused on a few areas only (Balaram, 2009). They insist that India also needs design for new changes and new processes and this is not addressed in the Policy. The Policy was shaped by political forces more concerned with globalised trade and, it is argued by advocates of social policies, that it has failed to address the survival needs of craftsmen and local communities. This debate is long rooted in India, since Indian Design was influenced by the Bauhaus School (Balaram, 2019) that emphasizes the importance of craftsmen in the Design System. It is also argued that it has failed to cater for design of services for community development e.g. design of educational and health services, databases and other essential applications and services.

In the last 10 years, India has seen the improvement of the status of the Design Professions. This is reflected on the establishment of the India Design Council, with governmental support, and several Associations of Indian Designers (Balaram, 2009; Balaram, 2019, http://indiadesigncouncil.org/, http://www.adi.org.in/).

In spite of the political support for national design and the emergence of quality design education in India, the concept of the professional designer who is multi-disciplinary and functions in a wide variety of situational contexts was not received very well from society. Most people thought for long that design was artistic work or that it was limited to engineering design. Though, this appears to have changed, due to the successful development of full Indian consumer and industrial products, people still fail to understand that design is interwoven in many aspects of modern life, including the use of Information and Communication Technology and Services.

1.3 Service Design and Social Innovation

Moving from a goods-based economy towards a service-based economy has been a trend that has gained significant traction around the 1970s, (Mager, 2008) today service dominant logic has become a structural part of marketing and has emerged as an autonomous branch of design. Ten years ago, at least 70% of the economy of affluent nations was made up of the service economy (Moritz 2005) today the service sector is the largest sector of the world. 63.5 percent of total global wealth comes from the services sector. United States is the largest producer of services sector with around 13.5 trillion USD. The services sector is the largest sector of 194 countries, with 30 countries receiving more than 80% of their GDP from services.

The shift from products to services, in terms of moving away from 'ownership towards access' (Rifkin, 2000) is inherent to the notion of 'dematerialization'. This has significantly dictated the way new service systems are emerging that offer completely and totally new experiences in how mobility, housing, travel etc. is perceived and sensed. If this shift is investigated in further details, it becomes apparent that there is a move towards re-conceptualizing products: where products are becoming the means for the successful functioning of services. Design thinking (IDEO) has been a long another emerging tool in this transition of design towards a more integrated and strategic approach.

It is no coincidence that service design has been born as a field of design practice during the last decade. Twenty years ago, the design of services tended to be about hotels and hamburgers. Today, digital platforms are critical to running a business, large or small. The digital landscape of the information age has created radical enablers for new types of service delivery. Modern service delivery

is entirely dependent on digital platforms. Hospitals and banks can't run without immediate electronic access to detailed records, airlines can't sell cheap tickets without algorithms that constantly balance supply and demand, and most people can't do much without the Internet or cell phones. Twenty years ago, cell phones were futuristic gadgets reserved for Wall Street traders and generals; today many people can't even imagine meeting up in a city without a cell phone. The combination of enterprise systems that store and link vast amounts of data with mass-consumer access to data through the Web and mobile telephony is transforming the way people live their daily lives. At the same time, the quality of service often suffers due to the complexity of linking these systems together in a way that makes sense to customers. This combination of opportunities and problems is the reason why service design has emerged as a specific design approach.

The social, financial and technological shifts have led to the emergence of a new economy. This economy is structured around the idea of access rather than ownership. The 'sharing economy' has emerged on the intersection of HCI, Service Design and Entrepreneurship as a new catalyst for growth and sustainability. Companies such as Uber, AirBnB and WeWork act as middlemen facilitating the exchange of value without owning any of the assets of infrastructure necessary to create said value. This service driven approach has the capacity, through social innovation, to improve daily lives for millions of people.

The term social innovation refers to "new ideas (products services and models) that simultaneously meet social need and create new social relationships or collaboration […] They are the innovations that are both good for society and enhance society's capacity to act." (Murray et al. 2013) This marks a trend towards collaboration, self-organizing and collectivism. These communities are collaboratively finding solutions to everyday problems in the form of systems or services and thus the role of Design is central in supporting these characteristics. This type of innovation is driven by behavioural change rather than technological or commercial changes. In the context of social innovation everybody designs (Manzini 2015) people design and optimise their businesses, their neighbourhoods and their way of life every day. Ezio Manzini refers to this as a grid of interconnected design systems based on the diffused design capacity of people, the opposite is the expert design capacity. The capacity to explicitly design that professional designers possess and use. The methodology adopted by social innovation reflects this transition from traditional, closed, hierarchical organisations to open distributed democratic communities based around self-determination. "These [creative] communities shape a complex system of interconnected processes that include communities, enterprise, NGOs, private citizens, local and global institutions that imagine, test and apply novel solutions to a variety of problems associated with the natural environment, the local societies and the personal wellbeing." (Tuomi, 2003). These creative communities are the main structure around which social innovation sprawls and as such the creation of design tools and methodologies that enable the co-creation of new service systems that combine expert and diffuse capacity as a catalyst for change.

Creative communities offering collaborative services are not only producers of social value, at the same time they present and produce novel profitable markets for new businesses. By scaling up they can redefine the social and economic capital for a wider audience and encourage a shift towards sustainable lifestyles as they provide viable solutions to contemporary problems.

Scaling up collaborative services entails the development of systems with a high degree of relational characteristics, which cannot be programmed in advance. Moreover, relational features are possible

only when the interaction between the actors involved are sufficiently direct and organizations are structured in a way that information can be easily understood and is manageable when that is sufficiently small (Jégou, 2008). The scaling up of successful collaborative services does not mean dimensional upgrade, as such an extension would alter the social characteristics, sense of community.

1.4 The maker movement

The origin or official start of the Maker Movement is normally associated with the launch of the Make Magazine by Dale Dougherty in 2005 with the goal of promoting technology, creativity and fun. Dougherty defines makers as people who make things, thus all of us are makers (Dougherty, 2011). This is a rather broad definition, that helped popularize the term and grow the movement, but not helpful for structuring it since it provides little insight about what makers do or are. Chris Anderson slightly narrows and improves the definition, and considers specific practices and principles, (still with a wide approach to characterize them) with three different features: a) the use of digital desktop tools for designing and prototyping artifacts; 2) the adoption of common cultural practices and collaborative processes of sharing these designs with their communities; 3) the production of artifacts with the use of digital manufacturing technologies, spaces and services (Anderson 2012). The adoption of digital fabrication tools is a key element of the Maker Movement (Gershenfeld, 2005, 2012), sharing the projects is another one (Abel et al. 2011; Bakırlıoğlu and Kohtala, 2019).

