SMART GOVERNANCE OF THE BUILT ENVIRONMENT: A STUDY ON RESILIENCE IN URBAN AGGLOMERATIONS IN DELHI, INDIA AND BERLIN, GERMANY

BY

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Ma o Baba'r jonno

(To My Parents)

Declaration

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person, nor material which has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgement has been made in this text.

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THESIS COMPLETION CERTIFICATE

This is to certify that the thesis on **"Smart Governance of the Built Environment: A Study on Resilience in Urban Agglomerations of Delhi, India and Berlin, Germany"** submitted by **Mr. Arnab Bose**, in partial fulfilment of the requirements for the award of the Degree of Doctor of Philosophy is an original work carried out by him under our joint guidance. It is certified that the work has not been submitted anywhere else for the award of any other diploma or degree of this or any other University. In our opinion, this work has reached the standard fulfilling the requirements for the award of the degree of Doctor of Philosophy in accordance with the regulations of the University and the UGC Act, 2016.

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Abstract

This research acknowledges that inclusive sustainable development is the most important challenge facing humankind in the present times. In this context, *'Smart Governance of the Built Environment'* is a study which finds that the crucial, and, evidently the first step, in attaining objectives of inclusive sustainable development is in providing for effective local governance. This research is a study of the resilience framework as a trans-disciplinary heuristic for effective local governance. Granularly, the research objective is to find meaning in the phrase – Smart Governance of the Built Environment; and, what it means for various stakeholders in terms of inclusion and sustainability. The locations and subjects are chosen purposefully to contrast and comprehend urban, semi-urban, developing and developed country attributes in the built environment. The study has been conducted to envision inclusion and sustainability at the grass roots of a built environment. The research entails cases from the urban agglomerations of Delhi, India and Berlin, Germany. The resilience framework with respect to stakeholder consultation is utilized to get an emic and etic narrative. Literature on Reflexivity and Heuristics is used to substantiate the study. The study is further validated with the utilization of techniques in User Experience. Cybernetics is used to provide a score and give a sense of the built environment to the user. Inclusion is found in various parameters like Gender, Age and Disability. The contexts of technology, like the use of Artificial Intelligence or Distributed Ledger Technologies are also brought in. The notion of Finance via the study of the concept of Financial Gradients is represented. To illustrate all the aspects succinctly, the communication of the results is categorized into three parts – vignette, an attribute-based table and photographs. This research finds that one major pathway of attaining

sustainable development and inclusion globally is to first work towards providing for effective local governance. And, the first step towards providing for effective local governance will be to utilize already prevalent information flows in the contextually relevant human system surrounding a defined built environment. In this context, the research also finds a new definition of culture as a manner in which information flows in a particular human system. This understanding is important to the emergent fields in information technology and governance of the internet itself. This aspect speaks to a better understanding of why the internet or emergent technologies thus far are seen to be reticent in conflating to the ideals of inclusion and sustainability. This research can be envisaged as a communique to bridge the gap among various disciplines and actors in the fields of inclusion and sustainable development. This communique is a first of its sort to encapsulate the true essence of a trans-disciplinary research presenting an approach of how multi-disciplinary, multi-dimensional, multi-lateral and multi-stakeholder complexities can be poured into a single cognitively and practically useful approach to effective and smart local governance.

Policy Impact

One major reason why studies in inclusive sustainable development are undertaken is to create policy impact. Aspects of this research has already been taken up by influential think tanks, government agencies, media houses in India and abroad, to be included in future policy discourse. *'Strategy for Financial Inclusion of Informal Economy Workers'* (Sharma et al., 2019), is a policy paper borne out of this doctoral research, which has been recognized lately by the National Urban Livelihood Mission of the Government of India for future action. The paper also got foreign media traction by the BBC World Services[1].

The wealth of knowledge created using a trans-disciplinary approach utilizing qualitative methods is truly worth noting. The paper *'Strategy for Financial Inclusion of Informal Economy Worker'* uses an observation from this research of the informality of the kiosk of a ubiquitous 'dhobi' or washer-man in the various urban spaces across India. The observational findings revealed that the informality is due to a lack of contractual papers associated with the location of the kiosk or the washer-man. Though such people have regular cash flows, they are financially excluded as they lack 'papers' to substantiate their proof of work. This research had found that treating them as 'static' workforce, a contract could be envisaged between neighbourhood residents' association and the informal workers themselves. Technology can be harnessed for scale. In such cases there is a fitment of distributed ledger technologies. This instance proves the importance of the research method, where observational data can be used to create major policy impact effecting an extremely large number of people.

[1] BBC World Services covering the paper on 'Strategy for Financial Inclusion of Informal Economy Worker' in a live interview on social media; link: https://www.facebook.com/bbcworldservice/videos/can-india-create-enough-jobs/604095123425249/

Another observation from the lived user experience of this research is the contrast in treatment of persons with disabilities in developing and developed country built environments. This research finds that most persons with disabilities can commute between most places on their own in a developed country setting, whereas it is virtually impossible for most persons with disabilities to commute between most places in developing countries. Through the user experience feedback method this research has unearthed that there is a substantial loss in public expenditure due to incorrect design of interventions in the public spaces, say, like those of creating ramps for bus stops. Moreover, creating a built environment which is friendly for persons with disabilities has very important co-benefits in sustainability, too. For example, improving wheel chair access in public transport, helps people ferry luggage easily thereby will reduce dependence on personal vehicles. It will also improve the quality of life of those people who are not in a position to avail personal transport themselves.

A Short Biography

Arnab Bose

An inclusive and sustainable future is primarily dependent on social cohesion and trust; Arnab works towards creating better social systems leveraging knowledge in technology, science, social sciences, finance, culture and human behaviour. He believes that people with passion can change the world for better.

He has a Bachelor's Degree in Economics from University of Delhi, India; a Master's degree in Economics from JNU, India; and an M.B.A in Finance from Amsterdam Business School, The Netherlands.

He was Assistant Vice President (Responsible Banking) at YES Bank and Associate Fellow in the Green Growth Division of The Energy and Resources Institute (TERI) in New Delhi working in various consultancy projects on resilience, climate adaptation, climate finance, renewable energies, river basin management and electric mobility.

Research Areas (apart from projects, consultancies and this doctoral work): He has carved out three important research areas, namely, Financial Gradients, Resilience Centers and Real Options analysis for Sustainability Investments. All three have a common approach of looking at Policy and associated disciplines of Finance and Economics in totality and not as silos of Public Finance and Corporate Finance. Resilience Centers: It is a concept focused on implementation and management of adaptation and resilience centric programs and projects. Financial Gradients: It can be looked at as introducing financial controls in sustainable development and climate action. It can also be thought of as an instrument to lower monitoring costs and a tool

for building a strategy for programs and projects in the climate and sustainable development space. Real Options: A suitable decision-making tool for large funds management in the climate domain. It helps to value options, manage funds, allocate resources, and make decisions under uncertainties. His recent interest is in crafting 'real options' as a solution for community or neighbourhood issues using advancements in technology particularly in information technology. Specialties: Environmental Finance, Business Analysis, Business Reporting, Financial Modelling, Real Options analysis, Economics and Business Research.

He has many publications to his name appearing in various high impact international peer reviewed Journals; few relevant publications are listed below:

Bose, A. (2011). Climate finance and financial gradients: perspectives and methods. International Journal of Regulation and Governance, 11(2), 57-76.

Bose, A., Ramji, A., Singh, J., & Dholakia, D. (2012). A case study for sustainable development action using financial gradients. Energy policy, 47, 79-86.

Bose, A., Wolf, J., & Sharma, S. (2012). The future of adaptation finance: methods and perspectives. International Journal of Regulation and Governance, 12(2), 145-172.

Pathania, R., & Bose, A. (2014). An analysis of the role of finance in energy transitions. Journal of Sustainable Finance & Investment, 4(3), 266-271.

Sharma, S., Bose, A., Shekhar, H., & Pathania, R. (2017). Plugging the Implementation Gap: An Indian Case Study on Bridging Disconnects Between Global Climate Regime and Creation of Local Impact. Review of Market Integration, 9(1-2), 27-44.

Bose, A., & Sharma, S. (2018). Understanding the relationship between global and national climate regimes and local realities in India. In: The Implementation of the Paris Agreement on Climate Change (pp. 212-221). Routledge.

Sharma, S., Bose, A., Shekhar, H., & Pathania, R. (2019). Strategy for financial inclusion of informal economy workers. ICRIER working paper series.

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To those innumerable persons from all walks of life, in India or in Germany or even from other places, whether from academia, policy, industry or community, whose help and insights have been vital in this research.

And Finally, Prof. (Dr.) Sanjeev P. Sahni without whom this journey would not have been possible.

What can I do?

A motivation for this research:

What can I do to improve the quality of my life? There are various constraints anyone faces to improve her or his quality of life. To many people from Africa or Asia going to Europe or North America and settling there seems to be the only robust method of improving the quality of life. Every day we hear about people from Africa, Middle East and even South Asia risk their lives to reach Europe. This also begs a question, that why cannot we in the developing world also have a similar quality of life as in Europe and North America. Economists often tell us that there are many barriers to be overcome before the same quality of life can be experienced in the developing economies. They say, the formal institutions need to be less corrupt, processes of access to technology needs to be in place, there are huge capital requirements for this, also so many other things need to be done; better health care, better education and access to modern technologies, transport, infrastructure. The sheer number of things that need to be done is over-whelming. It is here, anyone will sigh and ask - What can I do?

Well fortunately, this thesis is an endeavour motivated to improve your quality of life where ever you may be. There are few circles of influence everyone has. They include the person herself, or himself; family, colleagues; and very interestingly the neighbourhood where someone might live or work. This thesis finds that the key difference between developed countries in North America or Europe and developing countries in Africa or Asia is presence or absence of effective local governance. This thesis with the rigour of doctoral research has articulated a possible pathway for inclusive sustainable development and instituting a framework for effective local governance. The framework is a mechanism to give feedback on certain aspects in the

built environment which will appear in any neighbourhood across the world. The built environment can be a pedestrian pathway, a bus-stop, kiosks, waste bins, urban squares, meeting points, markets and so on. This thesis shows - first, how the feedback can be taken from across a variety of actors in a neighbourhood; and, second, how the feedback can be presented to strategic actors and/or policy makers for action in a neighbourhood. This thesis has laid out possible first steps towards articulation of effective local governance. The thesis considers inclusion through the lens of Gender, Age and Disability; sustainability through the lens of resource efficiency, financial efficacy and also looks into technological fitment of emerging technologies. The thesis has important bearing on how we articulate inclusive sustainable development, and therefore of policy actions for a host of interventions. This will include climate action (both adaptation and mitigation), developmental action like financial inclusion, to better health care and support for women and persons with disabilities. The thesis has an important consequence on designing interventions, and hopefully in answering - what can I do.

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List of Acronyms

3i:	Inform, Inspire, Implement *(three stages of the Resilience Framework)*
5G:	5th Generation *(technology normally for wireless networks*)
AI:	Artificial Intelligence
BBC:	British Broadcasting Corporation
CBPR:	Community-based Participatory Research
CP:	Connaught Place
CPR:	Centre for Policy Research
CSR:	Corporate Social Responsibility
DDA:	Delhi Development Authority
DLT:	Distributed Ledger Technologies
DU:	University of Delhi
FG:	Financial Gradients
GAD:	Gender, Age and Disability
HR:	Human Rights
ICRIER:	Indian Council for Research on International Economic Relations
ICT:	Information and Communication Technology
JGU:	O.P. Jindal Global University
JIBS:	Jindal Institute of Behavioural Sciences
JNU:	Jawaharlal Nehru University
MCA:	Ministry of Corporate Affairs
MCD:	Municipal Corporation of Delhi
MeitY:	Ministry of Electronics and Information Technology
MHRD:	Ministry of Human Resource Development
MLA:	Member of Legislative Assembly

MLC:	Member of Legislative Council
MoEFCC:	Ministry of Environment, Forests & Climate Change
MoF:	Ministry of Finance
MoUD:	Ministry of Urban Development
MP:	Member of Parliament
MSDE:	Ministry of Skill Development and Entrepreneurship
MUDRA:	Micro Units Development & Refinance Agency
NAPCC:	National Action Plan on Climate Change
NASA:	National Aeronautics and Space Administration
NCR:	National Capital Regional
NDMC:	New Delhi Municipal Council
NGO:	Non-Governmental Organization
NOC:	No Objection Certificate
PWD:	Public Works Department
RWA:	Resident Welfare Association
SDG:	Sustainable Development Goals
SWOT:	Strengths, Weaknesses, Opportunities, and Threats
TERI:	The Energy and Resources Institute
ToI:	Times of India
UN:	United Nations
UNFCCC:	United Nations Framework Convention on Climate Change
UX:	User Experience
WEF:	World Economic Forum
WHO:	World Health Organization
YBL:	YES Bank Limited

CHAPTER 1: INTRODUCTION

1.1 Background

At the heart of this research is the desire to draw a pathway for inclusive sustainable development for all humans. The discipline of Economics elucidates various pathways to develop nations. A rudimentary knowledge of Economics will tell us that a development process similar to say, the Lewis Model, for example, may look at a transition from agrarian societies to industrial and service-oriented forms of employment as a process to develop economies. Mercantilism, or the likes of export-oriented growth models, have shown some promise in delivering on target human indicators. Nevertheless, the world is grappling with issues like climate change (IPCC 2007, 2012; Solomon et al., 2007), terrorism, local pollution, gender equality, access for the disabled, a life in dignity, etc. while fundamental technological transformations are beginning to show their risks and potentials (Stiglitz 2009). There are varied 'wicked problems' which seem to be insurmountable across many parts of the world. The Sustainable Development Goals (SDGs) have set in a framework for achieving inclusive sustainable development globally (UN SDG 2019) and this research is much to aide that process by looking at it from a very granular, neighbourhood level perspective. Against this backdrop, this research addresses how *Smart Governance of the Built Environment* may well be a very appropriate starting point to achieve inclusive sustainable development.

1.2 Smart Governance

This section acts as a primer on *Smart Governance of the Built Environment,* to clarify succinctly what is meant by the word 'Governance' and the phrase *'Smart Governance of the Built Environment'.* The process behind smart governance can be described in

four stages from human systems to governance and feedback, feedback management, and resilience.

