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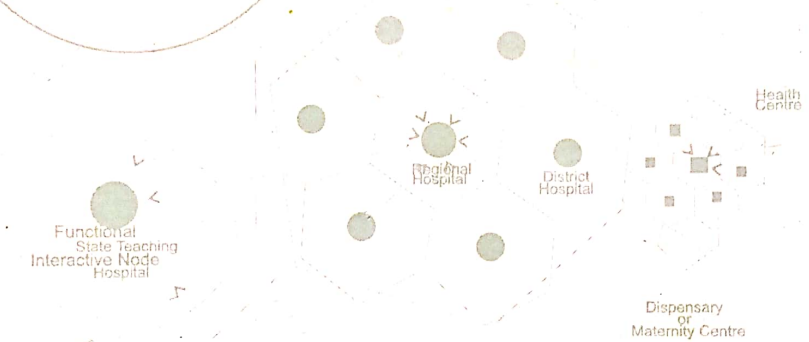
CONTEMPORARY CONCEPTS IN PHYSICAL PLANNING



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VOLUME II

Compliments of the editor to
Mr. O.O. Idowu

26/09/16

CONTEMPORARY CONCEPTS IN PHYSICAL PLANNING

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Volume II

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First published 2016

Published by the
Department of Urban and Regional Planning,
University of Ibadan,
Ibadan, Nigeria.

ISBN: 978-978-54459-0-9

Printed by:
Gbolagade Commercial Press
Ibadan, Nigeria.
Tel: 08074559512
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Preface

This is Volume II of *Contemporary Concepts in Physical Planning*. It is a follow-up to Volume I, which was introduced to the global academic cum professional market in 2015. As a pleasant appetizer to the present volume, it has presented an image of resounding success through acceptance inferred from the large volume of sales within a period of only one year. The motivation, as presented in respect of volume one, is contribution to advancement in urban and regional planning (URP) knowledge and practice. Enrichment in critical thinking, conceptualization and creativity has constituted our broad objective. Specifically, the objective is coming up with a list of concepts; defining those concepts in terms of origin, historical and philosophical development; and relating the concepts to urban and regional planning theory and practice.

The methodology adopted for the production of the book was a process of compiling over time, a list of the concepts through literature search, observation, attendance at conferences and consultations. This was followed by identifying potential authors by such variables as academic/professional qualifications, experience, competence in conceptualization, communication skill and time management. Indications of willingness to participate were followed by guidelines spelling out the authors' responsibilities and the publishers' obligations,

especially in review, printing and funding. The outcome of this process, building on the 2015 experience, is volume two of *Contemporary Concepts in Physical Planning (CCPP)*. One special feature in this new volume is the colour of the book's cover page, which is off-white and deep green (the colours of volume one are gold and coffee). This is to make the two volumes easily distinguishable on a bookshelf.

Volume II of *CCPP* is made up of 51 chapters put together in 1077 pages by a total of 76 single and joint authors. The chapters, as in the first volume, are arranged alphabetically. They are made up of concepts that are regarded as directly related to URP, such as 'community', 'development', 'location' and 'region,' but now presented with new insights and ideas. There are also concepts such as 'ecology', 'vulnerability', 'crime', and 'matrix,' that would not have been seen as directly related to URP, but now convincingly presented as relevant to and, therefore, closely related to URP. Lastly, there are a set of concepts which hitherto would not have been thought of as relevant to URP, but have now entered into the purview of URP. These include 'exclusion', 'inclusion', 'values' and 'leadership'.

The essential value of this volume, as also stated in first volume, is that it cuts across the whole spectrum of the various categories of town planners or urban/regional planners. That is to say that the book is of value to planning students, planning educators, those planners in practice as well as those in the public sector. However, we have, in this volume included another category of planners: these are the emerging crop of 'entrepreneur planners'. (See, Egunjobi Layi, Zubairu Mustapha and Gunn Ezekiel (editors), 2016, *Entrepreneurial Opportunities in Urban and Regional Planning Practice.* Abuja: Town Planners Registration Council of Nigeria – TOPREC; 218 pages). In general, the book is about familiarity with the changing world much as the changes relate to URP. For instance, changes in technology are reflected in 'planning on the moon,' planning the artificial islands and coping with traffic situations involving the self-

driven and, even, flying cars.

Emerging from this book project is the fact that the concepts that are relevant to the theory and practice of URP are legion. This in itself is a reflection of the nature of URP, as embracing almost all conceivable aspects of human life, and all its supporting elements. It also confirms the general assertion that there can be no end to the pursuance of knowledge, even in a narrow segment.

The measure of success attributable to this endeavour was due to the collaborative and cooperative efforts of the 76 authors, whose names and brief profiles have been highlighted in the table of contents and authors' profiles; the reviewers, who are mandatorily anonymous; and Dr. Adesina Sunday of the Department of English, University of Ibadan, who was consulted for language editing. Others were Tpl. Olusegun Falola, Miss Oluwafisayo Abiodun and Mr. Ola Olaniyan, who, since the conception of the idea of this publication, constituted a formidable team working on the logistics and technical areas of production. Tpl. Ademola Adebayo, who had the responsibility of designing the cover page, and Mr. Paul Gbolagade Falodun, the master printer, closely worked with the technical team and the editor. The publisher, the Department of Urban and Regional Planning of the University of Ibadan, currently being led by Dr. Olusiyi Ipingbemi, supported our efforts towards advancement in knowledge and professionalism.

Professor Layi Egunjobi
5th July, 2016.

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LEADERSHIP

S. O. Medayese, S. I. Shaibu and O. O. Idowu

27.1 Introduction

Leadership is one of the topics in modern research. It is limited to only management. It originated long back in history when people started understanding the importance of leaders' role in various facets of life, such as politics, governmental issues, foreign policy and war. Philosophers, historians, warriors and rulers in the past paid much attention to this subject to bring improvement to leadership practices of their times (Shamas-ur-Rehman, 2009).

According to the prominent leadership scholar Bennis (2007), leadership is an important resource in any organization; it exhibits individual's broad scope talents and abilities. The conceptual idea of leadership is embedded in managing and management principles. There is no area of human activity or profession where the task of leadership is

not require for smooth running of the affairs of the activity or profession. Howbeit, the concept of leadership is ambiguously viewed in organizational and managerial practice. Basically, the focus of leadership lies in the process applied in doing things or influencing people to get involved in achieving the set objectives.

Yukl (2002) notes that the term leadership is a word drawn from the common vocabulary and incorporated into the technical vocabulary of scientific and non-scientific disciplines, without being precisely redefined. There are scientists who work on the concept of leadership, trying to narrow this concept down in terms of traits, behaviours, influence, interaction patterns, role relationships, occupation of an administrative position, or attribution.

