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Article

A Causal Layered Analysis of Construction Labour Productivity in Developing Countries

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Abstract

The construction industry remains a major contributor to the economic growth of nations. Despite productivity being one of the key performance indicators of the industry, there is continuous, widespread criticism of prevailing low labour productivity within construction. This study used Causal Layered Analysis as a methodology to examine the current reality of labour productivity in construction. The study further presents a transformed future for construction labour productivity growth.

Keywords

Causal Layered Analysis, Construction, Contractor, Developing Countries, Labour Productivity

Introduction

Productivity is inextricably linked with resource efficiency and economic value (Al Refaie et al., 2020). The significance of productivity growth to the survival of construction businesses contributes to making productivity an important discourse in the construction industry. Dixit and Saurabh (2019) identify the construction industry as an engine of growth, as it contributes an average of 8-13 % to the global Gross Domestic Product (GDP). Regrettably, most construction projects in developing economies experience low productivity, either in simple or complex form (Agrawal & Halder, 2020). A large number of studies aimed at improving construction labour productivity (CLP) have reported different perspectives, which have further engendered broad implications for CLP (Nasir et al., 2014). Construction stakeholders desire productivity growth, but there is little agreement on how the desired productivity growth can be achieved. Sectors such as retail and manufacturing have reinvented and continued to invent themselves, whereas the construction industry is stuck in a time warp (Mckinsey Global Institute, 2017). Even when it represents one of the largest industries in the world economy, with about $10 trillion spent on construction-related goods and services every year, the construction industry's productivity has been low for decades (MGI, 2017). It is further worrisome that contractors in developing countries suffer more productivity loss than their counterparts in developed economies (Hiyassat et al., 2016). Certainly, the global construction industry requires every intervention it can obtain to engender productivity growth; however, the scope of this study is limited to developing economies, due to their relatively poor CLP performance. According to Jarkas et al. (2015), poor CLP is one of the most daunting problems confronting contractors in developing countries. Developing countries could account for a significant percentage of the global $10 trillion expenditure, therefore, consistent productivity growth in the region is considered essential. To reconstruct the current CLP narratives, construction stakeholders in the industry and academia must begin to rethink the industry's operations (MGI, 2017).

Labour cost is significant and represents between 30%-40% of the total project cost in a typical construction project (Manoharan et al., 2021). For clients and contractors to get value for money and make meaningful contribution to an economy, CLP must grow (Adebowale & Agumba, 2021; Adebowale & Agumba, 2022). Many barriers to higher productivity and ways of overcoming them have been proposed over time (MGI, 2017). Construction experts have recognized the need for productivity growth at the activities, projects, and industry levels

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(Yi & Chan 2014), which are associated with construction tasks, construction projects, and the industry's long-term productivity growth (Borg & Song 2015; Shan et al., 2016). Towards achieving CLP growth in developing countries, Adebowale and Agumba (2021); Agrawal and Halder (2020), Durdyev and Ismail (2016); Hiyassat et al. (2016); and Olomolaiye et al. (1987) have undertaken some of the research projects in the region. CLP performance remains unsatisfactory, limiting the industry's ability to actively respond to the needed changes (Agrawal & Halder, 2020). Due to its potential to contribute to nations' economic fortune, the current industry's productivity performance has attracted a widespread criticism (Akogbe et al., 2015). Existing studies have identified factors affecting CLP and further adopted a number of methodologies to help address productivity issues. Some of the methodologies include: system dynamics (Jalal & Shoar, 2019; Nasirzadeh & Nojedehi, 2013; Palikhe et al., 2019), quantitative and qualitative models (Golnaraghi et al., 2019; Jang et al. 2011); meta-analysis (Adebowale & Agumba 2021); scientometric analysis (Adebowale & Agumba 2022); Artificial Intelligence (AI) (Golnaraghi et al., 2019) and computational intelligence (Dissanayake et al., 2005).

Without doubt, these studies have contributed to the CLP research knowledge base. However, there is a dearth of research that explores CLP using Causal Layered Analysis (CLA). CLA, developed by Sohail Inayatullah, belongs to the field of critical research for the future (Milojevic & Inayatullah, 2015). It provides a tool to obtain information on social reality to harness the full potential of the future (Kaboli & Tapio, 2018). Its main task is not to predict the future like most CLP models, but to examine a subject through different layers to produce an alternative direction and a transformed future. CLA is useful in creating a robust process for exploring future opportunities in diverse research fields (Inayatullah, 2008), including CLP. Although CLA has been applied to many disciplines, including education (Conway, 2012; Davidson, 2020), psychology (Bishop, 2014), and forestry (Ariell, 2010), its application to CLP will contribute to the research field in terms of presenting a richer future towards CLP growth in developing countries. The four levels of CLA—"litany", "systemic causes", "worldviews", and "myths" (Inayatullah, 1998), are examined to achieve the research goal.