The Maker Movement is a phenomenon connected to the Design discipline since makers can be considered (and often are) designers or a new kind of designers, often working with open, peer-to-peer, distributed and DIY approaches (Abel et al. 2011; Bakırlıoğlu and Kohtala, 2019; Menichinelli, 2016a). Its preeminent characteristic of bridging the local and digital dimension and the often collaborative and social nature of its activities constitute a reason for identifying such movement as a clear example of digital social innovation (DSI) (Bria et al. 2015; Stokes, Baeck, and Baker 2017), a concept that further extends the definition of social innovation (Murray, Caulier-Grice, and Mulgan 2010): people, projects and organizations that use digital technologies to tackle social and environmental challenges with a stronger focus on social or environmental impact over financial return and a dedication to openness, collaboration, and citizen empowerment. Digital social innovation can be found in different fields such as healthcare, education and employment to democratic participation, migration and the environment, and maker projects can be found in all of them. This represents another connection between the Maker Movement and Design, especially along the reflections about how designers (both expert and non-expert, both formally trained and informal amateurs) are developing and spreading social innovation initiatives toward sustainability (Manzini, 2015).

When creating and deploying social innovations both makers and designers can thus perform, at least partially, as social entrepreneurs, and the connection between design and social entrepreneurs have also been debated in positive terms (Agafonow, 2017; Brown and Wyatt, 2010). Social entrepreneurs are motivated to address social problems using an entrepreneurial approach, develop and implement their innovative solutions to improve communities and the world in which we live, playing an important role in addressing social, economic and environmental challenges. While defining impact models and designing social business initiatives, social entrepreneurs can support the achievement of the Sustainable Development Goals (SDGs). These contributions happen from one or a small number of

value chain activities or extend throughout them, and with a focused contribution or with a broad focus on advancing the SDGs (Littlewood and Holt, 2018).

In the context of distributed microproduction (Bianchini & Maffei, 2012) system, this property translates into a large number of microproducers who develop Community Based Fabrication projects also by devising models of Community Supported Manufacturing where the production sites – digital fabrication plants – are co-financed or co-managed by a number of actors interested in the development of particular products, whether individual or collective (hackerspaces). These models of microproduction seek to enable, use, and enhance local skills and work practices by linking them with those present on global platforms.

The concept of community of practice (Wenger, 1998) is therefore well visible also in the activities of urban microproducers, and also of independent microproduction distributors which create local associations and alliances scalable and extendible to the national and global level. These initiatives undertaken by diverse types of microproducers exhibit recurrent and common dynamics and patterns, which consolidate a microproduction community through **creating or frequenting a place or productive initiative,** or through a dispersed set of experiences. The convergence of these actors on the basis of shared interests shapes the experience or the community with toolkits, standards, wiki, certifications, and licenses, which formalize their principles and rules and make participation-reproduction-replication-reiteration possible through mechanisms of enrolment and affiliation. These creative communities of makers create models comprising of instruments for self-assessment and peer-review. This model is a valuable tool to connect the grassroots innovators of India and further strengthen the enabling ecosystem existing in the country. Such a community already exists in India as a distributed community of social innovators producing grassroots low tech solutions to everyday problems. Connecting these makers amongst themselves and academia is a challenge that is informed by the fields of social innovation, extreme affordability, the maker movement and the grassroots innovation support organisations found throughout India.

1.5 Grassroots innovation

Informal sector in the context of the low-income nations is very important. In India alone the informal sector provides employment to around 90 per cent of the people (Mitra, 2014). Over the years the informal economy of India has shown considerable improvement in not only wages and capital accumulation but also in the productivity. The informal sector is considered to be quite diverse and so are the sources of knowledge which shapes the activities of the informal sector. These are mostly improvisations and adaptations of the existing technology and since there is no metric available for the measurement of the informal sector innovations, these remain hidden from the outside world.

Grassroots innovations in India as a movement started with the Honey Bee Network (HBN) led by Prof Anil Gupta of Indian Institute of Management – Ahmedabad along with several other researchers, farmers, activists and artisans to search for the alternative technologies and traditional knowledge practices of the people at grassroots (Abrol & Gupta, 2014). The aim of this network was to scout and bring these technologies into the mainstream by providing the innovations a proper channel of diffusion and also to recognise the talent and skills of the innovators.

Hence, grassroots innovations resonate with the idea of appropriate technology in terms of limited resource requirements, use of the local material and talent, affordability to local communities, reliance on the informal knowledge (Smith et al. 2014). However, the appropriate technology as a movement failed in the mid-1980s and was a contested terrain because it failed to integrate the local innovations with long term strategies of social and technological capabilities at the local level.

Grassroots innovations can be found in different countries and has found reference in many countries and cultures by different names such as Gambiarra in Brazil, Systeme D in France, ZizhuChauangxin/folklore innovation in China, independent/user or Do-it-yourself innovation in US, jua kali in Kenya and grassroots innovation in UK (Kumar & Bhaduri, 2014).

In the last 20 years an alternative commentary on innovations in the global south has been the subject of increasing interest both within the academic and policy levels. Srinivas and Sutz (2008) describe grassroots innovations as scarcity induced innovations that are mainly conceived to meet a need often overlooked by the mainstream. Gupta (2014) describes grassroots innovations as those which are created by the people without any professional degrees, mostly self-employed, and without any help from a formal sector institution and organisation. Rao (2006) defines the innovations as the bottom up social innovations which are extremely practical solutions involving knowledge and behaviour in the difficult circumstances and conditions. Bhaduri & Kumar (2011) explain that grassroots innovations emerge usually from the informal sector and demonstrate the complex socio-political and economic aspirations of the people at grassroots who by innovating new products and practices rely on their skills and practical experience and work outside the realms of the formal sector. The innovations are necessity led and scarcity induced and enhance the livelihoods of grassroots innovators and users of the innovations (Pathak, 2008).

Although, research on grassroots innovations has been carried out for the last two decades, it still remains as an understudied research area. Scholars have referred to these innovations by different names and terms such as bottom-of-pyramid innovations (Prahlad & Hart, 2002), emergent innovations (Jain & Verloop, 2012) and below the radar innovations (Kaplinsky et al., 2009). A good review of the terms and terminologies used for the innovations for and from emerging markets of the developing economies is given by Albert (2016).

There are various state and non-state actors including government, NGOs, and the private sector which are involved in providing due support and all other activities to institutionalise the grassroots innovations in India. The non-state civil society bodies like Honey Bee Network and SRISTI while state actors like NIF and GIAN work actively for the recognition of the existence of the grassroots innovations and make sure to use them for the benefit of both the innovators and also the society as a whole. Some of these actors which play a key role in promoting and fostering grassroots innovations are mentioned in this section. In addition to this,the government has also set up a Traditional Knowledge Digital Library (TKDL) to prepare a computerised database of the indigenous knowledge on medicinal plants. Table 1 lists the various actors which are involved in the grassroots innovation network in India.