Stage 1: Human System, the neighbourhood or locality

In the first stage, let us consider a Human System. For this research a neighbourhood or a locality is the human system. There are many factors or events which can happen to the locality. These can be exogenous or endogenous, like air quality of the locality worsening as a result of activities from outside and/ or inside the locality respectively. Think of a new industry cluster that has come up close to the locality or air quality worsening as a result of garbage and garbage burning inside the locality. There are a host of other factors, phenomena or events, exogenous and endogenous which can affect the quality of life within the locality. Figure 1.1 illustrates this stage.

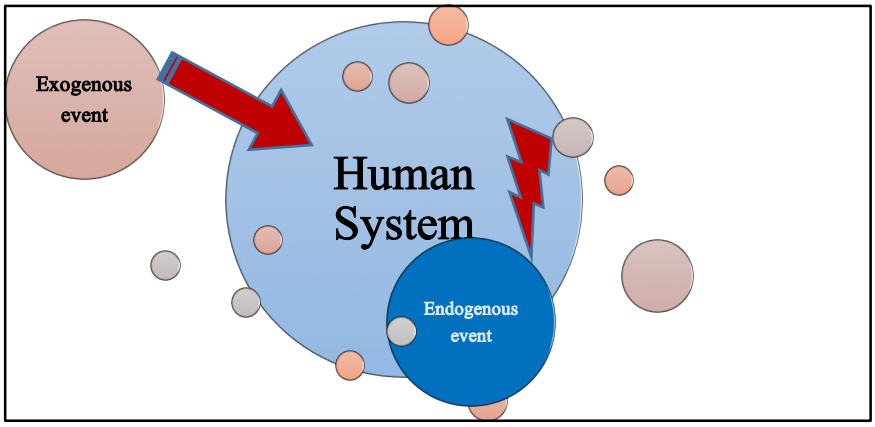

Figure 1.1: Human Systems and Events

Stage 2: Governance and Feedback

As a result of exogenous or endogenous factors influencing life in a neighbourhood there are two things that can happen: the human system can improve its position, because the feedback or repercussion is positive; or, if the feedback is negative, like road congestion worsening, then the human indicators of the locality will decline, and the human system will worsen its position.

Stage 3*:* Feedback management

The argument of this research is that good or bad governance is mostly the result of feedback loop management or simply feedback management. To clarify what is meant by feedback management let us take two cases of detrimental governance:

Case 1 – negative feedback goes unnoticed or is not taken up for action. (Air Quality in certain instances is a good example because it did not come up in the 2019 elections in India. Globally a similar argument can be made for Climate Change.)

Case 2 – negative feedback is noticed, but responses and interventions designed were incorrect, resulting in the position of the human system to decline even further. As a caveat, we notice a potential spiralling effect with new problems created as a consequence to the intervention.

Stage 4: Resilience

It may well be self-evident that the case for Good Governance is also a case for Resilience. Resilience is understood here as "a system's ability to endure pressures or shocks while maintaining or improving upon its functionality" (Styczynski et al., 2014). The discourse on either resilience or good governance will include multiple stakeholders, multiple dimensions, multiple disciplines and may well be multi-lateral, too. The entire discourse is complex while a simple process needs to be created at the grass roots level of a locality – the place where the impact on human and other life is the highest.

Good Governance processes that utilize new information and communication technologies (ICT) in a simple yet robust and effective manner following a framework for resilience is defined as *Smart Governance* for the purposes of this research. Smart

Governance at a local level, of places created by humans, places that we live and work in, is essentially *Smart Governance of the Built Environment.*

Additionally, the phrase Smart Cities is inherently tied to a discourse of the management and governance of a built environment leveraging ICT and allied technologies (Albino, V. et al. 2015). Given this research *Smart Governance of the Built Environment,* uses the word *smart* as a ways and means to address the concerns of scoping the research to focus on the objective of creating a pathway to realize the synergy between effective local governance of the built environment, internet governance (including ICT) and governance of emerging technologies like Artificial Intelligence (AI) and Distributed Ledger Technologies (DLT).

1.3 Context

There are significant shifts occurring in the world today at large. Three major points of inflexion of the recent past and present have important implications for this research. Primarily driven by technology, the disruptive forces behind these shifts have the power to rapidly and fundamentally transform the advances made over the last 300 years. These three points of inflexion are:

1. Finance: Financial Crisis of 2009 and the need for a new paradigm for Finance.
2. Urbanization: Human settlements and the grave challenges for India's urban realities.
3. Technology: The Fourth Industrial Revolution and its implications for India.

This thesis wants to connect these three factors with issues at the local level applying a 'Systems Thinking' approach (Checkland 1999; Weinberg, 1975).

Given that the discourse on either resilience or good governance will include multiple stakeholders, multiple dimensions, multiple disciplines and multi-lateral

actors; the unfolding narrative is ultimately a process of transfer of information among relevant actors within systemic boundaries. This transfer or flow of information among different relevant actors is of fundamental importance. Actors who will take decisions or on whom decision making rests, whether directly or indirectly, are called strategic actors.

The objective of this research is to unearth and unravel the influence of the flow of information on neighbourhoods in India and Germany to instil attributes of social and ecological resilience. The words 'social' and 'ecological' are brought in to account for (or scope) the context of resilience to those problems which are anthropogenic and endogenous to the localities studied in this research. The aim is to better understand how various social and ecological parameters in a neighbourhood such as cultural values, social harmony, law & order, essential services, employment opportunities, demography, location, local governance structure, gender, child friendliness, access to technology, land use, air quality, water availability, built environment and/or additional resilience dimensions affects the flow of information (or vice-versa). Put differently, the 'flow of information' is being looked at as a building block running through this research while it also carries the criteria by which neighbourhood attributes are assessed. It is recognized that the dimensions applicable for social resilience in the context of a neighbourhood in India involve a complex set of layered understanding of various social, physical, political, Indic (related to Indian philosophy) and behavioural factors; which this research shall endeavour to unfathom and explain succinctly.

1.4 Problem statement

The key issues of this research are revolving around the *'Design for Governance in the Built Environment'*. The comparison of localities in developed and developing nations has shown one important difference in the presence or absence of effective local

governance. However, the urban challenge of the Global South and to some extent the North too, is how to create multi-stakeholder synergies and build a pathway for robust decision making. The complexities involved seek a solution rooted in creating a framework for multi-stakeholder and multi-disciplinary actors, agencies and institutions which will result in instilling and overcoming the need for social and ecological resilience. The framework will ultimately result in bringing out a Design for Governance that synchronizes the multiple streams of Local Governance, Internet Governance, and Inclusive Sustainable Development. This research opts for a narrative to finding such a design closer to a logical conclusion. In addition, the design has to manifest itself as a trans-disciplinary heuristic led by Systems Thinking and a problem statement captured through the Resilience Framework (Bose & Sharma 2018; Mukherjee et al., 2014; NABARD 2011) applied to cases from the National Capital Region of Delhi and the Berlin Metropolitan Area.

The relation between a city and its neighbourhoods is a very interesting one (Florida 2003; Wellman & Leighton 1979). One pertinent method to enquire about this relation will be to look into Assemblage theory (Deleuze & Guattari, 1987, DeLanda 2006, Schaffers et al., 2011). DeLanda (2006) talks about two important aspects - segments and materiality. Both of these concepts become relevant with the progress of this research. The segment is an important concept as the neighbourhood is a smaller part - a segment - of the city; and materiality is important to create a border between a set of themes that are immediately relevant to the research and those that are not immediately relevant.

1.5 Theoretical underpinnings

This section is dedicated to various theories which can explain or at least address what this research means by ‘flow of information’. In this research design, a major

congruence can be seen between Emergence Theory and Assemblage Theory, referring to Gitt's propositions, vis-a vis Cybernetics and Systems Thinking approaches.

1.5.1 A Mechanism of Heuristic Judgement

Speaking about heuristics – earlier this century, Daniel Kahneman and Frederick Shane proposed that cognitive heuristics work by a process called 'attribute substitution' (Kahneman & Shane 2002). According to this theory, 'attribute substitution' happens without conscious awareness of replacing a computationally complex "target attribute" by a rather easier calculated "heuristic attribute" in the decision-making process. In effect, a cognitively difficult or complex problem is dealt with by answering a relatively simpler problem (Kahneman & Shane 2002). This theory explains cases where judgments fail to show regression toward the mean (Kahneman 2003). The implication is that heuristics can be considered to reduce the complexity of clinical judgments in healthcare, for example (Cioffi 1997). This particular argument will be extended to heuristics in the built environment at neighbourhood level (Bose & Sharma 2018).

1.5.2 Emergence Theory and Assemblage Theory

Emergence Theory is centred in Theoretical Physics but has a lot to say or add to Ontological and Philosophical questions on existence (Davies 2006). From the concepts of Emergence Theory, the famous Physicist John Wheeler[2] is acknowledged for having said that "Reality is made of information; which is created by observation." According to Gitt's (2006, 1996) taxonomy, Information can be classified as follows:

- Statistics
- Syntax (Cosyntics)
- Semantics

[2] https://www.youtube.com/watch?v=Qa4JkgKDaR0 (accessed August 2018 for the quote which is referenced at 15'17'')

- Pragmatics
- Apobetics

The above taxonomy of information helps in distinguishing the kind of information that exists in intelligent systems. In this research, information normally is semantic (a statement), pragmatic (a command) or apobetic (an acknowledgement), unless otherwise stated.

1.5.3 Cybernetics

Cybernetics (Weiner 1961; Beer 2002; Tomas 1995) is a discipline that could help social scientists understand self-organizing or self-generating systems such as markets. In cybernetics, for any complex phenomenon the best way to examine its functioning is by using the feedback mechanism. In this research the concept of feedback is particularly taken into consideration in order to apply a heuristic method of using the analytical framework.

1.6 Contribution of the study

This research aims to evaluate the influence of the flow of information on neighbourhoods relative to the built environment in India and Germany. It is argued that the difficulties of Indian neighbourhoods addressed within the scope of this research are mostly a result of information asymmetries between different institutions of a locality. The objective is to find out how various social parameters in a neighbourhood affect the use of information technology (or vice-versa) (cf. adaptive management and resilience framework as given in Arrow et al. (1995)). The principle objective of this research is therefore to explore and elaborate on neighbourhood resilience in India contrasted by selected cases from Germany. The findings of this

research are envisaged to play a significant role in crafting meaningful policies and strategies with impact upon government, industry, academia and community at large.

1.7 Outline of the thesis

In the following chapter 2, a summative yet succinct presentation and evaluation of the literature of certain relevant disciplines and themes is provided essentially to prepare the ground for the central research questions. These research questions are brought to light in chapter 3 on Methodology and most practical steps taken to answer these questions are presented alongside some more theoretical considerations. Chapter 4 presents the research results from the cases studied in the field of the Delhi NCR and the Berlin metropolitan area. Each case contains the table, with a picture or a collage of the case, and a small write-up about the selected case. Since the review of the literature in this research has been a continuous process, some essential reviews of literature are done expansively also in the discussion chapter (chapter 5). The discussion chapter can be considered the most seminal part of this research. It is here that the resilience framework is presented as a trans-disciplinary heuristic while providing a summative narrative of the research distinguishing core, overall, attribute-based, and case-wise implications of the research for the Smart Governance of the Built Environment.

CHAPTER 2: LITERATURE REVIEW

2.1 Summary of current developments in the area of research

There is a need for sustainability in the urban set up (Zhang, Q. et al 2019, Carley, M., & Christie, I. 2017) and particularly from the Indian context (Shaw, A. 2018, Wang, Q. et al. 2018, Hoelscher, K. 2016), true for Europe too (Nijkamp, P., & Perrels, A. 2018) and recognising its complexities (De Jong, M. et al. 2015) is becoming ever more pertinent. Also, adding to the complexity is the inter-sectionality issues like gender, age and disability (Goethals, T. et al. 2015). Some of these issues are difficult to resolve and have been labeled as wicked problems in policy making (Head, B. W. 2008); though suggestions have been made to tackle these problems with a trans-disciplinary imagination (Brown, V. A et al. 2010). Of course, trans-disciplinary imagination or not, information technology should play an important role in the solution aspects, an approach known as Smart Governance (Willke, H. 2007). In Goodspeed, R. (2014) in find an interesting interplay of wicked problems, cybernetics and the built environment (as in human made environment) in form of cities, which is true in this research too. In Roof, K., & Oleru, N. (2008) we have an interesting definition of the built environment as - "the human-made space in which people live, work, and recreate on a day-to-day basis". Therefore, Smart Governance of the built environment corresponds to the discourse on inclusive sustainable development and to resilience (Hassler, U., & Kohler, N. 2014, Bose A. and Sharma S. 2018).

With its foreseeable gains, urbanization brings in its wake inescapable shortcomings. These inadequacies bring in ecological and socio-ecological challenges. Thus, social and ecological resilience becomes a recompense to mitigate these shortcomings. One of the inescapable shortcomings is information asymmetry between

various stakeholders which can affect various people in myriad ways. Another dimension to remember will be that rapid urbanisation makes information asymmetry a dynamic problem and adds to the complexity of the situation.

On the premise that information technology could help address these problems of information asymmetry there is compelling evidence that the design of these ICT platforms is void of suitable applications and rather have an opposite and distracting effect (WEF 2016). In order to avert the same and to effectively foster improved living conditions in the Delhi NCR, this research is set to study the influence of information technology at the most critical (and perhaps least understood) level – the Indian neighbourhood (Bose & Sharma 2018). This implies to further our better understanding of the level challenges and provide a baseline for a framework or tool that can help various relevant stakeholders including policy makers and information technology platform developers to work symbiotically for the improvement of the local environment.

The following section summarises the current developments in the chosen area of research and provides an analysis of the literature on community resilience.

To begin with, a snapshot of one of the major phenomena of urbanisation in India is presented with the help of NASA pictures taken from space. Figure 2.1 shows images of India coming out of the "Earth at Night" program from NASA's Goddard Space Flight Center. These images provide "the clearest yet composite view of the patterns of human settlement across our planet."[3] The NASA imagery allows us to see both high population growth and increasing electrification of Indian cities for the year

[3] http://edition.cnn.com/2017/04/13/asia/india-nasa-satellite-night-trnd/index.html (accessed April 2017)

2012 and 2016 in comparative perspective. Huge swaths of northern India, relatively dark in night shots from 2012, are lit up by huge new urban areas in imagery from 2016. According to the Oxford Economics Global City Forecast, fourteen out of the 20 fastest-growing cities in the 2015-19 period are in India.