There are numerous definitions for leadership. Kotter (1992) submits that leadership is most fundamentally about changes. Yukl (2006) firmly subscribes to the view that leadership is the process which influences others to understand and agree on what to be done and how to do it. This involves facilitating individuals with collective effort to accomplish shared objectives. Norhouse (2010) discusses involvement of process in the conceptual background of leadership. In exercising leadership responsibility, an individual influences a group of individuals to achieve a common goal. Kotter (2009) mentions five basic approaches to which leadership could be understood: the involvement of the process approach, the influencing ability, the dealing and relationship with a group of people, the goal-oriented approach, and the sharing of responsibility among the people. Decades of work on leadership have yielded trends in leadership application and its relationship to several professions, including urban and regional planning practice and training.

Understanding the concept of leadership in the light of the contemporary ideas in urban and regional planning is a worthwhile venture. With regard to the restructuring of the curriculum of the profession (urban and regional planning) in the tertiary institutions in the country, the study of the principles, philosophy and theories of leadership as a contemporary concept in physical planning will passionately enhance qualitative results in the practice or teaching of the profession. Transformation is bound to continue in the immediate and

distant future. It is against this view that the contemporary concept of leadership is required, for instance, to position the physical planning profession as a reckoning profession, with experts in leadership skills playing the leading role and creating innovativeness among the professionals in the built environment.

This chapter mainly addresses the meaning and different definitions of leadership, the emerging concepts and evolution of the leadership cum historical background of leadership. The key elements, concepts, philosophies and theories of leadership are also appraised, which form the first part of the chapter. The second section discusses the relevance of leadership to the town planning education and practice.

27.2 Literature Review

27.2.1 Meaning and Definitions of Leadership

The literature on leadership is, characterized with confusion and misunderstandings of the definitions, concepts and approaches of leadership. The researches on leadership have been repeatedly conducted on a few areas and topics. Shamas-ur-Rehman (2009) argues that several works on leadership started with the question: What is leadership? He discusses the variations on the concept of leadership and lack of common definition by which leadership can be evaluated. Burns (1978) argues that leadership is the most observed but least understood phenomenon.

Proliferation of terms in explaining what leadership is all about has been reported by several researchers; still its concept is not yet sufficiently defined. Besides the leadership ideologies and myths, the common understanding of leadership seems blurred, with diverse approaches to explaining and interpreting the scholars' opinions on leadership. Yukl (2002) makes a compilation of different definitions of leadership, summarizing the views of several scholars, as shown in Table 27.1. Most of these definitions mainly assumed that leadership is a process exerted by an individual, influencing others by guiding; and that it creates a structure to facilitate organizational activities and promote relationships. However, the focus on leadership differs as to who exerts influence and in what manner, as well as the purpose and the outcome of the influence attempt.

Table 27.*1:* Definitions of Leadership

Leadership is ...
1. "the behaviour of an individual ... directing the activities of a group toward a shared goal" (Hemphill and Coons, 1957: 7)
2. "the influential increment over and above mechanical compliance with the routine directives of the organization" (Katz and Kahn, 1978: 528)
3. "exercised when persons ... mobilize ... institutional, political, psychological, and other resources so as to arouse, engage, and satisfy the motives of followers" (Burns, 1978:18)
4. "the process of influencing the activities of an organized group toward goal achievement" (Rauch and Behling, 1984: 46)
5. "a process of giving purpose (me aningful direction) to collective effort, and causing willing effort to be expended to achieve purpose" (Jacobs and Jaques, 1990: 281)
6. "the ability to step outside the culture ... to start evolutionary change processes that are more adaptive" (Schein, 1992: 2)
7. "the process of making sense of what people are doing together so that people will understand and be committed" (Drath and Palus, 1994: 204)
8. "about articulating visions embodying values, and creating the environment within which things can be accomplished" (Richards and Engle, 1986: 206)
9. "the ability of an individual to influence, motivate, and enable others to contribute toward the effectiveness and success of the organization..." (House et al., 1999: 184)

Source: Yukl (2002)

When leadership is defined in different ways, the focus and the interpretation seem to vary. This depends on the circumstances, the purpose and the capacity of responsibilities such an individual is saddled to bear or undertake. Whatever the way, one may try to define leadership, or interpret its contextual basis, leadership entails developing the skills and ability to inspire confidence and support among the people who are needed for one to achieve organizational goals.

27.2.2 Evolution of Leadership Thought

The study of leadership has its roots in the beginning of civilization (Stone and Patterson, 2005). For instance, the Egyptian rulers, Greek heroes, and biblical patriarchs all exhibited leadership as a common feature. Although the practice of leadership has changed considerably over time in many ways, the basic functions of leadership – providing direction, decision-making, establishing goals, communicating, resolving conflict – still remain the same. Examining the evolution of leadership provides a necessary perspective within which to appreciate the increasing interest in transformational leadership (Clark and Clark, 1990). There has been a growing interest of the cultural and biological anthropology on the contents of leadership.

The evolution of leadership, as related to this chapter, can be viewed from a different paradigm. This enables systematic illustrations on how the leaders emerged and how principles of leadership evolved.

(a) Leadership Traits

The Galton's Great Man theory formed the historical basis for the evolution of the study of leaders and leadership (Clark and Clark, 1990). This era is traceable to the royalty, battlefield heroes, wealthy and successful individuals who possessed inherent talents and abilities that set them apart from the population at large. In the 1920s and 1930s, the trait theory became accepted and spread due to the "Great Man' theory. However, this theory has been unsuccessful in identifying the traits that made leaders different from other people. The underlying assumption of the theory was that leaders surely had to possess some universal characteristics that made them leaders. For the most part, the traits were viewed as given at birth. The theory did not take into account the different circumstances faced by leaders, nor the vast differences in the types of the individuals being led.

(b) Leadership Behaviours

A shift away from the view on who a leader is or the inborn traits of the leader has influenced several researchers to refocus themselves to what leaders are actually doing, as an attempt to identify the leader's behaviours. This is referred to as a behavioural approach to leadership. The behavioural approach tries to identify exactly what good leaders do on the job and then draws correlations between those specific behaviours and their leadership effectiveness (Yukl, 2002). Research in this area basically identified two different dimensions of leadership behaviour,

one focused on the task and the other on the people or interpersonal dimensions.

(c) Situational Leadership

The situation under which the leadership operates is quite important, as important as the leadership behaviour is. The work of previous scholars has resulted in reorientation of the field in what is, referred to as situational leadership. For example, some specific personal characteristics that were associated with leadership were identified (Shamas-ur-Rehman, 2009). Leader traits, for example, were relevant only to the degree that they pertained to the task under consideration.