Table 1. Grassroots Innovation Network in India. Source: Mathur and Sinha (2007)

Activities t	Government	Non-Government	Private Sector

Documentation and Dissemination of Information	National Innovation Foundation (NIF) Department of Science and Technology Traditional Knowledge Digital Library Grassroots Innovation Augmentation Network (GIAN)	Honey Bee Network (HBN) Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI)	
Value Addition and Experimentation	Technology Information, Forecasting, and Assessment Council (TIFAC) Council of Scientific and Industrial Research (CSIR) NIF GIAN	SRISTI GIAN	
Commercialisation	CSIR NIF GIAN	SRISTI GIAN	Aavishkar
Dissemination	NIF	HBN SRISTI	
Finance	DSIR Technoentrepreneurs Promotion Program Micro Venture Innovation Fund	SRISTI NIF GIAN	Aavishkar
IPR Protection	NIF	SRISTI	

To sum up the emerging trends in design and economics provide unique tools and opportunities that are relevant and necessary in the Indian context. Design has widened its horizons in recent years providing a more strategic approach. The intersection between service design, digital design and product design provides a holistic approach that takes every step of the lifecycle into account. The days of looking at different aspects of the designed under a single perspective has passed and emerging design cultures are better at adopting radical new approaches compared to well established design cultures. India has already embraced design as a driver for growth and as such integrating these tools in education and practice has the capacity to act as a catalyst for the emergence of Indian design. In addition, the existing organisations supporting, disseminating and scaling up grassroots innovation in a local, extreme affordability context have to be strengthened with a two-pronged approach. Firstly, using the professional design capacity and know-how of Indian HEIs to create a wider enabling ecosystem and secondly, through a social innovation approach to foster the emergence of creative communities of makers creating a system of distributed microproduction and appropriation in local contexts.

2. Background and context analysis

This is a context analysis of the current state of Design and Innovation in India, covering both the commercial and educational sectors.

2.1 The Context of the Design Sectors in India

The design industry in India has grown in line with both the fast growing internal market and exports. India is a massive and non-uniform market. It consists of different cultures over a wide geographical area across different climate zones. Foreign companies wishing to enter and succeed in the Indian markets need thorough understanding of cultures and buyer preferences that are very different from those in other countries. Without 'inside knowledge' from Indian professionals they may fail. The market is not restricted to the citizens and consumers of India but extends to a massive institutional and capital market that seeks new equipment, goods and services. On the other hand, if Indian companies are to succeed in foreign markets, they have to understand product and service requirements in the globalised economies of the 21st century. This is only possible through improved design education and through cooperation with foreign companies and organizations.

Modern Design is multifaceted, cross-disciplined and covers several aspects of human activity. Most official reports identify the following activities under the term "Design": Architecture, Interior Design, Landscape Design, Furniture, Graphic Design, Animation / New Media, Graphic Design, Fashion, Textiles/Leather and Fashion products Design, Industrial design / Product Design, Human computer interaction (HCI) and Service Design.

In 2016 the design market in India was estimated at INR 50 billion (GBP 612 million) expected to rise to INR 110 billion (GBP 1.34 billion) by 2020. There were about 7,000 qualified designers in India, at that time and about 5,000 trainees in Design Education, which is growing fast. It is estimated that the requirements of the country in different design disciplines amount to more than 60,000 qualified professionals by 2020. A major part of design activities has been undertaken by non-designer graduates and other trained personnel (e.g. mechanical engineers, textile engineers, architects, IT specialists, marketing specialists, etc) who obtain skills on the job.

2.1.1 Industries & Design Sectors Statistics, Key information and Trends

The distribution of design departments and/or independent design contractors and consultancies per design sector is depicted in Table 2. This Table includes Architecture, Interior and Landscape Design, which, though relevant to Design, are not included in the key subjects of this report. It also covers only part of service design.

Table 2. Distribution of design departments per design sector in India (2016)

Design Sector	Percentage of Design Units per sector (%)
Architecture	6
Interior Design/ Landscape Design/ Furniture	13

Fashion Products/ Textiles/ Leather/ Jewellery	9
Graphic Design	20
Animation / New Media	10
Industrial Design/ Automotive Design/ Fast Moving Consumer Goods	25
Other (Incl. Toys, Exhibition, Research)	11
Human Computer Interaction	6

The following table (Table 3) also provides information on the distribution of companies with design activities to Turnover size groups for the same sectors

Table 3. Percentage (%) of Design Departments in different sectors with strong design element according to Organisational Turnover in India (2016)

Design Sector	Under Rs 2,500,000,000	Rs: 2,500,000,000 – 5,000,000,000	Rs: 5,000,000,000 – 25,000,000,000	Under Rs 25,000,000,000
Architecture	50	17	17	16
Interior Design/ Landscape Design/ Furniture	47	10	26	17
Fashion Products/ Textiles/ Leather/ Jewellery	73	9	9	9
Graphic Design	64	12	15	9
Animation / New Media	53	0	20	27
Industrial Design/ Automotive Design/ Fast Moving Consumer Goods	55	5	24	16
Other (Incl. Toys, Exhibition, Research)	22	11	44	23
Human Computer Interaction	43	0	29	28

India is a country with growing manufacturing sectors ranging from fast moving consumer goods to automotives and aerospace, and Table 2 illustrates that a significant proportion of design firms (over 40%) is activated in Product Design (other than Construction and Landscaping). Besides manufacturing, Digital Product Design also scores high at around 40%. Most firms practicing design are SMEs. Since many Design Departments are integrated into wider organizational structures, any turnover figures, exclusively for design, provided here, are estimates. However, it is worth noting that the Gross Value Added of the manufacturing sector is currently US$ 395.89 billion and it is estimated that it may reach US$ 1 trillion by 2025. Besides exports, manufacturing is expected to address the needs of a massive internal market in what may become the most populated country in the world within the next 15 years. The Gross Value Added of the Information Technology sector is currently US$ 181 billion, of which US$ 137 billion is due to exports, thus making this sector mainly export oriented. The sector may increase its value to US$ 350 billion by 2025. Another industry with strong design connections and digital product development activities is the Media and Entertainment Sector worth US$ 22.28 billion and expected to double by 2025. This sector currently employs about 5 million

people. Two interesting aspects are that the national online gaming industry is expected to grow to US$ 1.68 billion and advertising to US$ 18.39 billion by 2023.

In terms of employment patterns, the distribution of designers in key design sectors (excluding architecture, landscaping and most services) is as follows:

Table 4. Distribution of design professionals in key design sectors in Manufacturing, IT and the Media in India (2016)

Design Sector	Percentage of Designers per sector (%)
Fashion Products/ Textiles/ Leather/ Jewellery	9.75
Graphic Design	18.09
Animation / New Media	9.64
Industrial Design/ Automotive Design/ Fast Moving Consumer Goods	22.63
Other (Incl. Toys, Exhibition, Research)	10.94
Human Computer Interaction	29

It appears that the percentage of design professionals working in HCI, Graphic Design, Entertainment, Animation and the New Media exceeds 50% of the total. Given the fact that these sectors will double by 2025, it is imperative that thousands of new graduates are trained in digital product development and enter the market over the next five years.