Figure 2.1: India from the "Earth at Night" Left picture: 2012, right picture: 2016, Source: NASA 2017

2.2 Urbanization in India - a literature review

One major narrative of Urbanization in India which this research will focus on is summarised in the works of Denis and Mukhopadhyay (2012), Danino (1996), Arup (2014), Sharma et al. (2013). Foundational work on urban resilience in India can be attributed to the Asian Cities Climate Change Resilience Network (ACCCRN), funded by the Rockefeller Foundation, with landmark studies being conducted by Arup between 2009 and 2011.

One part of the narrative is that India is far more urbanised than is officially understood creating many more issues and barriers to effectively organized urbanization. At the same time, the multifaceted construct of India is not very well understood even from within the country. In the words of Danino (1996), ‘official

India' (bureaucracy) looks at India itself as an exotic place. This dichotomy of administrative and other cultures of India creates frictions abundantly manifest in urban spaces of India. This is a plausible point of origin and may explain (at least in part) the information asymmetries in neighbourhood governance in India.

The work of Arup (2014) and Sharma et al. (2013) on understanding resilience and urban life in India suggest that among all parameters studied – the critical and important ones are not those of physical dimensions (e.g. the width of a road) but are related to human attributes (e.g. the integrity, cohesion, and cooperation of and in a neighbourhood). This would include looking at a neighbourhood through the eyes of a child, of a woman, of a physically disabled, and the aged. More broadly, this research is multifaceted. It looks at the built environment through the lens of Gender, Age, and Disability (GAD) which is imperative for modern India. It is of similar importance to understand the types of finance that have been allocated to design the built environment.

2.3 Themes

A number of eclectic themes has influenced this research project. They are the Financial crisis, the Flow of Information, the Marxist lens on Capitalism, and the Great Transformation. In the following sections these themes will be further elaborated on with a sense of reflexivity.

A recurring phenomenon in this research is the intertwining of both reflexivity (Gay 2009) and complexity (Chandler 2014). For such reasons, this part in a way perhaps beneficially or even intriguingly starts with an episode in Financial Economics more precisely the financial crisis of 2008. The reason is that the financial crisis of 2008 has elements of both reflexivity - that it was a very near personal experience - and

complexity - that it was also a phenomenon of deep uncertainty (Lempert & Collins, 2012; Hallegatte et al., 2012, Hallegatte, 2009)

2.3.1 Theme: Financial Crisis

If in part there is a consideration that the financial crisis of 2008 was caused due to over-leverage in the financial world (Caprio et al., 2008) one cause for that was the famous Modigliani Miller proposition (MM) proposition (Modigliani and Miller, 1958; Ely 2009; Cline 2015; Offer & Söderberg 2016; Bose 2011).

One way of narrating the MM proposition is to state that the nature and sources of finance are irrelevant to the valuation of a project as long as the markets are perfect and information is symmetric. In real life, the markets are not perfect and information is not symmetric. Therefore, the nature and sources of finance are important. However, since Modigliani and Miller got the Nobel prize and the proposition was referred to as the "irrelevance proposition", the "flow of information" led to the paradigm wherein an overleveraged world resulted in the financial crisis (ibid.). This inspired an investigation into development itself as being subjected to a similar problem in the "flow of information". The reflexivity of daily life led to looking at spaces in the Delhi NCR (Gay 2009) by looking at moments through the concept of "flow of information" which turned the concept into an original theme in the context of the built environment.

The financial crisis is a good example of something that went wrong causing a lot of despair and worsened the quality of life of an innumerable number of people but as a crisis was not external to the human system. That is, the crisis was not caused by an earthquake or disease or a volcanic eruption. It was caused simple by a structural defect in how human society is shaped and incentivized. Finance in a way is an incentive mechanism, therefore the way incentives were structured caused a problem.

Similarly, urban design faults, say that of the bus stop (as discussed in the results section) have come out of a similarly ill designed flow of information where the incentive structure was incorrectly designed. This in turn can be attributed to design faults in governance, multi-agency and multi-stakeholder engagement. Therefore, following the arguments made by Arrow et al. (1995) and Chandler (2014), Resilience is ultimately the Governance of Uncertainty. Against this backdrop, this narrative of Indian neighbourhoods emerges through the lens of Resilience and the Flow of Information. The themes are seeded in the researcher, and require a reflexive, contextualized, and mainstreamed thought process behind this research (Alvesson & Sköldberg, 2017; Alvesson 2003; Stainback & Stainback, 1988; Sultana 2007).

2.3.2 Theme: Capitalism

Under this theme, I will discuss two of the most important thinkers on capitalism – Karl Marx and Karl Polanyi.

Karl Marx (Marx, K. 2010)

Historical materialism is a method to the study of societies and their development over time that was first conceived by Karl Marx. Marx developed value or better 'the labour theory of value' (LTV) arguing that the economic (or monetary) value/price of exchange of a good or service is determined by the total amount of necessary and sufficient labour required producing it.

This research builds on the central notions in Marxist arguments including historical materialism, value, and interpretation of capitalism combining it with an attempt to apply this theoretical convolute to understand the financial crisis of 2008 and how we arrived at today's situation of planetary risk.

It is often said that Karl Marx was a brilliant diagnostician of the Capitalist economic system prevalent ever since the industrial revolution. He had wonderfully articulated the problems of accumulation in a capitalist economy but possibly no one could implement any of his ideas to come by the visible and invisible problems correctly. This is evident from various economies that started with a revolution to change into an economy in non-capitalist mode of production but have retreated from such attempts or have turned into inefficient and stumbling planned economies or nasty dictatorships.

Nevertheless, the problems of accumulation in a capitalist economy still persist and many would argue that the amplitude of the pains of capitalism is increasing reaching more alarming rates with every passing decade. The financial crisis of 2008 (from which the global economic situation has still not recovered) has compelled strategic actors in national and international fora to look for pathways towards an alternate economic system. According to Marx, there are three notions that highlight the problems in the capitalist mode of production – Alienation, Employment, Crisis.

Alienation: work is an important part of human wellbeing. Humans take a lot of pride in what they have created; however, with the beginning of the industrialization workers became subject to the dictate of the machine and were being treated almost like machines. There has always been a machine versus workforce struggle that is becoming even more threatening in present times with increasing automation and artificial intelligence.

Employment: The capitalist mode of production is efficiency oriented, and in fact it creates a surplus such that people should have had more time to relax and enjoy. However, that did not happen and instead the time which should have been spent in leisure is often termed as ‘unemployment’. The capitalist mode of production by itself is not bad. However, it has failed in redistribution, and also till recently has consistently

failed at addressing environmental challenges, or more pertinently has failed to allocate human resources towards addressing the important challenges of our times.

Crisis: Given the notions of capitalism, especially as diagnosed by Karl Marx the way capitalism solves alienation and employment/human resource issues is by getting into a crisis much like the one in 2008. Therefore, such crisis is endemic to the capitalist system – that is – the crisis was not caused due to any real problem, like a meteor attack, disease or natural calamity; it was caused due to the presence of surplus – specifically quality housing in America; which then could not be redistributed.

To conclude, Marx did diagnose the problem correctly whereas the solution is still not found and in fact with advances in technology and geopolitical situations the problems of alienation, employment and crisis are highly probable to further deepen. It can only be hoped that a solution of systemic relevance is found for humankind on this planet before it is too late.

Karl Polanyi (Polanyi & MacIver, 1944)

Karl Polanyi's 'The Great Transformation' deals with the social and political upheavals that took place in England during the industrialization and the advent of the market economy. Polanyi argues that the market economy and the nation-state should be understood not as discreet elements but as the single human intervention that he refers to as the 'Market Society'. His argument is essentially that prior to the great transformation, people based their social life on reciprocity and redistribution and were not the quintessential rational utility maximisers advocated by neo-classical economists. Polanyi rather supports the view that after the great transformation the market society did become the rational economy found in neo-classical economic descriptions. Another observation is that with the creation of capitalist institutions not

only changed laws but also fundamentally altered humankind's economic mentalities, such that prior to the great transformation, markets played a very minor role in human affairs and were not even capable of setting prices because of their diminutive size. He rationalizes that it was only "after the creation of new market institutions and industrialization that the myth of humanity's propensity to barter and trade became widespread in an effort to mould human nature to fit the new market based economic institutions." (Polanyi, The Great Transformation, 1944:44) However, there are various arguments that the market society has been re-inventing the market mechanism on various occasions. In fact, every energy transition can be thought of as a market or even societal transformation as well. And if we draw from the previous section – Alienation, Employment, and Crisis – these three attributes will also compel a transformation.

Contemporary reflections

There are many forms of finance existing simultaneously and the world is transitioning from pure investment grant towards more diffused form of financing illustrated in a concept called Financial Gradients (Bose 2011, Bose et al. 2012, Dixit & Pindyck, 1994; Zott et al., 2011). One example is TESLA where long-term finance has been made available for a fundamental paradigm shift both in technology and the provision of finance. At the same time, with the advent of technologies such as artificial intelligence, routine and inartistic work will be inevitably done by machines (Buchner et al., 2011; GEF 2012; Canter et al., 2005; Climate Fund Updates 2012). There will be a need to find new realms of activities suitable for human beings in the future – by virtue of the situation and sheer human ingenuity the challenge can be mastered. A structured paradigm shift within the framework of social and ecological resilience is precisely in that direction.

With the advents of these new jobs and a creation of a resilient society where human labour will be utilized creatively and fruitfully towards the creation of options (Kogut and Kulatilaka 2001) that can deal with various situations and at various scales – global, national or local – which frameworks in resilience contend to deliver – will in one go solve alienation and employment issues – and by extension of the argument solve the problem of endogenous crisis. In the future crises are bound to happen but will be exogenous kind to the human system. The resilience framework will help to fight a true crisis, not a self-inflicted crisis.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The research is an enquiry into the pathway of an inclusive sustainable development. As discussed in the literature review part on the financial crisis theme, the research gap seems to lie very much in the neighbourhood and its associated built environment. This gap is not only of scholarly nature but profoundly empirical in essence. To put this in perspective, for a city like Delhi and its different localities it is impossible for most people with disabilities to commute on their own. However, in Berlin, in fact the opposite is largely is true.

Though inclusive sustainable development is often articulated, formulated and strategized within the discipline of Economics, a number of alternative approaches emerged during the literature review on research methods (Alvesson & Sköldberg, 2017; Hannerz 2003; Yin 1984; Zainal 2007; Silverman 2006; Stenhouse 2004; Power 1996; Mason 2010; Dunleavy 2003; Chatterjee 2011; Agar 1996, 2001). The following table (Tab. 3.1) provides an overview of these research methods and their underlying implications. As Alvesson & Sköldberg (2017) note, "an economist who has learnt that self-interest lies behind everything, is hardly likely to notice any empirical indications of altruism." This statement might be broad brushing but certainly a succinct pointer towards the fallibility of purely quantitative methods in understanding reality in all its complexities. The financial crisis of 2009 was hardly anticipated by any of the quantitatively oriented economists. Only a few bank managers using observational research tactics abundantly found in qualitative research (and substantiated by quantitative analysis) had a hunch.[4] The methods followed in this research are therefore

[4] Lewis, M. (2011). The big short: Inside the doomsday machine. Penguin UK.

predominantly qualitative in nature.

3.2 Research Questions

Inclusive sustainable development is too broad a term to be meaningfully used in the context of this research. Instead, specific research questions will be posed to guide the data collection the research and especially the field visits.

Table 3.1: Choosing a research method (Source: self)

Element	Simplification	Positivism	Subjectivism
Axiology	Why to undertake the research?	Research undertaken to fill the knowledge gap. (Positivism normally associated with quantitative analysis)	Research undertaken mainly to solve problems. (Subjectivism normally associated with qualitative analysis)
Ontology	What is it (and how does the researcher view the context of research - the philosophy of reality)?	Objectivist	Constructionist
Epistemology	How do we know it - how do we get to know that reality?	Empiricist	Interpretive
Methodology	How can we get the data needed to know the reality?	Quantitative	Qualitative
Methods	The precise tools and practices to get the data required	Econometrics	Ethnography
Structure	The communication of the research and the actual findings about reality	Modular	Narrative

The central research questions are:

1. What is the first step to take in designing an intervention for inclusive sustainable development for a neighbourhood or locality? How can we incorporate Gender, Age and Disability to design an inclusive built environment?
2. What is the decision-making making process behind the formation or change in attributes of the built environment of a neighbourhood? How can we structure a process of Smart Governance or Resilience for such Built Environments?
3. What is the influence of information technology to instil resilience at the level of a neighbourhood in India?
4. How can emerging technologies be reined in to work for achieving the objective of inclusive sustainable development? Or, how can emerging technologies play a role in contributing towards the SDGs?
5. What is the role of Finance in inclusive sustainable development for a neighbourhood or locality? How can the concept of Financial Gradients play a role in designing an intervention for inclusive sustainable development for a neighbourhood or locality?

These research questions do create a narrative on the breadth of the envisaged research, looks into SDGs, thereby broad sustainability and inclusion issues, and looks into Gender, Age and Disability in particular complemented by looking into the role of finance and technology.

3.3 Research Design

There are numerous ways research can be designed especially from the resilience literature perspective (Dey 2003; Linkov et al., 2013). The following three steps have been identified as most suitable:

1. Sampling: Purposeful sampling
2. Data Collection: By utilising part of the resilience framework
3. Analysis: By using the feedback table

Purposeful Sampling

In Palinkas, L. A. et al. (2015) an elegant narrative is formed on 'purposeful sampling'. It says that the purposeful sampling to examine evidence rich cases as a part of the narrative to build on evidence-based practices (EBPs)

Triangulation

A succinct account of triangulation with respect to reliability (consistency over time) and validity (does it answer the question at hand) is provided in Golafshani, N. (2003). Triangulation can be multi-dimensional in terms of persons, sources, theories, investigators, actors, agencies etc. as we see in Carter, N. et al. (2014). The resilience framework itself provides a platform for triangulation in terms of persons, actors and agencies, and this research in terms of places then goes into two cities and across various locations to strive in terms of reliability and validity, and, accuracy of data. As Golafshani, N. (2003) points out that though reliability and validity are terms from the quantitative methods and positivist approaches, their essence should not be missed out even in qualitative methods using naturalistic approaches.