Situational leadership theories can be categorized as trait or behaviour, depending on the researcher's judgment as to whether the leader's actions reflect either innate skills (traits) or simply the leader behaving in a way in response to the demands of a specific situation. This reorientation of the field paved the way for consideration of other approaches to the leader-follower relationship.

(d) Contingency and Transactional Leader Model

These approaches to leadership emerged from the situational approach of leadership. They identify leadership effectiveness traits which relate to those qualities individuals in leadership roles had to perform well, as opposed to identifying any specific traits needed. Situational elements as well as the characteristics of both the leader and the followers greatly impacted the leadership process. The contingency and transactional models contributed to the understanding of leadership complexity by migrating away from trait or situational approaches to leadership.

(e) Contingency Leadership

The contingency theories of leadership claim that leadership effectiveness is the combined result of both the qualities of the leader and the demands of the situation. These requirements interact to ensure that leadership qualities are consistent with the encountered task. The contingency leadership concept is based on the idea that effective leadership is situation-dependent. The leader has to be prepared to address effectively a host of situational variables in order to make intelligent decisions regarding his actions. The model was predicated on the idea that there is a direct link between subordinate acceptance of the decisions and worker productivity. However, the model emphasises leader's behaviours, not traits. It introduced the idea of the leader being

concerned with followers' development.

(f) Transactional Leadership

Transactional leadership was derived initially from a social exchange perspective that focused on the implicit social contract between leaders and followers and its relationship to effectiveness. Typically, transactional models focus on exchange theory and the perceptions and expectations followers have regarding the actions and motives of leaders. The follower's perception regarding fairness and equity of the exchange with the leader is paramount.

(g) Charismatic Leadership

The field showed renewed interest in the idea of the "charismatic leader," a concept first introduced by Max Weber. Charismatic leaders are typically thought to exert enormous influence and power over their followers as a result of their emotional appeal, especially in crisis-type situations where conventional wisdom suggests strong leadership is sought out. Impression management, articulation of an appealing vision, communicating high expectations, and expressing confidence in the ability of their followers are all key behaviours of charismatic leaders. The behaviours of the charismatic leader are aimed at influencing their followers' attitudes and perceptions about the leader.

Burns (1978) notes that charisma is a phenomenon often associated with political leaders, and articulate the positive characteristics associated with that style-inspire trust, confidence, unquestioning acceptance, wilful obedience, emotional investment, affection for the leader, and garner higher performance from their followers. This concept of leadership promotes unquestioning follower obedience and dependence. Pseudo-transformational leaders employ symbols of authority and exploit hierarchical differences to advance their own interests and agendas. They also inappropriately use their transactional skills and behaviours to threaten, coerce, demand compliance, and manipulate follower behaviour.

(h) Transformational Leadership

This concept of leadership evolved as a discernible trend. It was first introduced by Burns in *Leadership* (1978). This concept notes a difference between those leaders whose exchanges with followers are transactional and those whose interactions with followers are transformational.

Transformational-type leadership is a potentially powerful approach to be explaining leadership. Transformational leadership did not replace transactional leadership; it rather built on it. The two theories are neither inconsistent nor incompatible. In fact, leaders typically use both approaches, although transformational leadership is often more powerful in its effect.

27.2.3 Changes in Leadership Approach

Bryman (1992) splits leadership research into roughly four decades, beginning with the trait approach up to the 1940s and ending to date, with the so-called "new leadership approach," that includes charismatic and transformational leadership (see Table 27.2). This brief listing is not exhaustive, but rather superficial. Motivational approaches, attribution theory, learning theories, etc., which also play an important part in understanding leadership, are missing.

Although research trends have changed over the years, each new stage did not herald the demise of its predecessor; rather, a change in emphasis and perspective was indicated. Components of the preceding approaches can be found in the following trends. The new leadership approach, for example, refers to charisma and leadership behaviours and, therefore, combines the first two decades with newer theoretical suppositions. The attempts to organize the major approaches to leadership, according to the literature, have only been partially successful (Yukl, 2002). A more useful way is the classification according to the variable that is emphasized the most. The three major variables of researches on leaders are (1) characteristics of the leader (traits, skills, behaviour, influence tactics, attributions about followers, etc.); (2) characteristics of the followers (traits, skills, attributions about the leader, trust in the leader, task commitment, satisfaction, etc.); and (3) characteristics of the situation (type or size of organizational unit, position power, task structure, environmental uncertainty, external dependencies, etc.).

According to Yukl (2002), in order to explain effective leadership, leadership theories emphasize one category more than the others. Therefore, he classifies the theories and empirical approaches into the following five categories, as shown in Table 27.2:

Table **27.2:** Leadership Approaches according to Different Schools of Thought

Approach	Examples
Trait Approach	Trait theory
Behaviour Approach	Ohio, Michigan studies
Power-Influence Approach	Participative leadership
Situational Approach	Contingency theories, leadership substitutes
Integrative Approach	Charismatic leadership, transformational leadership

Source: Yukl (2002)

27.2.4 Trait versus Process

Statements such as "She is a born leader" and "He was born to lead" imply a perspective toward leadership that is trait-based. Yukl (2006) states that the trait approach emphasizes leaders' attributes, such as personality, motives, values, and skills. Underlying this approach is the assumption that some people are natural leaders, endowed with certain traits not possessed by other people (p. 13). This is very different from describing leadership as a process. In essence, the trait viewpoint suggests that leadership is inherent in a few select people and that leadership is restricted to only those few who have special talents with which they are born (Yukl, 2006). Some examples of traits are the ability to speak well, an extroverted personality, or unique physical characteristics such as height (Bryman, 1992).

Viewing leadership as a process implies that leadership is a phenomenon that is contextual and suggests that everyone is capable of exercising leadership. This suggests that leadership can be learned and that leadership is observable through what leaders do or how they behave (Daft, 2005; Northouse, 2010).

27.2.5 Assigned Versus Emergent

Assigned leadership is the appointment of people to formal positions of authority within an organization. Emergent leadership is the exercise of

leadership by one group member because of the manner in which other group members react to him or her. Examples of assigned leadership are general managers of sports teams, vice presidents of universities, plant managers, the CEOs of hospitals, and the executive directors of non-profit organizations. In some settings, it is possible that the person assigned to a formal leadership position may not be the person to whom others in the group look for leadership. Emergent leadership is exhibited when others perceive a person to be the most influential member of their group or organization, regardless of the person's assigned a formal position. Emergent leadership is exercised when other people in the organization support, accept, and encourage that person's behaviour.