The Services Sector is also growing strong. It has received high levels of Foreign Direct Investment totalling US$ 68.62 million over the last decade. In 2009, the growth rate of the sector exceeded, for the first time, that of agriculture and manufacturing and accounted for 57% of the GDP. In addition, the employment in services rose to 25.3% of total employment, versus 53.2% in agriculture and 21.5% in manufacturing. More recent figures indicate that employment in services accounts for more than 34% (2014) and about 54% of the GDP (this is due to increased manufacturing and agricultural output share in the GDP and not in any reductions in the volume and value of services). Since 2000, India has been a preferred outsourcing location for many services departments and industries of the UK, the USA and other countries in the developed world, partly due to the quality of human resources, the English literacy levels of Indian employees and low labour cost. These outsourced service departments address not only back-bench needs but are also engaged in international customer service, bank-assurance and retail sales! Though such cases are well documented in western business case studies, it is important to understand that there are growing services aimed at an internal market of more than 1 billion consumers with increasing purchasing power. By 2025, the middle class will account for the 41% of the population and will have a share of about 59% of the total national consumption. Demand for services is expected to increase even further, given the new Trade Facilitation in Services 2017 WTO agreement. According to the National Industry Classification, the key services sectors are: wholesale and retail trade (including repair of motor vehicles and motorcycles), transportation and storage, accommodation and food service activities (including Tourism), information and communication, financial and insurance activities, real estate activities, professional, scientific, and technical activities, administrative and support services, public administration and defence, compulsory social security, education, human health and social work activities, arts, entertainment, and recreation, activities of households as

employers (including undifferentiated goods and services producing activities of households for own use), activities of extraterritorial organizations and bodies and other services.

In terms of percentage of share in the services and the GDP the most important sectors are shown in Table 5.

Table 5. The key Services in India (2009)

Services Sector	Share of the Services Sector (%)	Share in GDP (%)
Community /Social / Health	26.1	14.0
Finance / Business Services	27.3	14.7
Trade / Tourism	29.4	15.8
Transport / Storage / Communications	17.3	9.3

The application of Design frameworks (e.g. Design Thinking) in Services is limited. There are several professionals and entrepreneurs in all service sectors that survive and grow in a fast growing economy that tolerates average performance and ad-hoc approaches when responding to challenges rather than rewarding excellence through thorough planning and design. When it comes to servicing local markets, Design of services (and even of products) is often seen as liability and not as strategic tool. Whereas, physical product design is inevitably linked to some tangible elements and it has been supported by National Policies since the early days of the Independence, service design is often blurred with intangible aspects of marketing practices and service realization, it is more difficult to measure its contribution to business performance and it has not been a "favourite" subject to formulation of relevant National Policies or even Voluntary Initiatives.

Organisations practicing Design activities seem to concentrate in Bangalore (24.12%), Mumbai (22.35%), Delhi (22.94%), Pune (14.71%), whereas other cities tend to concentrate clusters accounting for less than 5% of the National activity. Delhi and Mumbai are particularly strong clusters in Digital Products, as well as the pioneers in Services, partly due to being multinational business hubs. Bangalore and Pune are strong clusters in Manufacturing and Industrial Design.

2.2 Design Education in India

This section of the report indicates the important Higher Education Institutions offering Design education in India including BSc, MSc and PhD studies (EQF >= 6) along with the main trends in this field. It also covers cooperation issues with National and International institutions and authorities, as well as the Industry.

2.2.1 Higher Education Institutions offering Programmes in Design in India and qualification routes

A full list of Higher Education Institutions offering programmes in Design is given in Annex II.

Courses range from Certificate and Diploma courses lasting from 3 months to 2 years, Bachelors courses and Masters taught courses. Research and qualification at PhD level is limited and only a very few institutions offer such options, viz. the Industrial Design Centre of IIT, Bombay University, the Centre for Environmental Planning and Technology (CEPT) and Ahmedabad University.

Architecture and Interior Design training and qualifications are State regulated and not the subject of this report. Fashion studies are mainly offered as a 3 year BSc. Graphic Design and Applied Arts are offered as a 4 year courses. Industrial Design is offered as 3-4 year course. Only recently, design studies programmes have been approved and this is still considered a fast evolving issue. Some Institutions have been set up with international support. DSK Supinfocom was set up in collaboration with the Chamber of Commerce and Industry of Valenciennois. It is active in Animation, Gaming and Industrial Design. Ecoleintuit.lab, active in Graphic Design, was setup in collaboration with the French institute intuit.lab. ISDI, active in Product Design, Interior Design and Fashion, was setup in collaboration with Parsons New School for Design. GD Goenka School of Fashion and Design has signed cooperation agreements with Politecnico di Milano. Pearl Academy offers programmes in collaboration with Nottingham Trent University and Domus Academy.

Most postgraduate courses in Design disciplines have been designed as conversion programmes for graduates of other relevant subjects (e.g. engineering, arts, information technology etc). Specialised courses for design graduates are very few and they are offered by very few institutions with longer tradition in design education e.g. National Institute for Design.

Apart from architecture there is no statutory governance on other design disciplines. The India Design Council is currently seeking options for the accreditation of design qualifications, whether through design education or a combination of education, apprenticeships and other training.

2.2.2 Number of Design education programmes and enrolment statistics

Table 6 shows the number of Design education programmes available in Indian Higher Education Institutions and Table 7 shows relevant enrolment figures.

Table 6. Design Education programmes at Higher Education Level in India (2016)

Design Sector	Post Graduate	Under Graduate	Diploma	Certificate
Architecture	32	135	0	0
Interior Design/ Landscape Design/ Furniture	8	22	0	0
Fashion Products/ Textiles/ Leather/ Jewellery	17	198	187	183
Graphic Design	5	30	2	0
Animation / New Media	3	1	347	372
Industrial Design/ Automotive Design/ Fast Moving Consumer Goods	11	12	1	1
Other (Incl. Toys, Exhibition, Research)	1	2	0	0
Human Computer Interaction (HCI)	5	1	1	0

Table 7. Student enrolment levels in higher design education in India (2016)

Design Sector	Student enrolment level per sector (%)
Architecture	17.35
Interior Design/ Landscape Design/ Furniture	6.81
Fashion Products/ Textiles/ Leather/ Jewellery	30.11
Graphic Design	6.81

Animation / New Media	33.65
Industrial Design/ Automotive Design/ Fast Moving Consumer Goods	4.46
Other (Incl. Toys, Exhibition, Research)	0.36
Human Computer Interaction	0.41

Animation is the subject with the highest number of course offers and student enrolment figures. This is because it offers an expanding profitable career option for graduates. There are several higher education institutions offering education in the field of animation in most major cities. Fashion/Textiles/Leather/Jewellery is the second most important sector in terms of training programmes and student enrolment levels. There are also many institutions offering relevant education and training in these subjects in most major cities. For both Animation and Fashion studies, the major institutes have established franchises (Deemed Universities) all over the country.