The Four Levels of CLA

Although CLA has drawn many perspectives from poststructuralism, CLA is different from poststructuralism. It is useful in creating an ideal future, while poststructuralism only seeks to problematize the present and the past (Inayatullah, 2014). The methodology is designed to deepen enquiry from a multi-stakeholder perspective (Inayatullah, 2014). The predominant assumption in CLA is that a substantive issue may be layered with multiple layers of reality and knowledge (Riedy, 2008). In its application, the world is examined through four layers, namely: litany, systemic causes, worldviews and myth. The four layers are not four discrete categories, but dynamically connected to allow both vertical movement between layers as well as horizontal movement within a layer (Inayatullah, 2007). Although, CLA and postmodernists believe in plural perspectives, CLA distinguishes itself from postmodernist relativism. Postmodernists view all the levels as equally valuable (Kaboli & Tapio, 2018), whilst CLA believes that change is required at all levels (Inayatullah, 2007). Postmodernist argument ignores what is known about the development of self and culture. Psychological and cultural developments bring forth perspectives that are more inclusive than those that they transcend (Riedy, 2008). Consequently, the postmodern recognition of plural perspectives is only possible after a long process of personal development, supported by cultural development. CLA understands development as a process that brings greater depth and uses the depth as basis for judgment (Riedy, 2008). CLA can be considered as a response to the shortcomings of postmodernism.

The *litany* layer is concerned with the conventional perceptions of reality as it appears to be (Inayatullah, 2007). It is clear and obvious (Slaughter, 2008). As in bare headlines, the litany is that layer of everyday life without any critical analysis (MacGill, 2015). A perception of helplessness and apathy is frequently the focus at this level (Riedy, 2008). In using an iceberg as a metaphor, empirical analysis focuses on the 'tippet' of an iceberg, or the 'surface level' of an issue which Inayatullah denotes as a litany (Inayatullah, 2004).

The *systemic* layer of CLA involves examining the socio-economic, political, technological, and environmental factors that influence the litany (MacGill, 2015). This level focuses on trends and drivers of change that influence the litany (Inayatullah, 2005). A large proportion of trend data mapped at this level is the result of structural and systemic causes. It involves the identification of issues, challenges and trends that are very much part of everyday working life (Conway, 2012).

The *worldview*, which is the next layer, is concerned with the assumptions driving the social causes and perspectives that are dominant (Inayatullah, 2005). For any change to happen, worldviews first need to change, and

this involves people recognizing that their perspective on an issue may be limited or flawed. At this level, these assumptions need to be articulated and challenged (Conway, 2012). They inform, support, and co-create the systemic layer (Inayatullah, 2004).

The final layer, which is the *myth*, constitutes the deepest level of the CLA pyramid: 'deep stories and collective archetypes that can be deeply felt but are not necessarily available to conscious understanding or control' (Inayatullah, 2014). Metaphors, images, archetypes, narratives, myths and archetypal symbols are found in this layer, which provide elements for defining a worldview (MacGill, 2015). A snapshot of discussion is created using imagery. Worldviews are embedded in unconsciously constructed myths, metaphors, and non-rational ways of knowing. By realigning the myth layer, we can influence and even change the whole structure of society in a tangible way (MacGill, 2015). Although the enquiry usually goes from litany to myth through the layers, the issue is formed from the myth through to litany (Inayatullah, 2004). The myth represents the layer people are least familiar with because it is the furthest from our everyday consciousness (MacGill, 2015). The deeper levels—worldview and myth—take a long time to change as CLA seeks to create new futures by creating new metaphors and narratives (Inayatullah, 2008).