Action Research

This research follows a Action Research work flow found in Community-based participatory research (Israel, B. A. et al. 2019). In Tab. 3a aspects of these have been brought in. There is an articulation of what people say via interviews; what people do via observations in photographs and videos; and what people say they do via feedback from seminars and conclaves.

Few salient features or aspects are discussed below with a table (Tab. 3a) on research summary

Table. 3.1a Research Summary (source: self)

Attribute	Comment
Methods	Qualitative, Reflexive, Action Research, Heuristic (see Fig. 1.1, 3.3; Table 3.1, 3.5)
Disciplines	Anthropology, Sociology, Psychology, Economics, Science and Technology, Management, Sustainability (see Fig. 5.2)
Techniques	Techniques found in Community Resilience; Interviews, Focus Group Discussions, Presentations in conclaves and seminars, Photography and Videography; creating levels of interpretation and/or aspects (Table 3.3, 3.4, 3.5, 3.6, Fig 5.1); there is one quantitative display in Table 5.1 and one satellite based image in Fig 2.1
Places	Research spread across two urban agglomerations in Delhi, India and Berlin, Germany. There are ten cases in India and seven in Germany, covering both urban and peri-urban regions. (See Chapter 4 Results)
Persons	Creation of emic and etic narratives via multi-stakeholder models as found in the Resilience Framework (see Fig 3.1, 3.2 and 5.1)

The following sections describe the specific steps taken in more detail.

3.3.1 Sampling

The sampling for cases occurs at two levels (Daymon & Holloway 2010) and will be purposive in both instances. First, at the level of case selection; and second at the level of selecting informants and participants. Cases will be selected according to a selection criterion mostly depending or trying to attain data saturation; participant selection will be done following the resilience framework (Bose & Sharma 2018). In this research roughly 7 to 10 cases each have been selected from built environments in and around Delhi, India, and Berlin, Germany. The stakeholder consultations can take the form of focus group discussions, conclaves, or conferences to improve access to important stakeholders (as shown in Fig 3.3). However, the nature of enquiry can be different on

different occasions given the audience and what information is required at the stage of research. The people to be interviewed can be categorised and interrelate with each other as presented in Tab. 3.2 and Figure 3.1 below.

This categorization is adapted from the resilience framework devised for working at the scale of neighbourhoods (Bose & Sharma 2018). The categorization of people to be interviewed gives us a sense of the range of stakeholders and is helpful in formulating whether a person is an external (etic) or internal (emic) stakeholder with respect to the neighbourhood or locality of the study (Olive 2014, Orr 1996, Pike 1967). In principle, internal stakeholders are those who stay within the neighbourhood, and external stakeholders are those who stay outside the neighbourhood while the decision-making powers of etic actors may affect the quality of life in the neighbourhood.

Table 3.2: Stakeholder Map using the Resilience Framework (Sharma & Bose, 2017)

Category	**Alternate**	**Type**	**Context**
Individuals	People	Internal	Emic
Community	Neighbourhood		
Civil Society	NGOs		
Local Firms	Small Business		
Local Administration	Municipality	Internal	Emic/Etic
State Government	Provincial Government	External	Etic
Large Companies	Industry		
National Government	Federal Government		
International Institutions	World Bank		

Figure 3.1: Stakeholder relation diagram for a socially and ecologically resilient society

3.3.2 Data Collection

Data collection has been done via qualitative methods, using semi-structured interviews, focus group discussions etc. After a first round of interviews especially with external stakeholders and experts, the criterion for case selection was developed along aspects of social and ecological resilience. The second round of interviews followed a semi-structured interview questionnaire and in-camera data collection, too. The first of its kind focus group discussion for Academics was conducted in the first week of June 2017, as the first Design for Sustainability Conclave at the University of Delhi. Participants filled out a questionnaire specifically designed to collate information about the influence of information technology on resilience at neighbourhood level. For each case studied, three aspects have become structurally crucial – Descriptive, Exploratory and Explanatory – as followed in the research output section of this research project.

Figure 3.2: Pictures from various stakeholder consultation

During the data collection phase, data saturation is important (Morse 1995). The research design looks at interviews or stakeholder consultations as an iterative process (Sharifi 2016); that is to say that the same person can be interviewed multiple times based on requirement as and if new information emerged. Similarly, places could be visited multiple times in order to completing the data collection process.

To structure the stakeholder feedback, a simple scoring system has been devised to assess the different cases of the built environment as presented in Table 3.3 below. A second lens adopted per case is the nature of finance. Here the type of finance used

for the case specific built environment was determined as per Table 3.4. The overall Feedback Table (Tab. 3.5) has been presented for each case individually to collate the data in one simplified format.

Table 3.3: Legend for cybernetic feedback score

Feedback					
	2	1	0	-1	-2
	Very Good				Very Bad

Table 3.4: Types of financial gradient and technological fitment

Gradient	Grant	Research	Public	Debt	Equity
Fitment	AI	DLT	web 2.0	ALL	

Table 3.5: Sample Feedback Table

Realm	**Attribute**	**Feedback**	**Type**	**Comment**
Social	Gender			
	Age			
	Disability			
Ecological	Energy			
	Resources			
Financial	Inclusion			
	Gradient			
Technological	Fitment			
Spatial	Furniture			
Overall	Social Contract			
	SDG			
	Human Rights			
	Decision Making			

3.3.3 Analysis

The analysis of collected data requires a structured fashion. The crucial part of the analysis is the presentation or communication of the research findings in a systemic and comparable manner. Normally, the analysis of qualitative research results is predominantly text based. For the purpose of this research, this one-dimensional form of a communication will not be sufficiently conducive as there might be several layers of interpretation (Alvesson & Sköldberg 2017). Given the multi-stakeholder, multi-dimensional, multi-disciplinary nature of this research, the analysis needs a robust yet simple communication method as will be detailed in the next section.

3.3.4 Developing a tool for analysis

As pointed out in the previous section, to illustrate the findings of analysis in a comprehensive yet simple manner, I propose a green field tool considering theoretical underpinnings and empirical findings with respect to Levels of Interpretation, Flow of Information, and User Experience.

Levels of Interpretation

According to Alvesson & Sköldberg (2017), there are interpretative options available to the researcher while conducting reflexive research as per Tab. 3.6 on Levels of Interpretation.

Table 3.6: Levels of Interpretation (Adopted from Alvesson & Sköldberg 2017).

Aspect/ Level	Focus
Interaction with empirical material	Accounts in interviews, observations, etc.
Interpretation	Underlying meanings
Critical Interpretation	Ideology, power
Reflection	Own text, claims

It is important to note that data interpretation is a crucial aspect in stakeholder interaction. The design philosophy of this research is to generate meaningful insights for strategic actors. Accordingly, the data generation and interpretation are in principle not subjective but objectively verifiable. For instance, let us take the pedestrian pathway, whether in India or Germany. Applying the heuristic framework or Feedback Table, we can assess whether the pedestrian pathway can be used by a person with disability (especially from a wheel chair perspective) or not. The answer will be between yes and no. Possible answers are – is the built environment very easy to use for a person on a wheel chair; or, usable, but with assistance as the pathway is sometimes corrugated; or, no, not at all, as there are steep stairs. Cybernetics (Weiner, 1961; Beer 2002) is used to provide a score and give a sense of the built environment to the user. The feedback scores will illustrate this range from +2 (readily usable) to -2 (not usable); and the score are objective as it is not similar to evaluating and scoring an essay, but, really on the usability of the built environment by a particular kind of user group.

User Experience

The discourse on levels of interpretation has brought out the importance of User Experience. The concept of User Experience (UX) prima facie has been developed independently and there is an industry definition which describes User Experience as "a person's perceptions and responses that result from the use or anticipated use of a product, system or service" (ISO, 2009). However, as practitioners point out there has been an understanding that trained ethnographers are very suitable to practice UX. UX as a field is similar to 'ergonomics' which brings in the concept of human factors, and as such is a combination of numerous disciplines, such as psychology, sociology, engineering, information technology, interaction design, visual design, user experience,

and user interface design. Generally, UX is concerned with the user and how the user utilizes a product or service. In the urban space, a bus stop is a good example for a public good and concepts in UX and ethnography can be utilized to ascertain the value proposition of this bus stop. Does it serve the purpose it was built for? Who are the users? Is it use-worthy for people of all walks of life including differently abled people? And how could a bus stop be improved in order to serve people more broadly? These are some of the questions that UX can answer.

However, UX might not be suitable to answer all questions created in this genre. For example, what is the alternative if a bus stop cannot be used by disabled people? Relying on UX alone might not answer this question. To figure out an alternative the research has to delve into ethnographic methods, researchers have to stay with disabled people to realize that in a city like Delhi bus transport itself is not suitable for a large proportion of disabled people. Instead, most disabled people use auto-rickshaws with significant personal financial implications. Public spending for disabled-friendly bus stops is given and the intention to help disabled people is shown. However, in reality the bus stop design does not do them any favour. And even if the design of the bus stops was good, using a bus would still be an insurmountable challenge. When we think of a transit system, we have to consider it end to end. Say from home to office. Getting to the bus stop itself is a huge problem. What can be a good transit solution is a mobile App that can fetch auto-rickshaws as close to the doorstep as possible. Accordingly, the auto-rickshaw design has to be improved for easier access and exit.

We see that Ethnography and User Experience have important implications. If we keep the following - “committed to developing theoretical understandings of broader social phenomena” (Anderson, 2006) - as a guiding principle, then we might be able to get to a resource mobilization and urban governance pattern that is responsive

to the various needs of the local community or society at large. Figure 3.4 illustrates the steps in decision making for resource mobilization and urban governance.

The figure depicts the 7 steps in decision making for resource mobilization and urban governance. Staying with the example of transit systems for disabled people the following can be said:

Step 1: Describes the ethnographic method to decipher what is required.

Steps 2 & 3: UX studies to plan and design fully integrative urban transit systems.

Step 4: UX studies concerning Information and Communication Technology.

Step 5: Ethno-legal step in providing the Contract Law.

Step 6: Economic cost-benefit analysis of different types of suitable transit systems.

Step 7: Formulation of an ethno-policy directive.

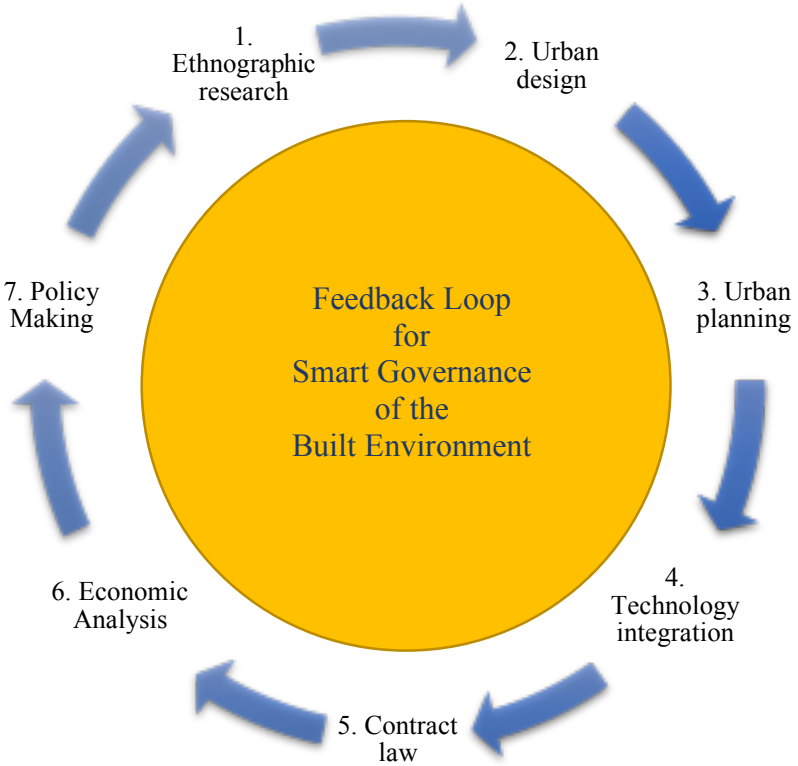

Figure 3.3: User Experience (Source: self)

Ethnographic understanding and User Experience concepts are continuously intertwined in this process and have the power to change the built environment toward

more inclusive sustainable development. This section has given a sense of how the analysis can be done and more importantly how to present the process.

Flow of Information

The phrase 'flow of information' is a leitmotif in this research. The research points towards vignettes of urban joy as much as urban dystopia. There is a constant reminder of Kafkaesque situations through these vignettes. To get simple things done (or corrected – this in reference to the results of the research) a person is forced to navigate labyrinths of bureaucracy. This is the result of ill-designed flows of information treating constructive feedback incorrectly in places that essentially lack effective local governance.

For the purpose of illustration, let us imagine an engineer in a locality who is a resident of the neighbourhood. The RWA has spent crores to fix an ageing pipe system. However, after spending the money, it was found that some basic checks were not done and that the new pipes do not serve their purpose and have to be re-laid. The aggrieved engineer resident is astonished as to why s/he was not consulted. The RWA in defence says there exists no means to do so and simply forwards emails with various documents attached. If existing systems keep running into such issues, at least any new ecosystem will need to create an alternate method for a more efficient and effective flow of information such that more robust decisions can be taken from utilizing the human resources which already exist within the neighbourhood. This instance can be used to point out the role of communication technologies such Artificial Intelligence (AI) and Distributed Ledger Technologies (DLT) which can be used to add an extra incentive for ex-ante ownership of the problem. The engineer is aggrieved in hindsight, but crafting ICT correctly will speed the process of effective local governance, allows for taking responsibility, and can ultimately even prevent ill-constructed infrastructure.

CHAPTER 4: RESULTS

Distilling the knowledge, realization and understanding gained thus far from the literature and methods, we now embark upon a layered narrative to present the results of the field research. The objective of finding meaning in the phrase – *Smart Governance of the Built Environment* – and what it means for various stakeholders in terms of inclusion and sustainability.