2.2.3 Design Centres & National and International academic initiatives

Certain Institutions have established Design and Innovation Centres. The most well documented ones are the Industrial Design Centre of the Indian Institute of Technology in Bombay and several Centres and schemes organized and run through the National Institute for Design (NID). The latter has established the International Centre for Indian Crafts, which integrated traditional crafts and art with modern design. The NID has also established cooperation initiatives with the Industry:

- The National Design Business Incubator (NID Ahmedabad) , set up with the support of the Department of Science and Technology, to facilitate integration of design and entrepreneurship
- The Integrated Design Cell, which is undertaking consultancy work for industry
- The Outreach Programmes, which is a network of design collaborations throughout Indian Societies
- The Design Clinics and the Industry & Online Programmes, which consist of a series of awareness workshops
- An Intellectual Properties Rights Cell

There are also student internships offered through leading companies to students.

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3. Sectorial reports, articles and studies

3.1 Introduction

This section aims to identify ways that the design sector in India can evolve, especially in relation to the collaboration between HEIs and industry. In order to ascertain direction for the project five sectorial reports will be presented briefly. Recommendations for the project will be presented in the end of this section. These insights are grounded in an analysis of previous sectorial reports analysing design and innovation in India.

3.2 British council report design in India

Design in India is expanding. The number of professional designers in India is 7.000 while the number of students is approximately 10.000. This explosive growth is attributed to the national policies that aim to kickstart design in India. In 2010 the number of design institutions in India was approximately 10, by 2016 this number increased to over 70 (British council report, 2016). *Design in India has matured over the years and is booming. By 2020, the potential market for design in India is expected to reach INR 188.32 billion (GBP 1.43 billion). Only a fifth of the design market is currently tapped. The number of designers required by 2020 in industrial, graphic, communication, packaging and other design domains will be 62,000, provided the design potential is fully realized. Currently there are approximately 7,000 qualified designers in the country and approximately 5,000 students in design education.*

Given these directions design institutes in India need a transformation. There is a need to increase emphasis on research and doctoral education. In addition, Design institutes need to cooperate extensively with other domains of study, such as business, social sciences and technology.

Designers today are expected to think beyond mere artefacts and be more strategic in their work. The boundaries within known design disciplines are blurring and there are several other disciplines that are practicing design. Design has become pervasive and hence the nature of design education also needs a change. A new way, marked by an attitude of openness, cooperation and exploration is needed to change the way design education is perceived.

Design is now branching out of its core roots to newer applications and utilities. Areas such as interaction design, service design, transformation design, and instruction design are establishing new paradigms. New tools and methodologies are being developed. These evolutions of design cannot simply be transferred from abroad, they have to be applied in the local context and incorporate the problems and opportunities of the Indian design approaches.

From being an intuitive discipline, design is growing into a discipline, replete with tools and frameworks. There is a growing focus on systematic and methodical incorporation of user experience in design, which entails the involvement of competencies in marketing research, consumer behaviour, technology, anthropology and psychology in the design processes. It is important for Indian design institutions to embrace these new developments.

3.3 The 'winning leap' report

In its seventh decade of independence,India stands on the cusp of major change: a transformation that could lead to unprecedented economic growth paired with radical improvements in the nation's Human Development Index (HDI). Over the past two decades, India's gross domestic product (GDP) has risen by more than US$1tr, in theprocess bringing millions of citizens into a new cohort we call the emerging middle class. We set out to understand what it would take for India to increase its GDP by 9% per year to become a US$10tr economy over the coming two decades.

Anything less than US$10tr would not secure India's future. The nation needs to create 10-12m jobs every year in the coming decades to provide quality of life for its growing population. Young Indians, particularly members of the emerging middle and the middle class—a billion strong by 2034—have rising aspirations. They are also more empowered to demand change, thanks to ever-greater access to the internet and mobile connectivity broadening the network to provide 80% access to the internet for the population in the two following decades from a 15% access in 2014. The recent electoral mandate for development is a more immediate signal of Indians' desire for growth and for the benefits of growth to be extended to all members of society. A commitment that is echoed in the National Design Policy established in 2014.

A 9% GDP growth rate with a percapita income rising from US$1,500 to just under US$7,000 per year will boost quality of life for more than 1.25bn citizens. This would be the largest national development effort any democracy has ever attempted.

3.4 Design Pataka- The Explosion of Design in India: 2010–2016

Design in India is a notion with many diverse meanings. This attributed to the history of design more than language. *"Indian women make floral patterns as auspicious welcome signs, and traditionally this is called design. The intricate decorative border of a sari is considered design. A piece of jewellery is design. But the innovative new chair made by a carpenter, or an improved bedpan—which the modern world calls design—is not considered design by people in India. Even in this twenty-first century, modern Indian industry is familiar with engineering design, but gets quite confused when it comes to design. The reason for this is traditional association, as well as what its colonial rulers promoted as design through Indian arts and crafts schools. When modern design, as it is known today, was introduced in India, and when the first professional group of designers was founded, it was called the Society of Industrial Designers of India (SIDI). This was done to emphasize the relationship between design and industrial production, although the Society admitted all designers including graphic designers, exhibit designers, textile designers, and animators."* (Balaram, 2005). A 2016 report carried out for Dutch Culture and the government of the Netherlands aimed at mapping the professional landscape of design in India by providing an up to date analysis of the government policies, initiatives and the public sector. The main findings of the report are:

- The fostering of the regional design capacity of the Indian periphery due to the national design strategy and the networks of grassroots innovation.

- An emerging collaboration between the diverse Indian crafts and modern design creates an emerging paradigm of craft-design.
- The Indian private sector is heavily investing in design by either buying or creating in-house design departments embedding design as part of their corporate governance.
- The increased interest, involvement and funding of design and culture by international entities.
- An increase in the number of conferences, festivals, workshops, pop-ups related to design.
- The massive growth of the tech sector, especially those specialising in e-commerce and mobile apps.
- The plethora of cheap Indian smart phone brands is creating an ever-larger online community that are more design savvy and engaged.
- As a result of the "mobile revolution", we see a spurt in the use of social media.

These opportunities paint a picture of a dynamic sector with a market ready to adopt design thinking in the DNA of organisations. This openness to strategic design creates a possibility for it to be central in the explosion of growth that will come from India's maturation and emergence in the world economy. Once again this underlines the necessity for a further evolution of Indian design curricula towards digital design fields such as UX, accessibility and HCI.