Research Method

An online search of publications in the CLP field was carried out in the Scopus database. The Scopus database was preferred because it contains a comprehensive publication coverage from numerous fields of study (Hosseini et al., 2018). The online search was conducted on November 16, 2021. The main focus of this study is to examine the existing CLP research projects using CLA. Therefore, at the first stage of article selection, "Construction Labour Productivity" was adopted as the search clause in the "article title" of the Scopus database, which produced 214 publications. This keyword was adopted for the Scopus database search because it represents the core of the study, which is capable of producing relevant articles in the research domain. The keyword limited the retrieved articles in the Scopus database to productivity articles that are specific to the construction industry. At the second stage of article selection, the Scopus database was subjected to a filtering process to eliminate articles in press, and thereafter retained articles that have been published. Subsequently, conference papers, reviews, book chapters, editorials, and erratum were excluded from the database, while journal articles were retained. Hosseini, et al. (2018) indicated that journal articles usually contain more information and are considered more useful for a review purpose. The next article selection process involved database filtering by countries. 34 publications distributed across developing countries were reviewed. India, Iran, and Saudi Arabia achieved the most active regions contributing 11, 7, and 6 publications respectively. Figure 1 illustrates the articles' extraction process.

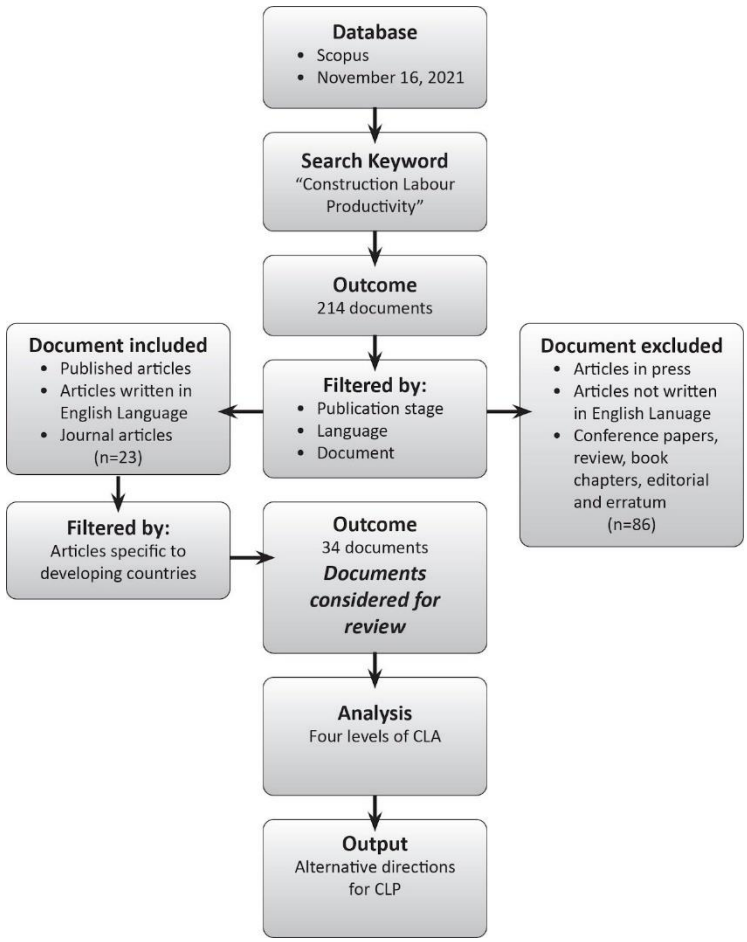

Fig. 1: Research process (Author)

CLP: A Causal Layered Analysis

In relation to CLP, this section presents the four layers of CLA developed by Professor Sohail Inayatullah.

Level one: Litany

Litany speaks to the general facts (Inayatullah, 2005) of CLP. It questions how the description of the general fact can be enhanced to the benefit of the construction sector. Labour productivity in the construction industry is essential for the survival and growth of contractors (Adebowale & Agumba, 2022; Alaghbari, et al., 2019). CLP growth averaged 1% yearly over the past two decades, compared with 2.8% for the aggregate economy and 3.6% for manufacturing (MGI, 2017). Over the years, construction productivity performance has been studied in developing countries, with reports of unsatisfactory performance in most of the countries (Dixit et al., 2019). Research conducted in Iran revealed a 51% weekly hour loss by workers on site, with activity sampling revealing 24-46% unproductive time (Jalal & Shoar, 2019). Iranian construction projects have continued to be confronted with low productivity over the past decade.