This research is explicitly novel in terms of its articulation of the research findings. The results section has been broken up into two parts – the Indian and the German cases. Each case is broken up further into three segments: a vignette, an attribute-based table and photographs. The attribute-based table notes the feedback per locality or neighbourhood. Feedback here is a term used in Cybernetics as discussed in the methods and the review of literature parts. This communique is a first of its sort to encapsulate the true essence of a trans-disciplinary research giving an idea of multi-disciplinary, multi-dimensional, multi-lateral and multi-stakeholder complexities moulded into a single simple cognitively useful presentation.

4.1 India Results

The following sections are dedicated to findings in the Delhi NCR, India with 9 localities/ neighbourhoods situated across the city.

4.1.1 North Campus, North Delhi

Case 1: Bus stops and footpaths

(Outside VC University of Delhi Office, Vishvavidayalaya Marg)

A bus stop is that piece of urban furniture which is ubiquitous. Bus stops across cities have their own nature and have to make sense according to their users. The users are of

different types, and the places where they are located can be different. It should be noted that a universal design philosophy should not mean the same design. Across the world bus stops are chosen from a range of options – not so in Delhi. There are serious design flaws to bus stops in the Delhi NCR. For example, bus stops have various elements to 'help' Persons with Disabilities but precisely those features have the exact opposite effect. This aspect has been elaborated on in more detail in the Methods (UX – User Experience part) part.

The bus stop at North Campus has only one positive feedback that is with respect to safety of women, as now due to the billboards there is a lot of light. Well-lit bus stops lead to an increased sense of safety. The billboards though lead a huge negative feedback for general pedestrians as walking across most bus stops including this one is not possible. Under no circumstance can a person on a wheel chair use this or any other bus stop. Ramp design is downright ineffective and a waste of both financial and material resources. The height of the bus stops has been elevated for theoretical reason and in real life lead to a majorly negative feedback from general users. The bus stop also reflects a problem of local governance, coordination between institutions and failure of social contracts for effective local governance. It can also be noted that builders possibly are kept out of the design process and are strictly asked to follow a design regime which turns out to be incorrect. This happens due to the nature of bureaucracy in India – an aspect that will be dealt with in the Discussion section. (It should be noted that in this research bus stops have been evaluated at 40 other places in the Delhi NCR, and all have a high level of negative feedback. In Indirapuram, there are bus stops without any presence of buses. This also raises concerns regarding effectiveness of Public Finance regimes, which will also be touched upon in the Discussion section.)

Bus stop being made in front of JNU main gate; the picture brings to light the disconnect of the builders to what they are building, its users and how will it be used. This is a snippet to the case on bus stops. The problem happens as the builders are not in a position to suggest any corrections though it is apparent to them. It possibly is that the payments are made after some instructions are followed. The instructions are a part of a top down decision-making process which often leads to incorrect on the ground implementation. In other words, even if the implementation was correct the basic design from the user experience was not correct.

Table 4.1: North campus - bus stops and footpaths

Realm	Attribute	Feedback	Type	Comment
Social	Gender	1		Lights
	Age	0		
	Disability	-2		Ramps
Ecological	Energy	-1		
	Resources	-2		
Financial	Inclusion	-1		
	Gradient		Public	
Technological	Fitment		AI	
Spatial	Furniture		Yes, Bus Stop	
Overall	Social Contract		Negative	
	SDG		Negative	
	Human Rights		N.A.	
	Decision Making		centralised	

Figure 4.1a: North campus bus stop, North Delhi

Figure 4.1b: JNU bus stop, South Delhi

Case 2: Walkability (road design)

(Avenue with Street Hawkers, North Campus, Chhatra Marg)

This is a street through the centre of North Campus which has many tracks and layers. Each track or layer was originally for various type of movements, walking to cycling to motorized mobility. However, the street has possibly evolved for the better to include various street foods. There is ample space for this and motoring has been restrained to two lanes. The open spaces, the environment and surroundings of the University and academic blocks along with the street design is useful and has an overall positive feedback across various parameters and lenses.

Table 4.2: North campus-street walkability

Realm	Attribute	Feedback	Type	Comment
Social	Gender	1		
	Age	1		
	Disability	1		
Ecological	Energy	1		
	Resources	1		
Financial	Inclusion	2		
	Gradient		Public	
Technological	Fitment		DLT	
Spatial	Furniture		Yes, Street Space	
Overall	Social Contract		Positive	
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		Decentralised	Local

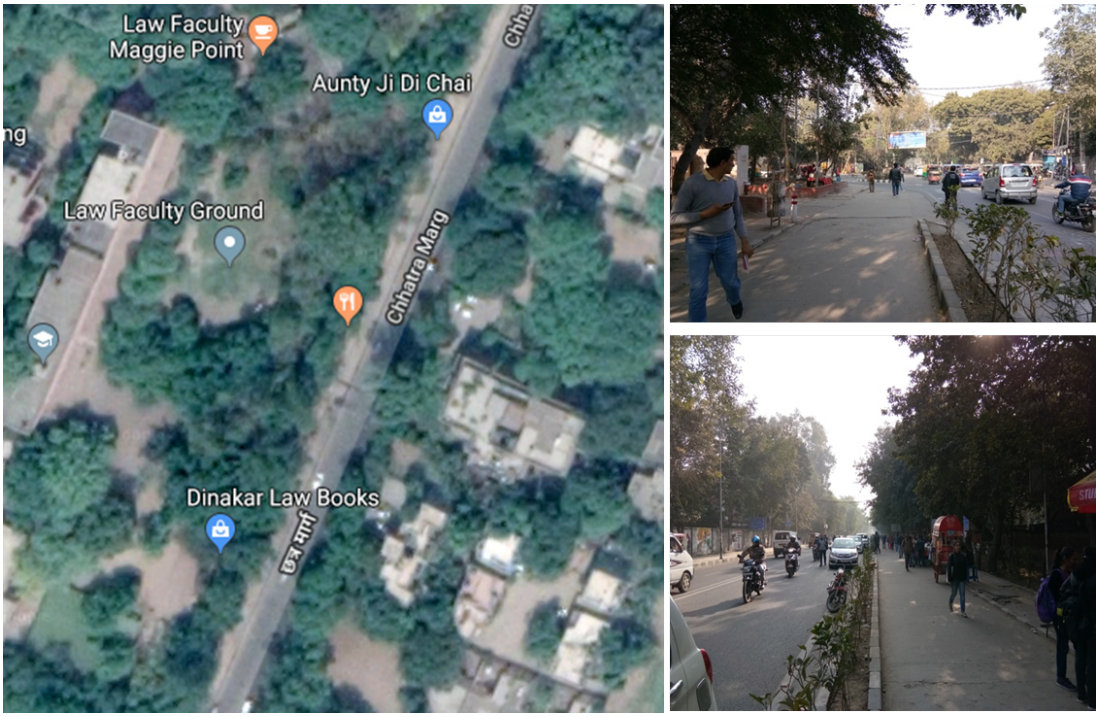

Figure 4.2: Walkability in North Campus, North Delhi

4.1.2 Central Delhi

Case 3: Stray animals

Delhi has over 5 lakh stray dogs (ToI 2017). Various rounds of interview have revealed the complexity of the problem. However, stray animals are becoming a bigger problem with human aspects of disability and poverty getting more severe. The narrative is complicated as some of the stray dogs also have a sentient relationship with the people who are affected. The sentient relationship is manifest with locality guards and night watchmen. But with respect to rickshaw pullers and rag pickers dogs are a critical threat to their daily lives. Women in localities complain about dogs mostly from the point of view of protecting their children, but single affluent women are most vocal of stray dog rights. Though this vignette is written from a central Delhi perspective; this is a recurrent feature in all parts of the Delhi NCR. Also, it has to be pointed out that most people across localities and from various institutions do not know the relevant laws; also, the laws or the present narrative might not be connected to local realities.

Table 4.3: Central Delhi - stray animals

Realm	Attribute	Feedback	Type	Comment
Social	Gender	1		
	Age	0		
	Disability	-2		
Ecological	Energy	0		
	Resources	0		
Financial	Inclusion	0		
	Gradient		Various	
Technological	Fitment		AI	
Spatial	Furniture		No	
Overall	Social Contract		Negative	
	SDG		Negative	
	Human Rights		Negative	
	Decision Making		Local	Bottom-up

Figure 4.3: Central Delhi (Connaught Place) - stray animals

4.1.3 Connaught Place (CP), Central Delhi

Case 4: National Flag

The National Flag at CP is an example of a built environment which has a beneficial effect on all stakeholders. The built environment has positive effects on various physiological aspects (Ulrich et al., 1991) and CP as a built environment improved the human experience vastly as a result of the flag being put there.

Table 4.4: Central Delhi-Flag

Realm	Attribute	Feedback	Type	Comment
Social	Gender	1		
	Age	1		
	Disability	1		
Ecological	Energy	1		
	Resources	1		
Financial	Inclusion	2		
	Gradient		Private	CSR grant
Technological	Fitment		N.A.	
Spatial	Furniture		Yes	
Overall	Social Contract		Positive	
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		Various	Court order

Figure 4.4: National Flag at Connaught Place (CP), Central Delhi

4.1.4 Vivek Vihar, East Delhi

Case 5: Police booth on footpath

The nature of bureaucratic process design in the built environment (and therefore the nature of bureaucracy too) is starkly evident when this police booth was made completely engulfing the footpath right outside Vivekananda College in Vivek Vihar. This has been in existence for at least five years, however no police personnel have ever been inside as there is no entry to this post. The police personnel sit inside the college gate.

This of course causes problems in walking outside the college, and when college gets over there is a chaotic traffic situation caused as a result of students gathering on the road. Also, all pedestrians have to walk on the road to get around the college endangering safety issues.

Table 4.5: Vivek Vihar, East Delhi – Police booth

Realm	Attribute	Feedback	Type	Comment
Social	Gender	0		
	Age	-2		
	Disability	-2		
Ecological	Energy	-2		
	Resources	-2		
Financial	Inclusion	-2		
	Gradient		Public	
Technological	Fitment		All	
Spatial	Furniture		Yes	
Overall	Social Contract		Negative	
	SDG		Negative	
	Human Rights		Negative	
	Decision Making		Decentralized	Localized, strategic actor

Figure 4.5: Vivek Vihar, Police booth, East Delhi

In addition to the vignette, what residents say is that the police booth is like a scare crow. However, there is actually no evidence to show that it does stop or reduce crime to any extent in the area. They are yet agreeable to reduce the size of the police booth to improve walkability in the area. Students and college authorities are indifferent to the issue and have not taken any action yet. An Environment Teacher has raised awareness on the issue in a workshop and even a charter was signed on this.

What residents do – there is a huge traffic chaos as a result of the police booth, and a huge risk to students and pedestrians who have to walk in the street at a moment when various cars are trying to accelerate out of a traffic light. The risk is not well understood to the students, and the stress caused to residents is also not understood by themselves.

In fact, on the same footpath as anyone walks along there are several times when a normal pedestrian has to alight from the foot path due to some PWD (Public Works Department) work, making walking very difficult in the area. What has happened as a result is that even for normal chores people in Vivek Vihar try to use their cars as walking has become very strenuous and comes with high risk of accident.

Is there a solution – the police booth is owned by the Vivek Vihar police station, they can resize it with approval from the competent authority. Competent Authority is difficult to understand but an elected representative preferably the Member of Parliament specific to the area is the best bet. The MP's office then would need a No Objection Certificate (NOC) from the College Principal, who would then need a NOC from the Students' Union; the MP's office then would need other NOCs from the concerned RWAs. After that this will go to the PWD and they have their own processes to follow. There are at least six kinds of approval required for this intervention to resize the police booth. In the real sense there is no agent (person) who will be incentivised correctly to get this action done. That person will have to run around a year to get this done, at no particular gain to her or him. Secondly a single intervention might not lead to any tangible gain for the locality.

4.1.5 Vaishali, Ghaziabad, Uttar Pradesh

Case 6: Washer man (Dhobi)

The dhobi is a ubiquitous feature across the Delhi NCR and various urban centres in India. They normally work as a family collective in ramshackle kiosks, and interviews from this research has led to finding that there exists one dhobi for every 50 middle class families in the Delhi NCR. They mostly use coal as fuel. The entire operation is informal. They are an example of unorganized workers in the informal sector.

Table 4.6: Vaishali, Ghaziabad, Uttar Pradesh - washer man

Realm	Attribute	Feedback	Type	Comment
Social	Gender	2		
	Age	1		
	Disability	1		
Ecological	Energy	1		
	Resources	1		
Financial	Inclusion	-2		
	Gradient		Private	
Technological	Fitment		DLT	
Spatial	Furniture		Yes	Kiosk
Overall	Social Contract		Negative	
	SDG		Negative	
	Human Rights		Negative	
	Decision Making		Local	

Figure 4.6: Dhobi (washer man), Vaishali, Ghaziabad, Uttar Pradesh

4.1.6 Govindpuri, South Delhi

Case 7: Eye doctor on footpath

The eye doctor on a footpath in Govindpuri is an example of an unorganized worker in the formal sector that too in the health sector. Prima facie the reason is because of a formalized missing market for a particular financial category of patients. Going to a subsidized government hospital will be a waste a lot of time. The qualitative study from user perspective conducted in this research by embedding the researcher in the field has found that half a day to a full day loss happens in visiting a doctor. Evening slots are usually not available in government hospitals, and officially booking appointments can take up to three months. Evening slots are available in the private sector but they are way too expensive. For instance, to a routine eye check-up, at government hospital is INR 10 (AIIMS fees) but a whole day is lost, private sector INR 500 but in the evening; but this footpath eye doctor is INR 100 and anytime service. The flexibility and price point with word of mouth reliability is beneficial for various sets of client-patients.

Table 4.7: Govindpuri, South Delhi-eye doctor on footpath

Realm	Attribute	Feedback	Type	Comment
Social	Gender	2		
	Age	1		
	Disability	1		
Ecological	Energy	1		
	Resources	1		
Financial	Inclusion	-2		
	Gradient		Private	
Technological	Fitment		DLT	
Spatial	Furniture		Yes	Kiosk

Realm	Attribute	Feedback	Type	Comment
Overall	Social Contract		Negative	
	SDG		Negative	
	Human Rights		Negative	
	Decision Making		Local	

Figure 4.7: Eye doctor on footpath, Govindpuri, South Delhi

4.1.7 Cyberhub, Cybercity, Gurugram

Case 8: Public space

From the perspective of Gender, Age and Disability (GAD) and its intersectionalities there are very few open spaces which can address the multitude of problems. Cyberhub is one of those rare places. Though the literature (example Moodley & Graham, 2015) becomes a little hazy with addressing issues in India and largely the literature is occidental in nature. Still Cyberhub could get the GAD certification from two perspectives. The place had to cater to international offices in the surrounding Cybercity space, therefore in adherence to international standards the GAD lens was appropriated. Second, it is an example of the co-benefit approach. That, Cyberhub space was created because of a catchment area of 200,000 high income workers, has become

beneficial as it is the first port of call for all kinds of people with disability and morbidity. The space is a good example of GAD inclusion.