3.5 Indian design report. National design policy 2017

A 2017 report published by the National Design Committee Confederation of Indian Industry provides a deep understanding of the current state of design in different design disciplines. The report presents statistics of Indian design, information about design governance, design ecology, applicability of design and some trends. The report synthesises quantitative data and desk research to map the contemporary landscape of design. The main points of the report are:

- Design industry is characterized by small to medium sized firms. Many of them are one to five people operations. Of these, many are founded recently.
- There are a few well organized design consultancies with higher employment rate. These firms offer multiple specialties and serve more or less as one-stop-shop for design needs.
- Majority of design activities is focused in 4 cities viz. Mumbai, Delhi, Bangalore and Pune. Design activities are urban in character.
- India is one of the few countries to have formulated and adopted a National Design Policy. It recently constituted an India Design Council to implement the major provisions of National Design Policy.
- Design education has seen a spurt of growth in the last 5 years or so with many private institutions getting initiated.
- Lately the Indian Design companies have been entering into collaboration with foreign design companies. This number is miniscule at present, but the trend is visible.
- Many foreign design companies are setting up offices in India on their own. There are a few already here, mainly in the area of branding and communication.

The report concludes with recommendations deemed necessary for the sustained growth of the design economy. These recommendations touch on government policy, Business, education, society and finally the need for the establishment of design hubs:

"*It is suggested that Design Hubs be established in selected city centres across the country. In all instances mentioned above a lack of communication and information about the applicability of design towards business, society, public services, etc. is strongly felt. The Design Hubs will act as a facilitating centre that connects, engages and involves people who provide design, people who commission design and people who use design. It will function as a network provider which links and brings together sets of people/agencies that can engage in dialogue and move further. It will engage the public through dissemination of information through exhibitions, talks and events and other suitable mediums.*"

This necessity tied in with the maker movement and the recent developments in desktop digital manufacturing. In addition, these open hubs that connect innovators and designers are excellently suited to the particularities of India. Much of the emergent innovation is based on the diffuse design capacity of Indians, This is in line with the National Design Policy of India which calls for a creation of *"specialised Design Centres or "Innovation Hubs" for sectors such as automobile and transportation, jewellery, leather, soft goods, electronics / IT hardware products, toys & games which will provide common facilities and enabling tools like rapid product development, high performance visualisation, etc. along with enterprise incubation as well as financial support through mechanisms like venture funding, loans and market development assistance for start-up design-led ventures, and young designers' design firms/houses."*

3.6 Unleashing India's Innovation World Bank report

India is increasingly becoming a top global innovator for high-tech products and services. Still, the country is underperforming relative to its innovation potential— with direct implications for long-term industrial competitiveness and economic growth. About 90 percent of Indian workers are employed in the informal sector, and this sector is often characterized by underemployment, as well as low-productivity and low-skill activities. Although India has the benefit of a dynamic young population—with more than half of the country's population under 25 years old—only 17 percent of people in their mid-20s and older have attended secondary education. To sustain rapid growth and help alleviate poverty, India needs to aggressively harness its innovation potential, relying on innovation-led, rapid, and inclusive growth to achieve economic and social transformation.

One of the unique features of the report of the World Bank is its focus on grassroots innovation as a strategy enabling faster growth. By promoting, enabling and facilitating such top down innovation process India aims at unleashing its innovation potential. The report proposes the development of a three-pronged strategy:

1. India would benefit from increasing competition as part of efforts to improve the investment climate, supported by stronger skills, better information infrastructure, and more finance—public and private. Only 16 percent of Indian manufacturing firms offer in-service training. The skills bottleneck has to be avoided for growth to continue.

2. India would benefit from strengthening efforts to create and commercialize knowledge, as well as better diffuse existing global and local knowledge and increase the capacity of smaller enterprises to absorb it. New domestic knowledge needs to be converted to commercial use. Of the top 50 applicants for patents in India between 1995 and 2005, 44 were foreign firms. Only six were Indian; three of these were public institutions and one, a public corporation. Just two were private Indian firms. Actions to promote commercialization and strengthen links among industry, universities, and public laboratories

could include providing support to technology transfer offices, creating a patent management corporation, developing technology parks and incubators, and improving India's regime for intellectual property rights.

3. India would benefit from fostering more inclusive innovation—by promoting more formal R&D efforts for poor people and more creative grassroots efforts by them, and by improving the ability of informal enterprises to exploit existing knowledge. Existing pro-poor initiatives need to be scaled up. Inclusive innovation can play a critical role in lowering the costs of goods and services and in creating income-earning opportunities for poor people. The National Innovation Foundation has a repository of more than 50,000 grassroots innovations and traditional knowledge practices. And a number of initiatives exist to help the informal sector better absorb knowledge.Successful technology upgrading programs could be extended to help informal and rural enterprises make better use of existing knowledge.

3.7 Conclusions and recommendations

The shared characteristics of all the reports analysed point to the emergence of the field of design in India. The establishment of the National policy on design coupled with the opening of many design focused institutions paint a picture of the 'next big thing' in the country. This field is ripe with opportunity as the demand for professional designers is higher than the supply, a trend that will continue in the future as the necessity for designerly skills in the market increases. An additional reason that further supports this point of view is the demographics of Indian population. The population is young and they are expected to surpass China's aging population in the next two decades. These young people have needs for education, skills and new innovative products. At the same time India is witnessing a 'digital revolution' that will demand skilled designers in the fields of HCI, UX/UI and web design. Finally, as the county's economy grows creating low cost innovation that improves the everyday life of people living in poverty is an absolute necessity. This process cannot be approached in a context of charity. Instead supporting the existing networks of grassroots innovation with designerly thought seems like a spatially acceptable strategy. Importing innovative solutions is an expensive endeavour, by scaling up grassroots innovation in an extreme affordability mindset not only creates more competitive products but simultaneously increases the local design capacities and culture as well as creating jobs in the production sector.

Given all of the above the five main key findings and recommendations extracted are:

1. Establishment of design hubs in HEIs around the country to bring together grassroots innovators and Industrial designers
2. Investing in the education in fields of digital design as the country becomes more connected
3. Integrating traditional craft practices in contemporary design practice
4. Fostering grassroots innovation and scaling up such innovation to industrial products
5. Incorporation of design thinking, strategic design and service design in the DNA of Indian companies.

4. Design education in India (HEIs)

This part indicates the corresponding curricula of five key Higher Educational Institutions offering Design Education in India and gives emphasis to holistic, multi-disciplinary design education approaches. It also includes cases of cooperation between sectors of the Indian Economy and the HEIs, including Internships and other relevant activities.

4.1 The key Institutions that provide Design Education in India today

Table 8 in Annex II cites all Institutions that offer Higher Education at professional diploma, undergraduate, postgraduate and research level in India today.

Two State Institutes have the longest presence in this field and will be presented first. These are the Indian Institute of Technology in Bombay and the National Institute for Design (NID), which is the oldest public educational institution in the field of design, established solely for Design Education and set under the auspices of the Ministry of Industries and Trade for several years. Then, the educational approaches of the Indraprastha Institute of Information Technology - Delhi (IIIT), the RIMT University – Punjab and the World University of Design – Punjab, that are also key partners in the DESINNO project are presented.