According to Mahamid (2011), one of the most critical factors affecting time and cost overrun in the Palestinian construction industry is low labour productivity. Similarly, Jarkas et al. (2015) and Doloi et al. (2012) report low labour productivity as a critical factor, constituting delays to construction projects in India and Oman respectively. In the last 46 years, labour productivity in South Africa is at its lowest (Bierman et al., 2016). Coka (2013) reported -1.6 % and - 0.7 % decline of both capital and multifactor productivity. Odesola and Idoro (2014) studied labour productivity performance in the south-south zone of Nigeria, comprising six geographical states (viz.,

Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers). The study reported performance issues relative to productivity growth across the six geographical locations. Based upon their findings, improved labour management practices were recommended as a potent productivity improvement strategy that could enhance CLP growth. The situation with most contractors in other developing countries does not seem to differ. Craftsmen in Indonesia waste an average of 25% of their productive hours (Kaming et al., 1997). One of the primary challenges facing the construction industry in the Sultanate of Oman is low labour productivity (Jarkas et al., 2015). According to Hiyassat et al. (2016), labour productivity in Jordan grows too slowly and needs to be improved significantly. Alaghbari et al. (2019) reported poor productivity as a major challenge that confronts contractors in the Yemeni construction industry. In India, the construction sector is the second largest industry after agriculture. The majority of the construction projects in India suffer from delays, the majority of which arise from low labour productivity (Agrawal et al., 2020). In Egypt and Uganda, studies reveal that poor productivity of construction workers is one of the causes of cost and time overruns (Elgohary & Aziz, 2014; Alinaitwe et al., 2007).

Considering the CLP performance, construction stakeholders could throw their arms open in an expression of helplessness: what can anyone do about low productivity? Stakeholders could also demonstrate a sense of apathy: nothing can be done! Or propose actions: why is something not done about it? Given that the cost expended on construction labour constitutes 30 to 50% of the overall project's cost, growing labour productivity is a major concern for any profit-oriented construction organisation (Agrawal et al., 2020). Some government policies such as the *Employment Equity Act*, if not properly managed, could promote mediocrity in the industry and ultimately contribute toward barriers to productivity growth (Durdyev & Ismail, 2016; Hiyassat et al., 2016). There are advocacies that every government should begin to live up to: responsibility—especially in terms of upskilling construction workforces to improve productivity—and competitiveness of contractors (Durdyev & Ismail, 2016; Hiyassat et al., 2016). Governments have continued to develop interventions in the form of skill development initiatives (Aigbavboa & Thwala, 2014) and policies to help achieve steady productivity growth in construction (Gupta et al., 2018). Although various training programs exist—such as apprenticeships, company-sponsored training and vocational technical schools—labour costs continue to rise due to low CLP, and the industry is constantly under scrutiny (Yap et al. 2019). There are remarkable advances in construction technology; skilled workers in construction trades are still highly required since full automation of construction operations has not been achieved. According to MGI (2017), if the industry can rethink the industry's operations, construction productivity could be improved by 50-60%.

Level two: Systemic causes

The systemic layer addresses the question of "drivers of change" described by the litany (Conway, 2012). In principle, several complex and interrelated factors are the drivers of low labour productivity in construction (Dai et al., 2009). The first step towards ensuring construction productivity growth is to identify these factors (Adebowale & Agumba, 2021; Jalal & Shoar, 2019). Myriad research projects have been conducted in the field of CLP to explore this level of CLA. To change the current narratives about CLP described at the level of litany, the construction industry's stakeholders must understand the specific areas to focus (Neve et al., 2020).

It requires deeper insights into how construction stakeholders utilize resources and the need to determine critical factors that are significant to productivity growth; essential factors that drive the change. Based upon economic and political influences, factors affecting CLP vary from country to country (Jalal & Shoar, 2019). There is no consensus on drivers of low or slow productivity growth: some factors have been more recurring and thus could be considered more important for productivity improvement frameworks. At the systemic level of CLA, structural causes of factors that negatively impact on CLP are considered (Abdelalim et al., 2019). This is concerned with the underlying causes of the situation at the level of litany (Inayatullah, 2019). Scholars have distinctly grouped essential drivers of low CLP, based on intuition and experience (Parthasarathy et al., 2017). Among several classifications, Alaghbari et al. (2019); Jarkas and Bitar (2012); and Sangole and Ranit (2013) unanimously argue that the systemic causes of low labour productivity in construction can be generally classified into management, technology, human/worker, and external groups. As presented in Table 1, this study has further grouped these factors into internal (worker/management) and external (environmental and political) groups. This classification is motivated by the perception that the factors can either be related to construction stakeholders or external to them.