This way of leading does not occur when a person is appointed to a formal position but emerges over time through positive communication behaviours. Fisher (1974) asserts that some communication behaviours that explain emergent leadership are verbal involvement, keeping well-informed, asking other group members for their opinions, being firm but not rigid, and the initiation of new and compelling ideas (Fisher, 1974; Northouse, 2010).

27.2.6 Leadership and Power

Power is related to but different from leadership. It is related to leadership because it is an integral part of the ability to influence others. Power is defined as the potential or capacity to influence others to bring about desired outcomes. We have influence when we can affect others' beliefs, attitudes, and behaviour. While there are different kinds of power, in organizations, we consider two kinds of power – position power and personal power. Position power is that power that comes from holding a particular office, position, or rank in an organization (Daft, 2005). A university vice chancellor has more power than a dean of a business school, but they both have formal power. Personal power is the capacity to influence that comes from being viewed as knowledgeable and likable

by followers. It is power that derives from the interpersonal relationships that leaders develop with followers (Yukl, 2006).

We would argue that when leaders have both position and personal power, they should use personal power most of the time. Overuse of position power may erode the ability of a leader to influence people. It is important to know when it is most appropriate to use position power and to be able and willing to use it (Daft, 2005). Power can be two-faced. One face is the use of power within an organization to achieve one's personal goals to the detriment of others in the organization. The other face is that power works to achieve the collective goals of all members of the organization, sometimes even at the expense of the leader's personal goals.

27.2.7 Leadership and Coercion

Related to power is a specific kind of power called coercion. Coercive leaders use force to cause change. These leaders influence others through the use of penalties, rewards, threats, punishment, and negative reward schedules (Daft, 2005). Coercion is different from leadership, and it is important to distinguish between the two. It is important for you to distinguish between those who are being coercive and those who are influencing a group of people toward a common goal. Using coercion is counter to influencing others to achieve a shared goal and may have unintended, negative consequences (Dubrin, 2007; Yukl, 2006).

27.2.8 Leadership and Management

Leadership is similar to, and different from, management. They both involve influencing people. They both require working with people. Both are concerned with the achievement of common goals. However, leadership and management are different on more dimensions than they are similar. Zaleznik (1977) argues that managers and leaders are very distinct, and being one precludes being the other. Managers are reactive. While they are willing to work with people to solve problems, they do so

with minimal emotional involvement.

Conversely, leaders are emotionally involved and seek to shape ideas instead of reacting to others' ideas. Managers have limited choice, while leaders work to expand the number of alternatives to problems that have plagued an organization for a long period of time. Leaders change people's attitudes, while managers only change their behaviour. Mintzberg (1998) contends that managers lead by using a cerebral face. This face stresses calculation, views an organization as components of a portfolio, and operates with words and numbers of rationality. Leaders lead by using an insightful face. This face stresses commitment, views organizations with an integrative perspective, and is rooted in the images and feel of integrity. Managers need to be twofaced; they need to simultaneously be managers and leaders.

Kotter (1998) argues that organizations are over-managed and under-led. However, strong leadership with weak management is no better and may be worse. Organizations need strong leadership and strong management. Managers are needed to handle complexity by instituting planning and budgeting, organizing and staffing, and controlling and problem-solving. Leaders are needed to handle change through setting a direction, aligning people, and motivating and inspiring people. Organizations need people who can do both – they need leader-managers.

Rowe (2001) asserts that leaders and managers are different and that one aspect of the difference may be philosophical. Managers believe that the decisions they make are determined for them by the organizations they work for and that the organizations they work for conduct themselves in a manner that is determined by the industry or environment in which they operate. In other words, managers are deterministic in their belief system. Leaders believe that the choices they make will affect their organizations and that their organizations will affect or shape the industries or environments in which they operate. In

other words, the belief systems of leaders are more aligned with a philosophical perspective of free will. Organizations with strong management, but weak or no leadership will stifle creativity and innovation and be very bureaucratic. Similarly, an organization with strong leadership and weak or non-existent management can become involved in change for the sake of change – change that is misdirected or meaningless and has a negative effect on the organization. Bennis and Nanus (1985) express the differences between managers and leaders very clearly in their often quoted phrase: "Managers are people who do things right and leaders are people who do the right thing" (p. 221). Implicit in this statement is that organizations need people who do the right thing and who do the "right things right."

27.2.9 Principles of Leadership

The following are the principles of leadership:

i. **Know yourself and seek self-improvement** – In order to know yourself, you have to understand your *be, know,* and *do,* attributes. Seeking self-improvement means continually strengthening your attributes. This can be accomplished through self-study, formal classes, reflection, and interacting with others.

ii. **Be technically proficient** – As a leader, you must know your job and have a solid familiarity with your employees' tasks.

iii. **Seek responsibility and take responsibility for your actions** – Search for ways to guide your organization to new heights. And when things go wrong, as they often tend to do sooner or later – do not blame others. Analyse the situation, take corrective action, and move on to the next challenge.

iv. **Make sound and timely decisions** – Use good problem-solving, decision-making, and planning tools.

v. **Set the example** – Be a good role model for your employees. They must not only hear what they are expected to do, but also see them. *We must become the change we want to see* – Mahatma Gandhi

vi. **Know your people and look out for their well-being** – Know human nature and the importance of sincerely caring for your workers.

vii. **Keep your workers informed** – Know how to communicate with not only them, but also seniors and other key people.

viii. **Develop a sense of responsibility in your workers** – Help to develop good character traits that will help them carry out their professional responsibilities.

ix. **Ensure that tasks are understood, supervised, and accomplished** – Communication is the key to this responsibility.

27.3 Relationship and Relevance of Leadership Concept to URP Practice and Training

Town and country planning is the process of making decisions on the development and use of land. It is a tool for guiding and facilitating development and regeneration in a way that also preserves the best features of our environment. Town planning is the determining and drawing up plans for the future physical arrangement and condition of a community or the comprehensive planning of the physical and social development of a town. Town planning is the physical, social and economic planning of an urban environment (such as a town). Town Planning is the planning and design of all the new buildings, roads and parks in a place in order to make them attractive and convenient for the people who live there. Town planning is the designing of the physical layout of cities, planning the infrastructure of an urban area. Town planning, the conscious intervention by government in the orderly growth of urban centres, aims to improve health, ensure efficient land use, protect the environment and facilitate economic development. Urban, city, and town planning is the integration of the disciplines of land use planning and transport planning, to explore a very wide range of aspects of the built and social environments of urbanized municipalities and communities.