Table 4.8: Cyber hub, Gurugram

Realm	Attribute	Feedback	Type	Comment
Social	Gender	2		
	Age	2		
	Disability	2		
Ecological	Energy	1		
	Resources	1		
Financial	Inclusion	0		
	Gradient		Private	
Technological	Fitment		All	
Spatial	Furniture		Various	
Overall	Social Contract		Positive	
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		Private	

Figure 4.8: Cyber City, Gurugram

4.1.8 R.K. Puram, South Delhi

Case 9: Community Toilet

A high density non-legal human settlement near R. K Puram in South Delhi has very few toilets in it to fulfil the requirements of the settlement. Therefore, a temporary toilet was put near the settlement area. This act only helped to exacerbate the problem. This was primarily due to two reasons; an embedded toilet usage training was not done, and there was no water. Since holistic interventions are not done, the small amount of public finances made available are also wasted.

Table 4.9: R.K. Puram, South Delhi-community toilets

Realm	Attribute	Feedback	Type	Comment
Social	Gender	-2		
	Age	-2		
	Disability	-2		
Ecological	Energy	0		
	Resources	-1		
Financial	Inclusion	0		
	Gradient		Public	
Technological	Fitment		N.A.	
Spatial	Furniture		Yes	Temporary
Overall	Social Contract		Negative	
	SDG		Negative	
	Human Rights		Negative	
	Decision Making		Central	

Figure 4.9a: Community toilet in R.K. Puram

A contrasting image from Chandigarh is added as a snippet to show that when user experience is kept in mind, much better results can be achieved.

Figure: 4.9b: Community toilet in Chandigarh

4.1.9 Indraprastha, Central Delhi

Case 10: Delhi Metro

This is the entrance of a Delhi Metro station. In all Delhi Metro stations, a person with Disability can enter and exit without any barrier as a result of the design of the built environment itself. Persons with Disabilities (especially on wheelchairs) may face a problem of crowding but not any barrier as a result of the design of the built environment itself. In fact, as the picture shows from the road to the station, and with the station, and in the entire system (trains, other stations) a person with disability (especially on wheelchairs) can enter and exit on her or his own without any need of exogenous help. This type of built environment has a co-benefit as this helps in carrying and ferrying luggage on wheels, too. Thus, improving the utilization of public transport which in turn have positive spill over of air quality and climate change. Another co-benefit is for people with financial constraints who might be moving luggage can do so with ease thus improving their quality of life.

Table 4.10: Delhi Metro, Indraprastha, Central Delhi

Realm	Attribute	Feedback	Type	Comment
Social	Gender	2		
	Age	2		
	Disability	2		
Ecological	Energy	2		
	Resources	2		
Financial	Inclusion	2		
	Gradient		All	
Technological	Fitment		All	
Spatial	Furniture			

Realm	Attribute	Feedback	Type	Comment
Overall	Social Contract		Positive	
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		User Experience Centric	

Figure 4.10: Delhi Metro, Indraprastha, Central Delhi

The collage is showing the built environment of the station and its 'ease of access" to the platforms.

4.2 Germany Results

As this research progressed, there was a need to include a narrative from the developed part of the world. As the opportunity to study the Berlin metropolitan area emerged, the idea to serve as a good location to contrast the narratives that were emerging from the study of Delhi NCR became reality. Interesting enough, the areas studied in Germany

under the wider Berlin area are Berlin city, the city of Rathenow, and the nearby village of Hohennauen (depicted in the map as a red mark).

Figure 4.11: Field Map of Germany (this was used during field visit)

4.2.1 Berlin

Case 1: Public Spaces

All public spaces in Berlin are suitable via the GAD lens. Most (if not all) spaces appear to be accessible by persons with disabilities. There seems to be a very strong sense of user experience in mind while designing most urban furniture. There is not one single uniform construct of a bus stop. Instead, the bus stop is adapted to given a particular locality. There is uniformity, however, across the city space in terms of walkability and cycling, and use of wheel chairs. People on wheel chair can commute using public transport on their own; even blind people can commute without any assistance.

Table 4.11: Berlin - public spaces

Realm	Attribute	Feedback	Type	Comment
Social	Gender	2		
	Age	2		
	Disability	2		
Ecological	Energy	1		
	Resources	1		
Financial	Inclusion	2		
	Gradient		Mixed	
Technological	Fitment		All	
Spatial	Furniture		Various	
Overall	Social Contract		Positive	
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		Mixed	

Figure 4.12: Public spaces in Berlin

Case 2: Construction Protocol

(City of Berlin)

Most construction sites in Germany have protocols for all kinds of construction. Therefore, scaffoldings etc., are made in a way which makes transit in construction affected areas easy and smooth for all types of commute – whether by motorized vehicles, walking or cycling. This is particularly relevant for all kinds of built area as construction and maintenance will always go hand in hand.

Table 4.12: Berlin - construction protocol

Realm	Attribute	Feedback	Type	Comment
Social	Gender	2		
	Age	2		
	Disability	2		
Ecological	Energy	1		
	Resources	1		
Financial	Inclusion	2		
	Gradient		Mixed	
Technological	Fitment		All	
Spatial	Furniture		Various	
Overall	Social Contract		Positive	
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		Mixed	

Figure 4.13: Construction protocol in Berlin

4.2.2 Rathenow

Case 1: Cultural Centre – show on Optical traditions of the region

(Rathenow city centre)

Rathenow has a strong tradition in the optical industry. Starting from microscopes to lenses, and various firsts in the industry can be traced back to this place. The Cultural Centre at the heart of the city exhibits important achievements of the area and invites for the presentation of arts created by the people of Rathenow. This has a positive sense of achievement and human experience for people in the locality.

Table 4.13: Rathenow - Cultural Centre featuring the optical tradition of the region

Realm	Attribute	Feedback	Type	Comment
Social	Gender	2		
	Age	2		
	Disability	2		
Ecological	Energy	1		
	Resources	1		
Financial	Inclusion	1		
	Gradient		Public	
Technological	Fitment		Web2	
Spatial	Furniture		Space	
Overall	Social Contract		Positive	
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		Local	

Figure 4.14: Cultural Centre in Rathenow, show on optical traditions of the region

Additional Photos on walkability in Rathenow.

Figure 4.15: Walkability in Rathenow

4.2.3 Hohennauen

Case 1: Space for Disability support – home and work

The support for disability shows in various forms apart from general built area landscape. There are specific housing facilities with accompanying work areas. The locality is home to various agricultural workshops. The facility for work has various kinds of work with skill set requirements for differently abled people. Persons with various types of disabilities both mental and physical are employed in the workshop.

Table 4.14: Hohennauen - disability support at home and work

Realm	Attribute	Feedback	Type	Comment
Social	Gender	2		
	Age	2		
	Disability	2		
Ecological	Energy	0		
	Resources	0		

Realm	Attribute	Feedback	Type	Comment
Financial	Inclusion	2		
	Gradient		Public	
Technological	Fitment		All	
Spatial	Furniture		Yes	Buildings
Overall	Social Contract		Positive	Local governance
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		Mixed	

Figure 4.16: Space for disability support – home and work (Hohennauen)

Case 2: Waste Management

Waste management is very disciplined. There is a yearly time table of when waste is collected made available at the beginning of every year. Waste is carefully segregated at the household level. Waste disposal is carefully planned with user experience and client interface in mind. For instance, at the bottle waste dump, there are chutes for three kinds of bottles – for white, green and brown glasses respectively. The bottle waste dump has a car park area as well, for ease of the user – the design and functioning keep in mind the user interface. Some bottles can be returned for money. Every product has a symbol to specify what kind of waste it. For, waste management to effectively work, there is a need for scientific knowledge and an effective social contract. Waste management in Germany and this specific case show cases social contract as a heuristic process. (Strangely there was one area near Rathenow where waste is disposed illegally.)

Table 4.15: Hohennauen - waste management

Realm	Attribute	Feedback	Type	Comment
Social	Gender	1		
	Age	1		
	Disability	0		
Ecological	Energy	1		
	Resources	2		
Financial	Inclusion	1		
	Gradient		Mixed	
Technological	Fitment		All	
Spatial	Furniture		Yes	
Overall	Social Contract		Positive	
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		Mixed	

Figure 4.17a: Hohennauen - waste management

Figure 4.17b: Two contrasting scenarios of waste management in and nearby Rathenow

Case 3: Walkability – Bus stops and foot paths

The GAD lens at rural level is adhered to as well effectively. The built environment is made in accordance to local requirements. Walking, cycling is easy, and the public areas and built environment is accessible at all times. There is a highway which runs through the locality, and the road is curved in such a way that the high way traffic is slowed down. There is also a pedestrian first social contract.

Table 4.16: Hohennauen - walkability (bus stop, footpaths, and cycling)

Realm	Attribute	Feedback	Type	Comment
Social	Gender	2		
	Age	2		
	Disability	2		
Ecological	Energy	1		
	Resources	1		
Financial	Inclusion	2		
	Gradient		Public	
Technological	Fitment		All	
Spatial	Furniture		Yes	
Overall	Social Contract		Positive	
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		Mixed	

Figure 4.18: Hohennauen - walkability (bus stops, footpaths, and cycling lane)

Case 4: Leisure – bakery and coffee shop

There is access to leisure outlets across all localities. The notion of 'distributed leisure' is an important aspect in employment and in improving quality of life. Leisure has a primary meaning in fun and frolic, but it here also implies that the consumption of fun and frolic implies that fun and frolic (including eateries) have to be produced. 'Distributed' implies that places of consumption and production (of leisure) are not limited to important urban centres but are available everywhere including in rural and peri-urban areas. This may be an important pattern of approaching employment especially in the coming era of Artificial Intelligence.

Table 4.17: Hohennauen - bakery and coffee shop

Realm	Attribute	Feedback	Type	Comment
Social	Gender	2		
	Age	2		
	Disability	1		
Ecological	Energy	1		
	Resources	1		
Financial	Inclusion	2		
	Gradient		Private	
Technological	Fitment		All	
Spatial	Furniture		Yes	Shop
Overall	Social Contract		Positive	
	SDG		Positive	
	Human Rights		Positive	
	Decision Making		Decentralized	

Figure 4.19: Hohennauen - bakery and coffee shop

CHAPTER 5: DISCUSSION

This section discusses the implications of the research findings for the Governance of the Built Environment and its theoretical underpinnings. This section has been divided into four major parts. They are based on a categorization as core, overall, attribute-based or case wise implications. The core and overall parts are a summative assessment of the research with implications drawn from taking a bird's eye view on the research results. The attribute-based implication is primarily a synthesis of the attribute-based tables complemented by a case-to-case narrative.

5.1 Core implications for the Governance of the Built Environment

Effective local Governance

One important finding of this research is that all cases point to a difference between developed and developing nations in the presence or absence of effective local governance. The challenge of the urban or built environment in the 'Global South' is essentially in how to create multiple-stakeholder synergies and how to build a pathway for robust decision-making. The complexities involved seek a solution rooted in creating a framework for multi-stakeholder and multi-disciplinary actors, agencies and institutions that results in instilling social and ecological resilience. This framework will ultimately result in bringing out a Design for Governance which synchronizes Local Governance, Internet Governance, and Sustainability.

The first step for the governance of the built environment is the design for intervention. Here, key academic players have to create a discourse in the development narrative where systems thinking as a trans-disciplinary heuristic has to be adhered to. Accordingly, the heuristic of the resilience framework has emerged in three phases: Inform, Inspire and Implement (Bose & Sharma 2018). The resilience framework

creates two sets of actors for most human systems including the neighbourhood or locality. The two sets of actors are emic actors and etic actors. Emic actors belong to the neighbourhood or the locality (wherein a particular furniture or space of a built environment is being studied) in terms of work or stay. Etic actors do not work or stay in the area concerned but do make decisions or are involved in creating the built environment in that locality with or without conscious participation and consultation of the emic actors. An example of pure etic decision making without conscious participation is the Delhi Metro which features as an example of effective governance of the built environment in this study. The reason for Delhi Metro's effectiveness is its understanding of user experience and an inherent anthropological trait taken from Margaret Mead's dictum 'What people say? What people do? and What people say they do? are three entirely different things (Mead 2018; Spencer 2010; Kottak 2006; Ewing 2011; Harvard 2019). Participatory emic narratives are usually survey based. However, in the Indian context, survey methods rarely depict the user perspective and have thus limited value for design and implementation purposes. Instead, this research finds and adds to the heuristic of the resilience framework suggesting that the Inform and the Inspire stages can well generate focused emic and etic narratives. (See Figures 4.1 below) However, the implementation stage should be led by emic or embedded actors. In other words, external actors can lead a discussion at the Inform and Inspire stage reflecting on problems and possible solutions but should not be allowed to lead the Implementation stage without the proof of user centricity. Delhi metro is an excellent example for how usability and concerns of multiple stakeholders with varied needs were recognized and addressed. One paradigm of effective local governance may well be the resilience framework that focuses on the user of the locality. An important aspect as part of this discourse on effective local governance is building local capacity to work

towards its resilience. Another important governance paradigm is Financial Gradients (Bose 2011; Bose et al., 2012) which ensures a proper financial strategy from both public and private financiers. The Financial Gradients paradigm will be discussed in more detail in the attributes section of this chapter.