Underlying causes of low CLP gives rise to the need to devise pragmatic approaches for addressing the essential factors. Considering the numerous factors identified in existing studies, we examined the most prevalent ones. This necessitated the need to identify the highest rated issues in the sampled articles. It is reasonable that those factors

found to be amongst the highest rated problems in more than one study are reported only once in Table 1. Some of the issues can be controlled or improved, whereas some are out of management's control. Making use of the factors that positively affect productivity, whilst eliminating (or controlling) factors of negative effect, could ultimately contribute to productivity growth (Al Mehrzi & Singh, 2016).

Table 1: Prevalent Causes of Low CLP

Category	Causes of low CLP
Internal causations	Access to site, crew size, design and specification changes, health and safety issue, poor resources management, health and medical provisions, supervision issue, workers' skills, inadequate, lack of cooperation and communication between construction parties, leadership and efficiency in site management, material management, disputes and conflicts among project participants, management team, poor workers motivation, poor site management, improper planning and sequencing of work, inadequate training; inspection delay, construction technology and method; tools and equipment, fatigue, lack of support equipment, availability of materials in the market, financial status of the owner, financial incentives; paying employees' salaries on time, rework, schedule pressure (Abdelalim et al., 2019; Alaghbari et al., 2019; Ghoddousi & Hosseini, 2012; Gupta et al., 2018; Hiyassat et al., 2016; Hwang et al. 2017; Jalal & Shoar, 2019; Karthik et al. 2019; Muhammad et al. 2015; Mahamid, 2013; Parthasarathy et al., 2007; Pornthepkasemsant & Charoenpornpattana, 2019).
External causations	Extreme weather conditions, political and security situation, industrial action (Agrawal & Halder, 2020; Alaghbari et al., 2019; Ghoddousi & Hosseini, 2012; Jalal & Shoar, 2019; Muhammad et al. 2015; Parthasarathy et al., 2007).

Level three: Worldview

The poor performance of CLP has a significant impact on the business of construction. Some contractors, especially micro, small, and medium enterprises in developing countries, have continued to clamour for the need to increase their profit through productivity growth in order to stay in business (Agrawal & Halder, 2020). A number of these organisations have crashed out of business, while some that are still operating are struggling due to their low productivity level (Abdelalim et al., 2019). Although there is a desire for better performance of CLP, many contractors are trapped because they lack the idea of how to address their multidimensional productivity issues. Most of the existing studies have taken up the challenges of addressing the systemic causes of prevalent low CLP in developed and developing countries. It is, therefore, essential to understand construction stakeholders' popular beliefs that are associated with social causes. The *Worldview* represents the assumptions of construction stakeholders that drive the system. It establishes dominant perspectives that support and co-create the systemic causes of low labour productivity in construction. For any change to happen, worldviews first need to change, and this involves people recognizing that their perspective on an issue may be limited or flawed. The dominant perspectives are challenged to derive discrete alternative scenarios.

It is widely perceived that productivity growth in construction depends on the three important Cs in construction: contractors, consultants and clients (Akinsiku & Akinsulire, 2012). Doloi et al. (2012) underscore that poor productivity begins immediately an incompetent contractor is selected for a project. Hosseini et al. (2018) corroborate that the level of productivity attained on construction projects can be largely attributed to the choice of contractor. Alaghbari et al. (2019) advocate the need for contractors to focus on efficient labour-intensive management. Principal contractors are responsible for planning and managing the entire construction process (Agrawal & Halder, 2020). It is believed that lead consultants must ensure contractors' competence to enhance any projects' productivity, and ultimately, the clients' satisfaction.

Each of these principal construction stakeholders usually have interests in construction contracts. Clients desire to pay less for quality jobs. Consultants believe they are in charge of the project. Contractors are driven by the need to avoid delays, in order to make adequate profit for their organisations. A clients' desire for a cheap contract sum could make the client's organisation form a project team that is not suitable for the job. Preference may be given to contractors with lower tender figures as opposed to more important considerations, such as the contractors' experience in similar work, capacity, financial standing, health and safety (H&S) records etc. Construction contracts awarded under such circumstances could suffer from poor site planning, inadequate skill, and poor H&S practices (Agrawal & Halder, 2020), which are critical systemic causes of low productivity in construction (Akinsiku & Akinsulire, 2012). Public and private sector clients should look beyond contract sums to consider the overarching

project objectives and the industry's potential to meaningfully contribute to economic growth (Alaghbari et al., 2019).