What do town planners do? The modern profession of town planning mainly arose in response to the urban problems caused by rapid industrialisation from the late 19th century. The rapid growth of towns shook contemporary habits and concepts. Social reformers recognised the need for corrective intervention to deal with the growth forces unleashed by modernisation. Pioneering professionals often worked first in other built environment area like architecture, surveying, engineering or landscape architecture. Planning was a chance to exercise a distinctive overall spatial and social vision that drew on specialised inputs. Town planners could either design entirely new urban areas (such as suburbs and garden cities), or develop ways to reform and reorder existing ones to provide plenty of space and light, clean water and adequate drainage (through urban renewal).

Early town plans concentrated on securing adequate provision for key urban needs, such as: housing, commercial and industrial uses; railways and roadways; water; sewerage and energy supply; open space and recreational areas. Each element of a well-planned urban environment would work alone and as part of the whole. A town plan also to be affordable, and to fit the designated site. The vision of what the town or city could become was critical. The drawings produced were as important as the vision itself.

Planning today retains its commitment to ideal urban environments, but has to work within challenging political contexts. The task of reconciling competing development and environmental goals in the interests of "sustainability" usually falls to the planning function in government. Much attention is now directed at better managing existing cities than creating completely new ones.

There are various dimensions of leadership roles of town planners as a coordinator of resources, human, environmental and natural. The relationship between leadership and town planning education and practice is captured below:

i. The town planner as a leader in urban governance,

ii. The town planner as a leader in city centre design,
iii. The town planner as a leader in master plan design,
iv. The town planner as a leader in the design, implementation and monitoring plans,
v. The town planner as a leader in the conceptualization and development of plan both at local, regional and national scale,
vi. The town planner as a leader in the process of implementation of the sustainable development goals,
vii. The town planner as a leader in the sustainable city programmes, and
viii. The town planner as a leader in the drive towards mitigating climate change.

This chapter considers two of the important areas of relevance of leadership in planning and the leadership roles of the urban planner. These areas of relevance are urban governance and master plan conceptualization, as well as plan preparation, implementation and monitoring.

27.3.1 Planners' Leadership Roles in Good Urban Governance

Governance is a very complex issue. It refers to the administrative arrangements of economic and social resources for development. One of the main objectives of governance is to undertake holistic developmental planning for an area with the maximum utilization of the economic and human resources available therein. Governance is a generic term, which becomes more specific when we use the prefixes urban, rural, good, and so on with it.

Governance takes place at all scales of organization, ranging from global governance involving transnational coordination, planning and management of international policies, to internal governing of a small institution. Governance structures can include one, more or all of the following (Agere, 2000):

- between governments and markets,

- between governments and citizens,
- between governments and the private or voluntary sector,
- between elected officials and appointed officials,
- between local institutions and urban and rural dwellers,
- between legislature and executive branches, and
- between nation, states and institutions.

Urban governance involves administration, planning, coordination and management of an urban area/ city/town. It also refers to the relationship between local government institutions and urban dwellers or citizens. It equally includes partnership or coordination between local city governments and private enterprises/ the civil society/ the voluntary sector to help improve the administration of a city.

As cities in the developing countries are under stress on account of demographic transition and economic liberalization, many issues related to effective governance of these urban areas have emerged. Unfortunately, most urban governments are not well equipped to tackle some of these problems owing to reasons such as lack of resources or improper decentralization of power. This has led to inadequate and ineffective provision of public goods and services to the citizens. In such a scenario, partnerships of local governments with the civil society and the private sector become important to steer and create responsive governance structures. Local governments are the first and the most direct level of interface between citizens and governments and, therefore, the most vital platform for the exercise of democracy.

It is important to realize that for effective governance and planning of urban areas, local city governments must be empowered to carry out all functions related to the running of city administration. They must also have adequate funds and professionals with requisite skills to carry out all these functions effectively. In most developing countries, this kind of devolution of power and funds has not taken place and thus the local governments fail to function or deliver effectively. In India, there is constitutional support to such decentralization but its actual

implementation has been extremely slow.

When we define good governance, we are speaking about its quality. We, therefore, analyse the positive transformations that are alternatives to the current format, which can improve its functioning. Governance can be defined as good when all the issues that make it ineffective are addressed, removed or taken care of.

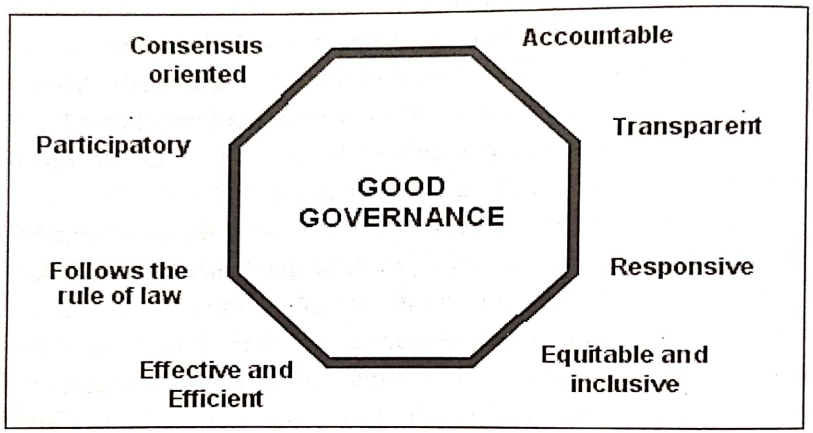

Figure 27.1: Characteristics/ Indicators of Good Governance

27.4 Conclusion

In view of the various responsibilities of the town planner enumerated above, it has become obvious that the town planner is an individual who needs and should have a detailed knowledge of leadership skills and attributes. The planner must be able to proactively harness resources, and provide requisite direction on how the built environment should be managed, operated and protected.

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32

MATRIX

J. F. Olorunfemi, O. O. Idowu and S. O. Medayese

32.1 Introduction

A matrix is basically an organized box (or "array") of numbers or other expressions. It is simply a rectangular array of numbers or expressions. In a general sense, it represents a collection of information stored or arranged in an orderly fashion. The mathematical concept of a matrix refers to a set of numbers, variables or functions ordered in rows and columns. Such a set then can be defined as a distinct entity, and it can be manipulated as a whole according to some basic mathematical rules (Abdi and Williams, 2010). According to *Cambridge Advanced Learner's Dictionary* 3rd Edition (2008), a matrix is a specialized group of numbers or other symbols arranged in a rectangle, which can be used together as a single unit to solve particular mathematical problems.

The applications of matrix have been widely explored to solve mathematical, algebra and computer puzzles. *Cambridge Advanced Learner's Dictionary* (3rd Edition) also defines a matrix as a development process that influences development. For example, it is a condition which provides a system in which something grows or develops. In line with this, the application of a matrix as a problem-solving mechanism cuts across other ways of life, including human geography, urban planning, design and development.