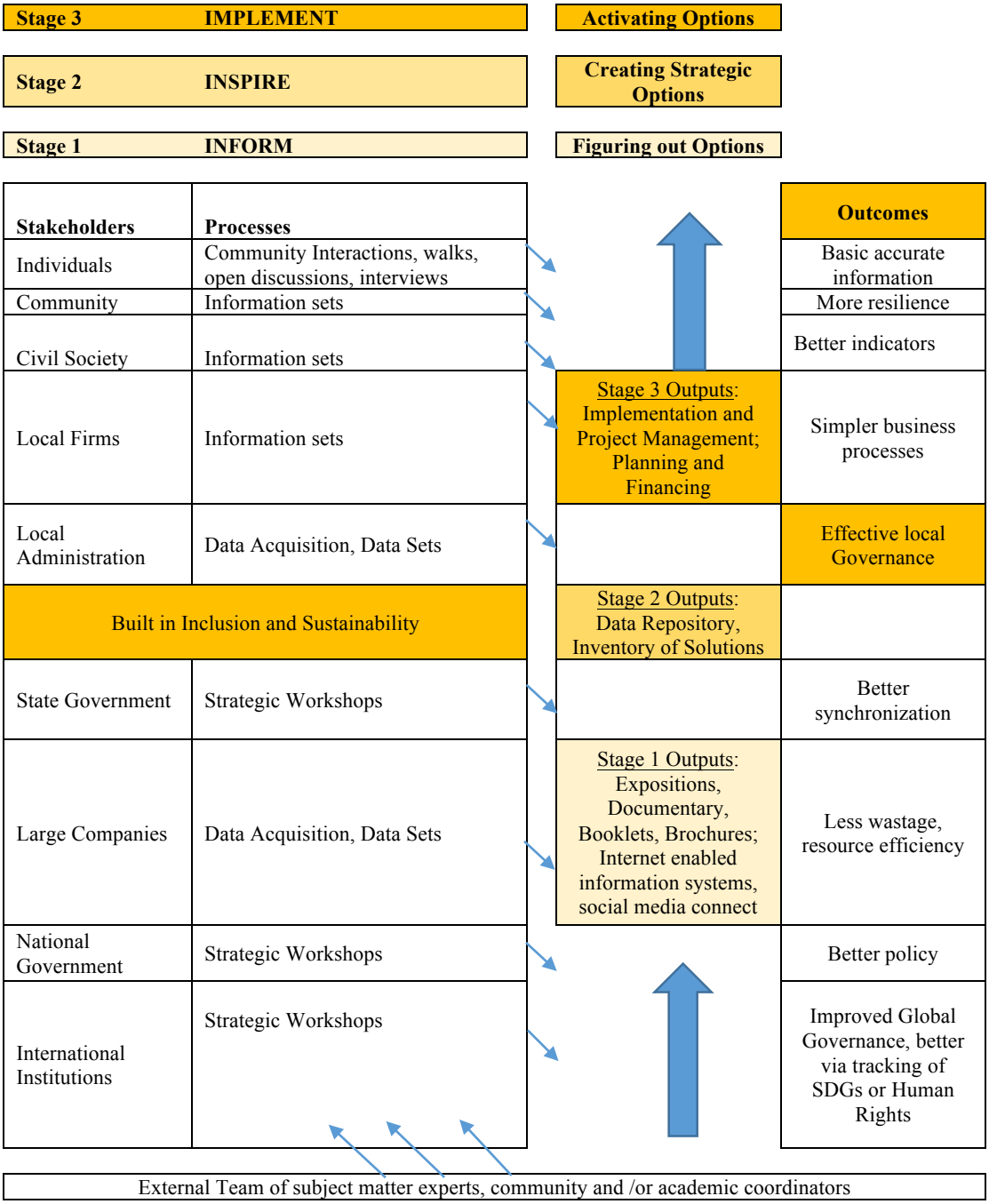

Figure 5.1: Resilience Framework (Source: adapted from Bose & Sharma 2018)

Trans-disciplinary research

A second key finding of this research points towards the need for trans-disciplinary approaches. This finding aligns with conclusions arrived at earlier by Gaziulusoy & Boyle (2013), Müller, Janetschek & Weigelt (2015), Christopoulos (2008) pointing at trans-disciplinary research and the need for understanding nexus and association.

The research clearly suggests that there are more negative impacts/issues in the Built Environment in the Delhi NCR than the Berlin Area. That is obvious to anyone who visits the two areas. However, when things go wrong in the Berlin Area such as with respect to smoking in public, illegal garbage dumping, and the massively delayed opening of Willy Brandt International Airport – in those cases a pathway to resolve the problems seems to be difficult to find even in the developed country context. It is interesting to note that while the Berlin Area has a wider bandwidth, i.e. the governance mechanisms handle a wider range of issues, yet when it comes to handling new kinds of problems the system seems to be unable to react appropriately. Smoking is a particularly interesting example as smoking inside public premises was banned across the European Union circa 2008 (EU 2019). As a result, it seems that people are found smoking more often in the open which was a clear difference in experience between urban India and urban Germany. This leads to a conclusion that what the respective system thinks as a low intensity problem – an issue that multiple stakeholders think of as a non-issue is not handled or dealt with correctly. This is all the more interesting as in the Berlin area this should be much easier to resolve than it is. This also means that even the best urban areas in the planet are unable to address apparently low intensity issues.

In this realm of understanding it is important to carve out a new thinking towards a solution. It is here that trans-disciplinarity becomes crucial. As discussed in

Jahn, Bergmann & Keil (2012), trans-disciplinarity indeed has a long history of academic discourse. It was initially promoted as an adequate scientific response to pressing societal problems like climate change. In fact, the literature on climate adaptation suggests that what is needed is effective local governance in South Asia (Sud et al., 2015; UNFCCC 2011; UNFCCC 2012 a, b, c; World Bank 2010; Wilby & Dessai, 2010; Smit & Skinner, 2002; Maybee et al., 2012; Maskrey 1989, 2011; Horstmann & Abeysinghe 2011; Gupta 2011; Burton et al., 2006) and all cases studied here point at the same. A number of scholars such as Chiapello & Fairclough (2002) argue that Management itself is a trans-discipline. Yet, despite its increasing popularity, trans-disciplinarity is still far from academically established and current funding practices do not effectively support it at Universities and research institutions. According to Jahn, Bergmann, & Keil (2012), building a framework for trans-disciplinary research is crucial. This research is a response to this quest by scoping a study to comprehend the resilience framework as a trans-disciplinary heuristic.

Flow of Information as culture

This research has recognized an emergent definition of culture as 'the manner in which information flows in a particular human system'. This definition is an extension on some definitions of culture as presented by Hall (1989, 2001). In fact, Hall (1959, 1971) has stated that culture is a method of communication. However, instead of speaking of 'communication' which is subject based and mostly draws on a human and the person's attributes to communicate something, I am suggesting to speak of 'information flow' as more suitable for this research. Using the phrase 'information flow' or 'flow of information' – the subject under scrutiny is the information or the idea itself, and not a person and its particular views.

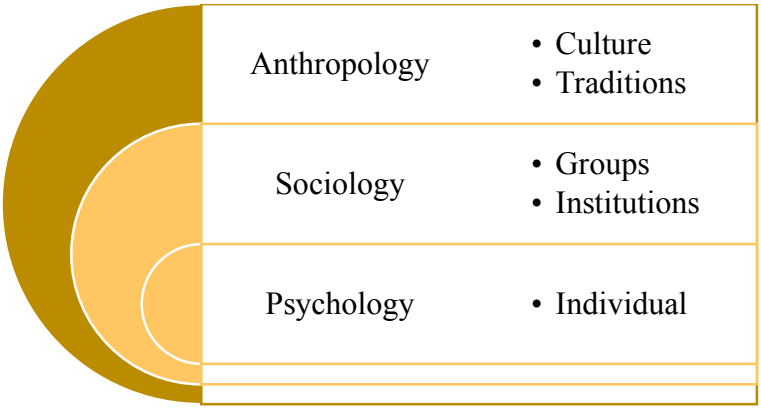

Figure 5.2: Layers of human systems (Source: self; interview/interaction with Professor Jayasinghe, JGU, April 2018)

Practically, the transformation of an idea or an information set can be mapped as much as its progress (or the lack of it) from abstraction to a physical tangible outcome. It should be noted that culture is different in different human settings and has been empirically proved to be different many times (Yang et al., 2011; Hofstede 1991; McSweeney 2002). Similarly, one can conclude that the flow of information within a culture is different from another.

Inclusion and Sustainability

None of the issues or problems found in the Indian cases led to any findings in corruption; instead, all were found to be the result of incorrect governance paradigms and the related flow of information. This is an important finding as the discourse on reducing corruption has to change as a prominent aspect to be addressed in the development struggle of developing nations. It should be moved towards more effective methods of designing use cases of local governance. This discourse rather resonates with Hanlon's Razor (Pinker 2014; Pinto 2014, Raymond & Steele, 1996) which suggests to 'Never attribute to malice that is adequately explained by incompetence'. The incompetence inherent in the studied cases is not necessarily attributable to people or countries but to systems including the global financial architecture. A primitive form

of the latter, which still exists today is, say, an institution like the World Bank which lends money to a developing country with a sovereign guarantee. The sovereign guarantee translates to mean that investment grade finance in the form of debt becomes a non-investment grade public finance at the level of the country at the mercy of a mostly colonial bureaucratic system. That system usually has a different culture or as we have found in this research a different flow of information than that of the innate human systems. We can find this idea abundantly in Douglas North's work on institutions, their consequences for economic performance, and the limits of rationality (North 1990). His work on the World Bank funds on limited access orders in the developing world is a compelling new approach to the problems of development with most ingenuous yet profound implications (North, Wallis, Webb & Weingast, 2007; Ménard & Shirley, 2014), much like this research too. To further the aside looking at the recent events at Rwanda, mainly the country's incredible economic growth without taking World Bank 'assistance' is noteworthy (Storey 2001).

To sum this up – this research on the governance of the built environment in India points to the present narrative of development finance as fundamentally incorrect. The Financial Gradients method suggests that sustainable development needs investment grade financing and that technology companies need non-investment grade financing or grants in their capital structure, at least in the formative phase. Let us stick to the first part of this statement. Arguments put forward by key opinion leaders such as Jeffery Sachs (WEF 2014) have raised a storm by arguing a non-investment grade foreign aid regime would be counter-productive. A WEF (2014) piece further states drawing on studies conducted by Banerjee and Duflo (2011), there is need for a "radical rethinking of the way to fight poverty." Banerjee and Duflo (2011) argue that the issue cannot be solved in the abstract, by using aggregate data and cross-country regressions.

That is why the debate between Easterly (2009) and Sachs (WEF 2014, Sachs 2005) on grant versus investments has missed the point. The evidence is simple and convincing. "Some projects financed by official aid work and are effective in reducing poverty and moving the domestic populations towards self-sufficiency and prosperity, while other projects (and programmes) fail miserably. The question is not how aggregate aid programmes have fared in the past, but how to evaluate whether specific programmes are effective" (Banerjee and Duflo, 2011). Bose (2011), Rajan & Subramanian (2008, 2011), Rajan & Zingales (2003), as much as this research support and substantiate this argument.

Resource efficiency, design for the built environment, continuous mapping of cases to SDGs and Human Rights have created high relevance of this research on issues of inclusion and sustainability. On the matter of use experience broadly and more specifically addressing issues of disability this research has found that user centric design planning and implementation is the most appropriate as other researches such as Sandler & Blanck (2005) have corroborated.

5.2 Overall Implications

Policy relevance

This research possibly has unpacked a very powerful form of qualitative research method addressing multi-dimensional, multi-stakeholder, multi-lateral complexity in a novel system thinking trans-disciplinary heuristic framework. From the seminal work on qualitative data analysis for applied policy research (Ritchie & Spencer, 2002), we find that the conceptual underpinnings of a framework become pertinent and central to further research. Traditionally, as we see in Ritchie & Spencer (2002), the narrative is broken into four broad areas: contextual, diagnostic, evaluative and strategic. To extend

the relevance of the resilience framework to policy recommendations the following four pertinent questions were developed:

1. What is the problem? (Contextual) – maps to the inform stage of the resilience framework (Bose & Sharma 2018).
2. Why does the problem exist? (Diagnostic) – maps to the inform stage of the resilience framework.
3. What are the possible solutions? – maps to the inspire stage of the resilience framework.
4. What is the possible consensus for implementation if need be? – maps to the implementation stage of the resilience framework.

These four questions map to the 3i (Inform, Inspire, Implement) resilience framework in terms of: a) context and diagnosis of a policy problem; b) articulating and creating a possible set of solutions; and c) implementation strategy involving consensus or near consensus. This framework will be very powerful in articulating research for crafting a narrow Artificial Intelligence (AI) strategy or tool for 'empathy' (Martinez-Miranda & Aldea, 2005). The issue is that if AI as an optimizing algorithm – will it be capable of catering to inclusive sustainable development goals and targets? The consensus mechanism should take us towards such an inclusive sustainable development framework. From the technology perspective, here we have just dealt with AI, other solutions such as Distributed Ledger Technologies (DLT) and 5G (5^{th} Generation Telecommunication Networks) need to be looked into in various following sections of this study.

Critical ontological considerations

This research has fundamental implications for ontological aspects of the built environment. It is clear and widely supported the built environment has significant

impact upon communities Edum-Fotwe, & Price (2009), or more importantly, Abanda et al. (2013). The built environment is an area or sector (in terms of industry nomenclature) with the highest cost and environmental saving potentials, provided effective strategies are implemented. The central proposition of this research is that of creating a holistic heuristic method for effective local governance. In doing so, this research also raises a concern about the current understanding of the built environment particularly with respect to ontological questions raised in the Delhi NCR itself. There are a number of research projects which look into the question of – what is Delhi? Prime amongst them are key opinion leaders defined by Valente & Pumpuang (2007) exemplified by the faculty at the Center of Policy Research (CPR). The urban studies team at CPR had organized a workshop on precisely this question with the title 'Colossus: The Anatomy of Delhi', dated 13th August 2018. The workshop gathered speakers such as Yamini Aiyar, Neelanjan Sircar, Partha Mukhopadhyay, Shamindra Nath Roy, and Sanjoy Chakravorty discussing among other things 'Infrastructure and Inequalities'. This discussion highlighted the weaknesses of current narratives on ontological questions on the built environment and/or urbanization. For instance, the session on survey findings and inequality focused on religious minorities or Dalits not by design but as a result of empirical findings. However, the CPR conference room itself points to prove that the built environment is not made for people on wheelchairs. Any Dalit could have entered the conference venue. The research presented at this workshop pertaining to ontological questions of inclusion could not bring out the plight of disabled people in Delhi making the research at least in part severely inadequate. The narrative being carried by this and possible other research organization contains an inherent research bias which is a dangerous trend that needs to be addressed and corrected.