4.1.1 The National Institute for Design (NID)

The National Institute of Design currently enrols only 100 undergraduate students in 4 year bachelors programmes. All students have to attend a foundation year, during which they are taught subjects in sciences and humanities (including social sciences, philosophy etc). Following the successful completion of the foundation year, the students have to select courses from 3 routes: 'Industrial Design', 'Communication Design' and 'Textiles-Fashion Design'. The Industrial Design route consists of the following course options: Ceramic & Glass Design, Furniture & Interior Design and Product Design. The Communication Design route consists of the following course options: Animation Film Design, Exhibition Design, Film & Video Communication and Graphic Design. The NID emphasizes education based on fine and traditional arts, history and many practical hands-on studios. Studies are neither considered "engineering" nor "artistic" in context, but rather "design oriented". Elements of Service Design are taught in Product and Exhibition Design, covering aspects as diverse as city planning and healthcare solutions. The educational philosophy that underpins the courses offered at the NID is consistent with all national design policies since 1957 that value designers as facilitators of change in Indian Society and solution developers for the good of the nation.

The NID undergraduate programme expects students to work in industrial internships for certain subjects with strong industrial content e.g. textiles, product design, exhibition design. For other courses e.g. glass and ceramics, the curriculum required further involvement with fine arts instead.

The NID is very active in promoting the National Policy on Design. It has established and runs the International Centre for Indian Crafts, which integrated traditional crafts and art with modern design.

The NID has also established cooperation initiatives with the Industry and in particular:

- The National Design Business Incubator (NID Ahmedabad), set up with the support of the Department of Science and Technology, to facilitate integration of design and entrepreneurship
- The Integrated Design Cell, which is undertaking consultancy work for industry
- The Outreach Programmes, which is a network of design collaborations throughout Indian Societies
- The Design Clinics and the Industry & Online Programmes, which consist of a series of awareness workshops
- An Intellectual Properties Rights Cell

The NID also offers 18 postgraduate courses (2.5 years) and Research (PhD) options. These cover animation, film, photography, new media, digital products, Information Design, industrial design, textiles and fashion, graphic design, as well as Retail Experience, Strategic Design Management and other Service Oriented aspects of Design. Thus NID covers physical, digital and service design.

4.1.2 The Industrial Design Centre of the Indian Institute of Technology in Bombay

The Industrial Design Centre of the Indian Institute of Technology in Bombay offers 4-year undergraduate courses, 2.5-year postgraduate courses and 5 year combined Bachelors and Masters courses. The philosophy of design education in IIT Bombay, is not engineering. Mathematics and engineering modules are not taught as in other engineering departments. Instead the education is cross-disciplinary including, besides design, specific subjects, humanities, applied arts and applied sciences and technology. On the other hand there is a very strong focus on digital and new media technologies, 3D product modeling, ergonomics and human-product interaction. The curriculum of the IDC-IIT combined course can be accessed at http://www.idc.iitb.ac.in/academics/Bdes-design-course-credits.html. During their studies the students have the options to select one of the following specializations: 'Industrial Design', 'Communication Design', 'Animation', 'Interaction Design' and 'Mobility and Vehicle Design'. IIT is not as focused on traditional crafts such as, pottery, glass art and textiles as NID. It is more geared towards a deep understanding and development of global products and services. IDC-IIT offers also short diploma courses and PhD options.

Student placements are offered for some routes in undergraduate and postgraduate studies and are counted in course credits.

4.1.3 Indraprastha Institute of Information Technology-Delhi (IIIT)

This Institute of Technology has been established as a State Institution by the government of Delhi. It is relatively small university offering courses in Information Technology topics, Computational Biology, Applied Mathematics, Social Sciences and Electronics & Communication Engineering. One of the 6 Departments of the University is the Human Centered Design Department.

The curriculum is based on a strong scientific and technological foundation and much less on applied and humanities. Foundational Design Drawing skills are limited in one module. Besides general academic education, key modules that are offered are Design of Interactive Systems, Game Design, 2D animation, 3D character animation, 3D production design for animation and gaming, motion graphics, visual design and communication. There is also a module on Design processes & perspectives, which

presents key methodologies and approaches (e.g. Design Thinking). In addition, students are taught Research Methods.

The University also offers Postgraduate courses mainly addressed to students of other disciplines and backgrounds, with programmes being quite similar to those for undergraduates. Opportunities for PhD research also exist.

The University has strong links with Large Corporations in India and it offers internships (291 places for the academic year 2018-2019).

On the 22nd August 2018, the IIIT Delhi established the Centre for Design and New Media, along with the TCS Foundation, that offer a multi-million grant, and Tata Consultancy Services. Over the next 7 years, it is planned to create infrastructure for labs in IIIT Delhi. The centre plans to focus on advancing the research and development activities in Human-Computer Interaction (HCI), Interaction Design, Multimedia, Graphics, Games, Virtual and Augmented Reality, New media and other areas of interest.

4.1.4   RIMT University - Punjab

RIMT is a large private university in the area of Punjab, established in 1998. Among many disciplines, it has architecture, information technology and fine arts school and in particular it offers 2 and 3 years professional diploma courses, 3 and 4 year undergraduate courses and 2 year postgraduate courses in Interior Design, Design and Textiles/Fashion leading to several specializations such as Interior Space Design, Exhibition Design, Furniture Design, Fashion, Apparel, Jewellery, Film & Video, Graphic Communication and Fashion Communication.

All courses in Design, Interior Design and Textiles/Fashion contain several modules in general skills and personal development (e.g. use of computer office applications), fine/applied arts (e.g. drawing, colour, photography etc.), humanities (e.g. ethics, history, etc.) and management. With the exception of modules in graphics and IT, all related scientific and technological modules (e.g. materials, textile technology, construction), are geared towards applied technology and are not considered engineering studies. This means that applied mathematics, thermodynamics, fluid mechanics, mechanics of materials, industrial chemical processes etc are not taught as single and detailed academic modules, but some of their concepts have been integrated in several modules. On the other hand training in elements of fine and applied arts is very strong. Teaching is supplemented by several studios that are important in any subject with strong artistic element.

RIMT runs a student placement (internship) scheme with several private companies in Punjab.

4.1.5   World University of Design - NCR New Delhi.

World University of Design (WUD) was established in 1998 and managed by the Shri Om Parkash Bansal Educational & Social Welfare Trust of Mandi Gobindgarh, Punjab. This University has been established to address Design Education and related activities. It has 6 schools: Architecture, Design, Fashion, Communication, Visual Arts and Management. The school of Design offers the following undergraduate and equivalent postgraduate courses: Product Design, Transport Design, Interior Design, as well as a 1 year Diploma in automotive modeling. The School of Fashion is purely fashion related with emphasis on apparel and other fashion products (i.e. very limited focus on textile and leather engineering) offering underground courses in Fashion Design and Fashion Communication,

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postgraduate course in Fashion Design and a Diploma in Fashion Design. The School of Communication offers undergraduate courses in Graphic Communication Design, Animation & Game Design and Film & Video, postgraduate courses in Communication Design and short Diploma courses in Graphic & Web Design and Photography. The School of Visual Arts offers undergraduate courses in Creative Painting, Digital Drawing & Illustration, postgraduate courses in Contemporary Art Practices, Curatorial Practices in Art, Art Education and Fashion Art and short Diploma training in Painting. The Management School is concerned with management of design practices and consumer aspects and, in particular, it offers undergraduate courses in Design Strategy & Management, Retail Business Management and two MBA schemes in Design Strategy and Management.