The application of matrix to human geography, urban planning, design and development is useful in describing a controlled environment or situation in which the people live and behave in ways that conform to the roles and functions that are predetermined by the professionals or the experts in urban planning or human interaction about this environment. The living within the environment (matrix) may also be referred to as "on the grid", with greater flexibility and choices available to those who venture off-the-grid. For instance, anyone living in the area has the right or freedom to opt out of the environment to any area of his choice as the situation warrants. The concentric model of city structure, as explained by Burgess (1925), maintains that invasion and succession process is the main transformation factor of urban structure. This analogy is best in describing the practicability of matrix, as urban population changes within the urban space.

The concept, elements, and principles of matrix have been considered relevant in explaining changing urban phenomena. Importantly, the contemporary issues and concepts in the field of physical planning have explored the philosophy of the matrix as a problem-solving mechanism, for economic, social, political, and physical inadequacies.

32.2 Literature Review

32.2.1 Meaning and Definitions

According to Wikipedia (2016), matrix is a rectangular array of numbers or other mathematical objects for which operations such as addition and multiplication are defined. Most commonly, a matrix over a field f is a rectangular array of scalars each of which is a member of F. This chapter focuses on the complexity of matrix and its applications in physical planning profession and education. The numbers, symbols or expressions in the matrix are called its entries or its elements. The horizontal and vertical lines of entries in a matrix are called rows and columns, respectively, just as the city structure are arranged in both vertical and horizontal arrays, as seen in Table 32.1.

Table 32.1: Size and Description of Matrix

Name	Size	Description
Row vector	$1 \times n$	A matrix with one row, sometimes used to represent a vector
Column vector	$n \times 1$	A matrix with one column, sometimes used to represent a vector
A square matrix	$n \times n$	A matrix with the same number of rows and columns sometimes used to represent a linear transformation of a vector space to itself, such as reflection, rotation, or shearing

Source: Wikipedia (2016)

The matrices which have a single row are called *row vectors*, and those which have a single column are called *column vectors*. A matrix which has the same number of rows and columns is called a *square matrix*. A matrix with an infinite number of rows or columns (or both) is called an *infinite matrix*. In some contexts, such as computer algebra programs, it is useful to consider a matrix with no rows or no columns, called an *empty matrix*

(Wikipedia, 2016).

To simplify what matrix signifies from Table 32.1, it is a collection of numbers ordered by rows and columns. The elements are customarily enclosed in parentheses, brackets or braces. A matrix is primarily viewed as a set of numbers arranged in a table (Abdi and Williams, 2010). Gantmacher (1959), among others, claims that a matrix is an array of number in rectangular form. He stresses that the concept of matrix has been applied to the daily activities of man and in other professions, such as mathematics, mechanics, theoretical physics, and theoretical electrical engineering. The relevance of a matrix has also been acknowledged in the field of social sciences and environmental planning and management.

32.2.2 The Basic Concept of Matrix

A matrix comprises rows and columns, which must be arranged in the form of a vector or elements. The transpose of the column vector is the row vector. A vector can be represented in space as a directed line with components along the axes.

$$x_p \times 1 = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_p \end{bmatrix} \quad or \quad x^t = [x_1 x_2 \ldots . x_p]$$

The basic concept of a matrix entails that, two vectors can be added together if they have the same dimension and can be contracted or expanded if a vector is multiplied by a constant 'c,' as multiplication is element-wise.

$$\mathrm{x}+\mathrm{y} = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_p \end{bmatrix} + \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_p \end{bmatrix} = \begin{bmatrix} x_1+y_1 \\ x_2+y_2 \\ \vdots \\ x_p+y_p \end{bmatrix} \quad \textbf{or} \quad c\mathrm{x} = c \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_p \end{bmatrix} = \begin{bmatrix} cx_1 \\ cx_2 \\ \vdots \\ cx_p \end{bmatrix}$$

A better understanding of this procedure and its applications to urban system and physical planning and training will help in solving urban problems. Although the literature and materials harmonizing the need of the subject matter to physical planning is scanty, the flexibility of the components, in a matrix has made it possible to employ it in physical planning practice and training.

32.2.3 Evolution of Matrix

The idea of matrices first arose as a means to solving the problems in systems of linear equations. Such problem dates back to the very earliest recorded instances of mathematical activity (Gunawardena, 2006). The origins of the theory of matrices can be traced to the 18th century, although it was not until the 20th century that it became sufficiently absorbed into the mathematical mainstream to warrant extensive treatment in textbooks and monographs; it is truly a creation of the 19th century (Hawkins, 1974).

The historical background and development of the matrix has been attributed to several scholars (Hawkins, 1974; Gunawardena, 2006; Abdi and Williams, 2010). Many authors argue that, there are different views on the evolution of matrix. However, most authors have now agreed that a matrix is a problem-solving system, as it is being used in all branches of mathematics and the sciences and constitutes the basis of most statistical procedures (Abdi and Williams, 2010).

Hawkins (1974) notes that, when one contemplates on the evolution of matrix theory, the name that immediately comes to mind is that of Arthur Cayley. In 1858, Cayley published a memoir on the theory of matrices in which he introduced the term "matrix" for a square array of numbers and observed that they could be added and multiplied so as to form what we now call a linear associative algebra. Because of this memoir, historians and mathematicians have regarded Cayley as the founder of the theory of matrices. He laid the foundation in his 1858

memoir, and other mathematicians erected the edifice we now call the theory of matrices.

On the contrary, Benzi (2009) identifies some important contributions to the study of matrix, which were earlier than the work of Arthur Cayley in 1858. Benzi attributed the origin of the study of matrix to a scholar known as Gauss in 1823. He admitted that the earliest reference to an iterative approach to solving Ax = b appears to be contained in a letter of Gauss to his student Gerling, dated 26 December 1823, in the context of solving least squares problems via the normal equations. In 1826, Gauss gave a block variant of the method in the supplement to his famous work on least squares, Theoria Combination is Observationum Erroribus Minimis Obnoxiae, an English translation by Pete Stewart was published by SIAM in 1995 (Benzi, 2009). Other scholars identified by the same are Jacobi (1845), Nekrasov (1885), Pizzett (1887), and Nagel (1890).

Regardless of the incoherence and inconsistency in the documentation of the origin and pioneer in this area of knowledge, the concept, theory, principles and philosophy of matrix cannot be underrated in shaping the present world system and preparing the world for the future demand.