It is argued that a myriad of issues in India and even possible improvements in Germany can come from the advancement in Information Technology. Understanding the internet and its associated technologies such as AI and DLT are important even for the general population (IBM Global Business Services 2006). According to a recently published report by Kantar IMRB ICUBE (2019), the internet user base in India has exceeded 500 million people and is likely to reach 627 million by the end of 2019. In 2018, the internet use rate has increased by 18 per cent. The following table (Tab. 5.1) provides an overview of the figures on smart phone ownership globally. The India data presented below is a clear indicator for the growth in smart phone diffusion in the country which is a crucial prerequisite for the application of emerging internet and communication technologies.

Table 5.1: Active Smart Phone Users Globally and by leading regions/countries

	Year	**India (in mill.)**	**China (in mill.)**	**Western Europe (in mill.)**	**Globally (in bill.)**
	2016	227	687	291	2.50
	2017	300	735	298	2.70
	2018	375	783	306	3.00
projected	2019	456	830	313	3.30
projected	2020	531	875	319	3.50
projected	2021	601	918	325	3.80

Source: Newzoo (2018)

There are reasons to believe that India's complexities can be suitably addressed by Artificial Intelligence and vice-versa, as pointed out by Aggarwal (2018) in a recent MIT Technology Review Article.

5.3 Attribute-based Implications

Sustainable Development Goals at the local level

Sustainable Development Goals (SDGs) and Human Rights are two mechanisms born out of a system of global governance at the United Nations level (UN SDG 2019; Alston & Crawford 2000). India's Niti Aayog (2019) adds that the SDGs are an ambitious global agenda with a commitment to economic, environmental, and social aspects for the improvement of the conditio humana. Interestingly, it notes that the progress of the world to meet the SDGs, largely depends on India's achievements. It further goes on to put in that India played a prominent role in the formulation of the SDGs and much of the country's National Development Agenda is mirrored in the SDGs. It is true that the SDGs had a better participation from the Global South than the MDG (Millennium Development Goals) (Loewe 2012). In India, apart from the 17 SDGs, there are 169 targets and 306 national indicators. This makes the process highly complex and difficult to get a hold on (Niti Aayog 2019). Therefore, defining and measuring success with indicators poses a tremendous challenge. Various countries have put in processes to implement and measure success against the Goals. Dashboards have been created like the *'SDG India Index'* (Niti Aayog 2019). The problem with these dashboards is that there is country wise or even state wise data but effective local governance does not feature in any of these reports. This research can possibly help in creating a locality wise SDG dashboard – a tool for which there is growing need (Galli et al., 2018; Nilsson, Griggs & Visbeck, 2016; Fankhauser 2009 and 2006; Deutscher 2009).

The same discourse on SDGs also points towards the inter-connectedness of the SDGs and suggests creating a framework-based heuristic for better SDG management particularly at the local level. The 'heuristic' of creating the lens of Gender, Age and Disability is fairly novel to the research on the built environment from a user

perspective. There are various narratives coming out of the empirics and academia like Sibley's (2002). This research, however creates a multi-stakeholder, multi-lateral and multi- and trans-disciplinary framework for data collection and presentation. This research would seek to be scaled to implement, measure, and mange SDGs at the local level.

A Social Contract for an Inclusive Built Environment

The question of a prevalence of a social contract from all the cases is interesting and raises an intriguing value in this discourse. One of the first ideas of a Social Contract was developed in Thomas Hobbes' Leviathan (1651). This discourse does not significantly differ from Hobbes' definition of Social Contract but possibly differs in context which here in this research is not a nation but a locality. This research found systematic errors in the information and the flow of information amongst relevant stakeholders in the Delhi NCR – theoretically they are all social contractors.

The differences found in the built environment of the Delhi NCR and the Berlin area suggest that the social contract in Germany was intact and somewhat robust especially with regard to decision making adopting the user experience perspective of the GAD (Gender, Age, Disability) lens. Generally, a bus stop is far more usable all over the Berlin area than the Delhi NCR. A bus stop is not only an urban furniture but a central element in the entire ecosystem. Let us imagine a disabled aged woman moving on her own in her wheel chair from her house to the bus stop, boarding the bus, reaching her destination bus stop, de-boarding and then finally heading towards her final destination. From any two random points in the Berlin Area that is possible. In the Delhi NCR it is not. Such freedom of movement for a disabled, aged and female person is possible in the Berlin Area because the bus stops and pathways are built with considerable local knowledge in the design requirement of inclusive places and their

urban furniture. One absolutely critical aspect is User Experience or user centricity. There is considerable literature on this such as Vischer's *'Towards a user-centred theory of the built environment'* (2008). In the Delhi NCR, by contrast, there is a considerable disconnect between literature and practice. Nevertheless, this research has found that a disabled aged woman can travel between any two metro stations in the Delhi NCR during off peak hours. In other words, there are instances of user-centred public built environment in Delhi NCR. This makes an intriguing finding for a social contract which may warrant further research.

Financial Gradients

It will be worthwhile to note that the Bus departments in Delhi NCR are variously public financed, and are headed by a bureaucrat. Delhi Metro is different; it is headed by a technocrat (normally an engineer). The first finances were made by Japanese investment agencies on a part debt basis. This made Delhi Metro an investment grade project unlike the bus agencies. It will be interesting to note that though Ghaziabad administration has made real progress in making a well-planned cost-effective urban area, it still has made various bus stops without a plan for buses. This creates a strange case for making public finance in India more efficient. Public Finance efficiency is visibly more important than corruption in the cases of the built environment. As Deming (1993) has pointed out, short-termism in public finance will lead to cost escalations in the long term. This makes a holistic and robust structuring of financing important from the outset. Foreign aid and World Bank loans are inefficient if they are purely managed by bureaucrats – Delhi Metro had a technocrat which made the built environment more user centric. This was helpful as Delhi Metro had a visible positive internal rate of return – something quite unprecedented in this sector for some time (Joshi 2010). Though these calculations are difficult and are a research area in

themselves (Chatterjee 2019), the built environment in the Delhi NCR is visibly impacted by the nature, structure, and sources of finance. This kind of financing is called Financial Gradients (Bose 2011, Bose et al., 2012).

5.4 Case Wise Implications

In the results section, each of the 16 cases contained a vignette, a table, and photographic evidence. In this part, we will draw implications from each of these cases divided by results from India and German, and in the order followed in the results section.

India Results

Case 1: North campus bus stop and footpath – The major implication of this case is on formulating pathways for effective local governance. This case highlights that much of the decisions made at the local level are not user-centred. This also has implications on the resilience framework to be utilized with a contrasting and synergistic emic and etic narrative.

Case 2: Walkability (road design) near North campus – This case is very important and has major implications on the design of urban furniture to create employment. India needs to create 10 million jobs every year in this current period, aspects pertaining to job creation are extremely important. Creating spaces for static workforces is crucial. The identification of the static workforce is a specific outcome of this research enriching the discourse on labour economics.

Case 3: Stray animals in Connaught Place (Central Delhi) – This case highlights a wicked problem. The narrative is a complex one as discussed in the results section. The implication here is again looking for very local solutions with a higher degree of emic narratives.

Case 4: National Flag at Connaught Place – This case highlights how 'Out of the box thinking' can create an urban installation with an extremely pleasing and awe-inspiring effect upon the people living in, working in and visiting Connaught Place.

Case 5: Police booth on footpath in Vivek Vihar, East Delhi – This is a pivotal case showcasing how the flow of information is crucial in decision making for effective local governance. This case has implications on redefining culture as flow of information.

Case 6: Washer man in Vaishali – This case brings out the multi-dimensional nature of creating a solution in the built environment. It is a pivotal case in highlighting the static workforce further discussed in a paper titled *'A Strategy for Financial Inclusion for workers in the informal economy'* (Sharma et al., 2019) - an ICRIER working paper which got traction by the BBC World Services[5] and acknowledgement from the Indian National Urban Livelihood Mission for future collaboration. This shows the robustness and effectiveness of the method applied in this research. A simple observation of daily life in the NCR Delhi has created an enormous opportunity for all those workers who are associated with the informal economy.

Case 7: Eye doctor on footpath in Govindpuri, South Delhi – This case manifests a missing market and draws upon the need for creating a built environment for various groups of people.

Case 8: Cyber City, Gurugram – A major implication of Cybercity is on financial gradients. Cybercity shows how effective local governance and an effective, user conscious built environment (considerate of Gender, Age and Disability) in Delhi NCR is brought about by investment grade finance. Thus, structuring public spaces with

[5] https://www.facebook.com/bbcworldservice/videos/can-india-create-enough-jobs/604095123425249/

investment grade finance such as also Delhi Metro is crucial for inclusive sustainable development in the built environment of the Indian context.

Case 9: Community toilet R.K. Puram – This case again highlights the lack of emic narratives and user centric approaches in creating an effective built environment.

Case 10: Delhi Metro, Indraprastha station – This case shows that when the built environment has been constructed keeping persons with disabilities (especially on wheelchairs) in mind, there are significant co-benefits to sustainability, climate change and inclusion. The major reason for this to happen is that the decision-making process has become user experience oriented. The Delhi Metro example show when the design philosophy and decision-making process imbibes a user experience centric model, the result is that of a developed country standard for the built environment. User Centric decision-making processes can also be linked to the Financial Gradients criterion. The fact that Delhi Metro has investment grade financing channels and the key decision makers are technocrats rather than bureaucrats can also explain part of the effective decision-making process. This has important implications on how to structure finance for small, medium and large infrastructure projects in developing economies.

Germany Results

Berlin

Case 1: Berlin Public Spaces – This case depicts that public spaces are designed with an effective user centric approach. The users can be various with different needs from across the spectrum including those derived from the Gender, Age and Disability lens. The implication being that different agencies have coordinated to provide spaces using emic and etic narratives.

Case 2: Construction Protocol (Berlin city) – Across public spaces in Germany, a particular construction protocol is followed. If a building is being constructed or maintained a protocol is followed in such a way that pedestrians, cyclists, persons with disabilities and other stakeholders remain unaffected. This aspect is particularly relevant for India where a vast majority of our built environment is still to be made and maintained.

Rathenow

Case 1: Cultural Center (Rathenow) - A major implication is to fine tune an emic narrative and create a sense of creative purpose embedding oneself in historicity with an emic narrative.

Hohennauen

Case 1: Space for Disability support – home and work – One striking aspect of the built environment in the developed world is the user centricity with respect to the GAD lens. When you structure the built environment and the social system with the disability lens various problems of built environment and associated social systems get resolved.

Case 2: Waste Management – In Germany, the waste management process is similar to the built environment in terms of its efficiency and user centricity. There is a book given to every household with a clear date and time of how, when, and what type of garbage is going to be collected. The manual is made with a proper understanding of emic and etic narratives.

In conjunction with case 1 from Berlin city, these two cases are marvellous example for creating an inclusive and participatory framework for managing mobility and waste management for a wide range of audience with a wide range of needs, while the systems are not completely resilient, yet. This research using the resilience framework as a

heuristic has unearthed that while the local governance frameworks in Germany cater to a wide range of issues, a resolution is tough to come by when unknown problems occur in the system. There is high level of predictability in how they work. In the instance of open spaces in Berlin when the European Union changed its laws banning smoking in public buildings, people began smoking more in the pedestrian walkways which leads to a particularly bizarre situation. While Delhi has one of the world's worst air quality and people are rarely seen smoking in public, Berlin has among the best air quality indicators globally with pedestrians being affected by second hand smoke on the sidewalks. As concerns waste management, there are illegal dumping grounds – something which should be very easy to resolve in Germany given its capacity and social contracts, yet for years the illegal site operates.

Case 3: Walkability in Hohennauen

This is similar to the open space implication in Berlin. The important aspect over here is that Hohennauen is a rural area comparable to a peri-urban area in India. The important thing to note is that even in an urban and peri-urban area it is possible to put in a built environment using the GAD lens. In India, the implication of the built environment in the rural and peri-urban space are huge. It is a low hanging fruit and the first step is to create an emic local capacity.

Case 4: Leisure: Bakery and coffee shop in Hohennauen

With an increase of capital intensity in our production functions, labour would have to renegotiate in terms of a module for production following a Marxist tradition. This research finds that leisure itself can become a production mode. This production mode of leisure is decentralized and distributed. If we look at the governance structure of Artificial Intelligence (AI) and Decentralised Ledger Technology (DLT), it also

advocates for a particular paradigm of distributed and decentralized government regimes. In this instance where mostly AI and DLT are in conflict with human resources and creating unemployment – leisure as a production function creates an opportunity for AI and DLT to synchronise with human systems, to create opportunities for employment, and to improve the quality of life.

CHAPTER 6: CONCLUSION

This research has used qualitative methods to further develop the resilience framework and has inspired to form a trans-disciplinary heuristic connecting actors, agents and multiple stakeholders in a multi-lateral and multi-dimensional setting. The research is a testament to the fact that complexity at the level of the localities cannot be dealt with further methodological or theoretical complexities. The research recognizes that there are cognitive abilities which can present itself as heuristics to align multiple stakeholders to resolve problems at their level of interaction within the human system. The research has unearthed novel concepts like the static workforce, utilization of gender, age and disability as a lens for the built environment. It has also incorporated cross-learnings from two different countries affected by very different sets of human indicators. This research suggests that whilst the scope of addressing issues is much larger in a built environment of a developed country than in a developing country set-up, yet the resilience of both countries vis-à-vis foreseeable challenges seems questionable. In fact, in developing countries there seems to be a parallel economy with informal trust institutions who have worked their ways towards improving their respective quality of life. This research paves the way for creating solution sets with the utilization of emergent technologies like Artificial Intelligence and Distributed Ledger Technologies. One of which can be found in the strategies for financial inclusion. This research has pointed towards creation and synchronization of emic and etic narratives using the resilience framework. This narrative will be particularly important in creating a multi-stakeholder framework for constructing a governance paradigm for AI, DLT and 5G to synchronize itself smoothly with the paradigms of global governance such as Sustainable Development Goals (SDGs) and human rights.

To conclude, this research finds a reflection in the quote by Carl Gustav Jung “The creation of something new is not accomplished by the intellect but by the play instinct acting from inner necessity. The creative mind plays with the objects it loves.”

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