The educational approach is similar to that of RIMT above (In fact, RIMT and WUD were founded by the same educational and social Trust). Education is supplemented by a placement scheme, managed by WUD's placement office that involves real work experience for undergraduates and postgraduates in selected public and private organizations, as well as NGOs.

WUD provides design services to various sectors of the industry and the public sectors. The Comprehensive Design Services (CDS) of WUD is the unit that undertakes these consultancy projects. WUD has already taken up and successfully completed many projects in logo design, graphics & communication, exhibition design and even setting up design educational services in other Asian countries.

The WUD Outreach is another initiative that connects the academic knowledge and facilities to those outside its regular education and client service activities. In these cases, the clients are typically SMEs, hand & craft industries, other institutions of education and training, voluntary organizations and central or state bodies working in social sectors.

WUD also runs the Industry Programmes. These are workshops and short programmes for design awareness. These aim at enhancing industry competitiveness.

4.2 Innovation outside the academic context

Many innovation and design initiatives originate purely in the private sector. Major companies have started setting up innovation hubs to facilitate technological, business and social change. These cover most aspects of product and service development, as well as community-oriented actions.

India has a huge growing internal market, in a process of fast transformation, thus making certain business projects a challenge. Managing resources to ensure what will be achieved, how and for whom, requires thinking beyond ordinary business practices. However, certain so-called innovative approaches appear to be nothing more than complex business problem solving. That is the case with many Business Consultancies that sell problem solving as part of their business (e.g. the case of the Accenture Innovation Hub at Bengaluru)

Examples of innovation hubs that go beyond ordinary business problem solving can be seen in the Information Technology field. For example, Facebook is in the process of launching 3 new innovation hubs within 2019. The application that will be developed will aim at addressing real challenges in society. Other multinational corporations e.g. SAP, set up new R&D campuses, though the solutions that they develop are addressed to corporate users, they do not involve community users in the development process and they are not community oriented.

R&D is strong in most industries throughout India. Besides pure private interests, there are also numerous mixed private-public initiatives that involve businesses, the Indian or local government, NGOs and other stakeholders. One example of such cooperation is the India Innovation Growth Programme (IIGP) 2.0 which is a unique tripartite initiative of the Department of Science and Technology (DST), Government of India, Lockheed Martin and Tata Trusts. At this phase, the IIGP2.0 is in the process of assessing innovative ideas and selecting 30 University and 50 Start Up applications for support.

4.3 Debate on the issue of Industry-Academia partnerships

The issue of Industry-Academia-Government partnerships has attracted academic interest in the last decade, analysed and models for improved cooperation have been proposed. It is argued that such partnerships are still complicated by failures from the part of all stakeholders involved (Gandi,, 2014 ;Nangia, Pramanik, 2011).

The Government is considered very inflexible and bureaucratic. It is argued that instances of over-control and delays for funding are too many. It is also argued that the Universities are not fully aware of the real industrial and national needs, they have not experience in marketing their strengths to industry and the government adequately and they lack incentives to engage in partnerships. On the other hand, it is argued that all this is changing. This is probably true since reporting of such problems took place at least five years ago and it is based on several observed practices of the previous decade. One of the key problems hindering such partnerships appears to be the lack of state of the art scientific and technical infrastructure (i.e. fully equipped R&D Laboratories). Another problem is the limited university-industry interaction that does not promote cooperation opportunities and a cooperation culture. The Industrial partners are concerned with short term results and profits, are reluctant to invest in R&D that has unclear or long term output, are not willing to share what they think is proprietary information or resources that constitute competitive advantage and they often fail to understand the capabilities of the universities or hold negative views of earlier unsuccessful joint projects with academia.

Future improvements in the Industry-Academia cooperation will have to address both infrastructure and attitude aspects, through investment in specialized equipment and a well-designed communication campaign.

Annexes

Annex I – Sources

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Annex II – Providers of Design Education in India in 2016

Table 8. Providers of Design Education in India (2016)

Design Sector	Institutions
Architecture	• Centre for Environmental Planning and Technology (CEPT) • JJ School of Architecture • School of Planning & Architecture
Interior Design/ Landscape Design/ Furniture	• Anna University-Chennai • Centre for Environmental Planning and Technology (CEPT) • Design Institute of India • National Institute of Design (NID) • Srishti School of Art, Design & Technology • University of Pune
Fashion Products/ Textiles/ Leather/ Jewellery	• International Institute of Fashion Technology (IIFT) • Inter National Institute of Fashion Design (INIFD) • National Institute of Design • National Institute of Fashion Technology (NIFT) • Pearl Academy of Fashion • Srishti School of Art, Design & Technology
Graphic Design	• Apeejay Institute of Design • Department of Design-IIT Guwahati • Design Institute of India • DJ Academy of Design • IILM Institute for Higher Education • Industrial Design Centre- IIT Bombay • Loyola College- Department of Visual Communication • MIT Institute of Design • National Institute of Design, • Raffles Design International • Srishti School of Art, Design & Technology • Symbiosis Institute of Design
Animation / New Media	• Arena Multimedia • Design Institute of India • DSK International Institute of Design • Industrial Design Centre- IIT Bombay • Maya Academy of Advanced Cinematics (MAAC) • National Institute of Design, • Srishti School of Art, Design & Technology

	• ToonSkool
Industrial Design/ Automotive Design/ Fast Moving Consumer Goods	• Centre for Product Design and Manufacturing, IISC, Bangalore
	• Department of Design-IIT Guwahati
	• Design Programme- IIT Kanpur
	• DJ Academy of Design
	• DSK International Institute of Design
	• Industrial Design Centre -IIT Bombay
	• Instrument Design & Development Centre- IIT Delhi
	• IILM Institute for Higher Education
	• IIITDM, Jabalpur
	• MS Ramaiah School of Advanced Studies
	• MIT Institute of Design
	• National Institute of Design
	• Nettur Technical Training Foundation
	• Raffles Design International
	• School of Planning & Architecture
	• Symbiosis Institute of Design
Other (Incl. Toys, Exhibition, Research)	• Design Institute of India
	• National Institute of Design
Human Computer Interaction	• Department of Design-IIT Guwahati
	• Industrial Design Centre -IIT Bombay
	• National Institute of Design