32.2.4 Elements and Operations in Matrices

Basically, a matrix is an array or arrangement of numbers in a table for better expression of value and responses. In a matrix, row and column numbers are used to identify a specific element of a matrix. The numbers are called the element of the matrix.

$$A = \begin{bmatrix} 2 & 5 & 10 & 20 \\ 1 & 2 & 3 & 4 \\ 6 & 1 & 3 & 10 \end{bmatrix} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

For instance, in equation (1), the cell defined by Row 3 and Column 1 contains the value '6'. We write that a 3; 1 = 6. With this notation, elements of a matrix are denoted with the same letter as the matrix but written in lower case italic. The first subscript always gives the row number of the element (i.e., 3) and the second subscript always gives its column number (i.e., 1).

A generic element of a matrix is identified with indices such as *i* and *j*. So, a *i;j* is the element at the *i*-th row and *j*-th column of A. The total number of rows and columns is denoted with the same letters as the indices but in upper-case letters. The matrix A has I rows (here I = 3) and J columns (here J = 4) and it is made of I × J elements a *i;j* (here 3 × 4 = 12). We often use the term 'dimensions' to refer to the number of rows and columns; so, A has dimensions I by J.

As a shortcut, a matrix can be represented by its generic element written in brackets. So, A with I rows and J columns is denoted for either convenience or clarity. The number of rows and columns can also be indicated as a subscript below the matrix name.

$$\mathbf{A} = [a_{i,j}] = \begin{bmatrix} a_{1,1} & a_{1,2} & \cdots & a_{1,j} & \cdots & a_{1,J} \\ a_{2,1} & a_{2,2} & \cdots & a_{2,j} & \cdots & a_{2,J} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ a_{i,1} & a_{i,2} & \cdots & a_{i,j} & \cdots & a_{i,J} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ a_{I,1} & a_{I,2} & \cdots & a_{I,j} & \cdots & a_{I,J} \end{bmatrix} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$\mathbf{A} = \underset{I \times J}{\mathbf{A}} = [a_{i,j}] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The elements via double indices are referred to as follows:

(i) The first index represents the row

(ii) The second index represents the column

(a) Vector of a Matrix

A matrix with one column is called a column vector or simply a vector. Vectors are denoted with bold lower-case letters. For example, the first column of matrix A (of Equation 1) is a column vector.

$$b = \begin{bmatrix} 2 \\ 1 \\ 6 \end{bmatrix} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

Vectors are the building blocks of matrices. For example, A (of Equation 1) is made of four column vectors.

(b) Transposition Operation for Matrices

If we exchange the roles of the rows and the columns of a matrix we transpose it. This operation is called the transposition, and the new matrix is called a transposed matrix. The A transposed is denoted A^T, for instance,

$$\text{if } \mathbf{A} = \underset{3\times4}{\mathbf{A}} = \begin{bmatrix} 2 & 5 & 10 & 20 \\ 1 & 2 & 3 & 4 \\ 6 & 1 & 3 & 10 \end{bmatrix} \text{ then } \mathbf{A}^T = \underset{4\times3}{\mathbf{A}^T} = \begin{bmatrix} 2 & 1 & 6 \\ 5 & 2 & 1 \\ 10 & 3 & 3 \\ 20 & 4 & 10 \end{bmatrix} \quad \ldots\ldots\ldots \quad (5)$$

(c) Addition of Matrices

When two matrices have the same dimensions, we compute their sum by adding the corresponding elements. For example, with

$$\mathbf{A} = \begin{bmatrix} 2 & 5 & 10 & 20 \\ 1 & 2 & 3 & 4 \\ 6 & 1 & 3 & 10 \end{bmatrix} \text{ and } \mathbf{B} = \begin{bmatrix} 3 & 4 & 5 & 6 \\ 2 & 4 & 6 & 8 \\ 1 & 2 & 3 & 5 \end{bmatrix} \quad \ldots\ldots\ldots \quad (6)$$

we Find

$$\mathbf{A} + \mathbf{B} = \begin{bmatrix} 2+3 & 5+4 & 10+5 & 20+6 \\ 1+2 & 2+4 & 3+6 & 4+8 \\ 6+1 & 1+2 & 3+3 & 10+5 \end{bmatrix} = \begin{bmatrix} 5 & 9 & 15 & 26 \\ 3 & 6 & 9 & 12 \\ 7 & 3 & 6 & 15 \end{bmatrix} \quad \ldots\ldots\ldots \quad (7)$$

In general,

$$\mathbf{A} + \mathbf{B} = \begin{bmatrix} a_{1,1}+b_{1,1} & a_{1,2}+b_{1,2} & \cdots & a_{1,j}+b_{1,j} & \cdots & a_{1,J}+b_{1,J} \\ a_{2,1}+b_{2,1} & a_{2,2}+b_{2,2} & \cdots & a_{2,j}+b_{2,j} & \cdots & a_{2,J}+b_{2,J} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ a_{i,1}+b_{i,1} & a_{i,2}+b_{i,2} & \cdots & a_{i,j}+b_{i,j} & \cdots & a_{i,J}+b_{i,J} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ a_{I,1}+b_{I,1} & a_{I,2}+b_{I,2} & \cdots & a_{I,j}+b_{I,j} & \cdots & a_{I,J}+b_{I,J} \end{bmatrix} \quad \ldots\ldots\ldots \quad (8)$$

Amatrix addition behaves very much like usual addition. Specifically, matrix addition isommutative: (A + B = B + A); and associative: (A + (B + C) = (A + B) + C).

(d) Multiplication of Matrices

In order to differentiate matrices from the usual numbers, we call the latter scalar numbers or simply scalars. To multiply a matrix by a scalar, multiply each element of the matrix by this scalar, for example:

$$10 \times \mathbf{B} = 10 \times \begin{bmatrix} 3 & 4 & 5 & 6 \\ 2 & 4 & 6 & 8 \\ 1 & 2 & 3 & 5 \end{bmatrix} = \begin{bmatrix} 30 & 40 & 50 & 60 \\ 20 & 40 & 60 & 80 \\ 10 & 20 & 30 & 50 \end{bmatrix} \quad \ldots\ldots (9)$$

(e) Special Matrices

The unit matrix, I, is a square matrix whose only non-zero elements are on the diagonal and are equal to one, for example:

$$\mathbf{I} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \quad \mathbf{I} = \begin{pmatrix} 1 & 0 & 0 & \ldots & 0 & 0 \\ 0 & 1 & 0 & \ldots & 0 & 0 \\ 0 & 0 & 1 & \ldots & 0 & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & 0 & \ldots & 1 & 0 \\ 0 & 0 & 0 & \ldots & 0 & 1 \end{pmatrix} \quad \ldots\ldots (10)$$

All elements of the zero matrix, 0, are equal to zero, for example:

$$\mathbf{0} = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, \quad \mathbf{0} = \begin{pmatrix} 0 & 0 & 0 & \ldots & 0 & 0 \\ 0 & 0 & 0 & \ldots & 0 & 0 \\ 0 & 0 & 0 & \ldots & 0 & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & 0 & \ldots & 0 & 0 \\ 0 & 0 & 0 & \ldots & 0 & 0 \end{pmatrix} \quad \ldots\ldots (11)$$

A diagonal matrix only has non-zero elements on the main diagonal. These non-zero elements that can have any value are square diagonal matrices, as shown below:

$$\mathbf{D} = \begin{pmatrix} d_{11} & 0 & 0 \\ 0 & d_{22} & 0 \\ 0 & 0 & d_{33} \end{pmatrix}, \mathbf{D} = \begin{pmatrix} d_{11} & 0 & \ldots & 0 & 0 \\ 0 & d_{22} & \ldots & 0 & 0 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \ldots & d_{n-1,n-1} & 0 \\ 0 & 0 & \ldots & 0 & d_{nn} \end{pmatrix} \quad \ldots\ldots (12)$$

32.3 Relationship and Relevance to Urban and Regional Planning Practice

Matrix, as a problem-solving mechanism, is described as an 'array of numbers' or other expression. This is simply interpreted as an arrangement, organization, and coordination. Obateru (2005) rightly observes that the physical planning profession is concerned with the organization, design and management of space or land. In relation to this, the content of a matrix has to do with collection of information, processing it and storing the information for relevant uses. In achieving its primary objectives, planning makes use of spatial and non spatial information for predicting the future. According to *Cambridge Advanced Learner Dictionary* (Third Edition) (2008), matrix is simply posited as a process that influences development or a condition which provides a system in which a settlement grows or develops. This points to the relevance of the concept of matrix to the practice and training of urban and regional professionals in Nigeria and in other parts of the world.

Relationship of matrix to urban and regional planning practice is unquantifiable. The scope of planning is believed to entail use of reasoning ability to balance the situation of physical elements based on the information on the ground, or the past events and the future expectation. The definitions of planning encompass things that are relevant to the use of the mechanism in physical planning. For instance, Davidoff and Reiner (1962) claim that planning is a process of determining appropriate future action through a sequence of choices. Faludi (1973) opines that planning is the application of scientific methods to policy making with a view to increasing the validity of the policy concerned with the present and the future of the environment. Robert (1974) argues that planning is the process of making a choice among options that appear open for the future and then securing the

implementation, which depends on the allocation of the necessary resources.

Obateru (2004), citing Hall (1962), provides a logical illustration and interpretation of physical planning. He presents planning as coordination that characterizes forecasting the future implications. From the views of these reputable scholars, three major inferences could be drawn, about physical planning, namely that planning is:

i. a sequential procedure in making choices between and implementing the most preferred option by the physical planners;
ii. the involvement of methodological and scientific approaches for data gathering, analysis, and plan presentation; and
iii. making choices for alternative future options.

The profession of planning is prompted by problems; such problems may exist or be anticipated. To practise physical planning requires a medium for its operation. The summation of Keeble (1969) on what planning is all about seems relevant to explaining the relationship of the physical planning profession to the concept and principles of matrices. Keeble defines urban and regional planning as the art and science of ordering the use of land and the character and siting of buildings and communication routes, so as to secure the maximum practicable degree of economy, convenience, function and beauty.

Keeble's definition can be viewed in line with the concept, elements and principles of matrices as highlighted below. These are:

i. the art and science approach involves the reasoning ability of physical planner; the creativity and the use of social and scientific methods in solving the numerous problems facing the urban environment;
ii. the ordering or arrangement of land uses is non-negotiable; a content of array in a matrix;

iii. the other character in physical planning has to do with human activities with the social, economic and political environments, which are jointly attached to the physical environment;

iv. siting of buildings is the arrangement of buildings and the conformity of uses with the environment;

v. communication routes entail leakages and interrelationship of the land uses or accessibility for convenience;

vi. practical degree of economy, convenience, depends on the economic importance of the uses created and the benefits for optimum use of facilities at appreciable measure; and

vii. functional and aesthetically pleasing' relates to the purpose and composition of beauty, which make the environment adorable for healthy living and visual attractiveness.

The four ways by which the concept of a matrix is useful to physical planning practice is as follows:

a. the promotion of accessibility from homes to workplace, shops, schools, as well as source of labour, power and raw materials;

b. the easy employment of resources, so as to achieve the greatest possible measure of improvement on the environment with limited mean;

c. the separation of incompatible land uses from others and the association of compatible or mutually helpful uses; and

d. carrying out of all development in a way which is usually pleasant and practicable.

In Nigeria, the practice of urban planning lies within the organization and administrative machinery of the institutional and regulatory bodies. The Nigerian Institutes of Town Planners (NITP) and the Town Planning Registration Council of Nigeria (TOPREC) are saddled with the responsibility of coordinating the activities of the profession. This

principle will be useful in coordinating the goals of the profession as well as preserving the resources of the public who are directly concerned with the use and development of land. The framework for effective service delivery in the physical planning profession is the policy and programme. Application of matrix in physical planning policies will promote quality professionalism. The concepts of a matrix, such as row, column, vector, elements and transpose, are potent rudiments in the formulation of physical planning policies and programmes, for a good design and development of design

32.4 Implications of Matrix for Physical Planning Training

Essentially, the ultimate goal of planning education is to produce sound physical planners that are well equipped as well as technically and professionally sound to meet the current and future urban challenges. To achieve this, the concepts, principles and elements of matrix are vital and applicable in physical planning training. The application of matrix to physical planning training will achieve the following:

a. development of balanced training programme in planning education;
b. encouragement of the development of a sustainable manual for training of physical planners in Nigeria and promoting an adequate arrangement of theoretical work and practical work;
c. a better approach in the development of studio design criteria, for the design courses;
d. ensuring best studio design management and practices, through: strong commitments of both the trainers and the trainee, and promotion of a well structured criteria for grading; and
e. teaching the new trend in urban and regional planning, as well as global best practice.

32.5 Conclusion

The term town planning is used to indicate the arrangement of various components or units of town (Rangwala et al., 2012). Thus, training and development of manpower in the field of town planning helps in making use of the best possible advantages of solving the problems facing human settlements. The applications of the concepts and principles of matrices, to certain extent, is relevant in achieving most of the physical planning objectives.

The use of the term 'matrix' has appeared in certain areas of studies in urban planning, but the scope and usage has been limited. With the exposition in this chapter, matrix can now be employed in physical planning. The application of matrix idea enhance the reasoning capacity of those that are involved in practice and training within the profession.

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