As the party responsible for the design and management of the clients' projects, consultants play a multifaceted role in construction endeavours where their involvement affects project performance in terms of time control (Hwang & Leong, 2013). A lump-sum or traditional form of contract is still the most common form of construction contract. Since it is a consultant-led design arrangement, contractors are not usually involved early in the traditional form of contract. Contractors are only involved when the designs are substantially complete. At such times, consultants are reluctant to entertain significant changes, as they consider themselves as the one responsible for driving the process (Doloi et al., 2012). Due to the contractor's generally limited involvement in the design phase, the issues of buildability and maintainability of the project occasionally arise during construction (Adebowale, 2018). Consultants issue change orders during construction (and sometimes later) before they make working drawings available for contractors (Jarkas & Bitar, 2012). Bierman and Pretorius (2016) report factors associated with consultants as the highest ranked factors contributing to low productivity in South Africa. Essential systemic causes of low productivity identified in the study include: the consultants' late issuance of drawings to the contractor; the consultants' delayed reply on request for design information; late issuance of specifications to contractors, delayed inspection by consultants, and buildability of design. Some other developing countries that are confronted by similar consultant-related factors include Malaysia (Abdul Kadir et al., 2005), Uganda (Alinaitwe et al., 2007) and Chile (Serpell et al. 2002).

One of the primary goals of every business is to render service and make profit. In the event of a dearth of construction activities, contractors who have no construction job could be compelled to compromise on contract rates. Contractors undertaking a project with low contract rates would have a stringent budget and could be unable to cater for any staff development initiative that could promote productivity growth and competitiveness for an organization (Jalal & Shoar, 2019). Contractors are more engrossed in delivering the jobs as quickly as possible, so as to make sufficient profit to cater for the company's overheads and still have funds to expand the company's operations. Besides low contract rates, paucity of funds could result from a contractor's lack of financial prudence. Challenges associated with funds make some contractors—especially those in developing countries—predisposed to cheap labour (Abdelalim et al., 2019). Cheap labour significantly contributes to defective workmanship (Love et al., 2002) as one of the systemic factors of low labour productivity. Whilst training construction workers promotes a competitive advantage, contractors hold the view that they cannot expend the organizations' limited resources on workers who may leave for another organisation, and eventually result in a loss in business (Ingle et al., 2021). Such trends contribute to a contractor's inadequate commitment to skill development, which is a leading cause of low CLP. Existing studies have widely reported contractors' frustrations, arising from a lack of capital to hire skilled workers. Contractors confronted with skill shortages are advised to supplement their workforce with skilled Indigenous or foreign workers (Durdyev & Ismail, 2016). The challenge of finance makes it difficult to heed the foregoing recommendation.

Level four: Myth

This level provides deep stories and an emotional level of experience to the worldview under inquiry (Inayatullah, 2019). It is particularly focused on deep expression of the different perspectives of stakeholders with respect to CLP. The language used is less specific and more concerned with touching the heart instead of reading the head (Inayatullah, 2019). The word *myth* is often used in the sense of something that is untrue. Labour productivity in construction is considered to have *"fallen behind"* productivity in most industries, and has declined continuously for decades (Neve et al., 2020). The issue of the decline of productivity in construction has been in the spotlight due to failures to meet ever-changing performance expectations for half a century (Hiyassat et al., 2016). Yap et al. (2019) and Gupta et al. (2018) express the problem of productivity in the construction industry as being *"chronic"*; a term that emphasizes the subsistence of CLP issues over decades.

There were four core myths found to be associated with CLP: "Robots build better"; "workers are dispensable"; "inherently unsafe environment"; and "inevitable change orders". "Robots build better" is concerned with AI, which suggests that technology is the answer to CLP growth. The next myth suggests large numbers of construction workers, where contractors can easily recruit workers when needed (Karthik et al., 2019)—besides, the myth can be related to the first in terms of technological advances. There is a widely accepted perception that the numerous workers who are not usually adequately skilled for their jobs could be replaced by machines (Abdallah, 2007). Contrary to the foregoing belief, construction operations (especially in developing economies) have not been fully automated, which makes the role of human resource (HR) in modern construction essential.

The fields of construction management and engineering widely report the construction sector's working environment as inherently unsafe, thus the high fatalities and death rates that characterize its operation (Agumba & Haupt, 2014). The construction industry is known as one of the riskiest sectors in terms of accidents (Kukoyi et al., 2021). Based on the global statistics, it has been estimated that more than two million people worldwide were annually considered as disabled due to work-related injuries (Hamid et al., 2019). There are claims that the dangerous nature of construction operations results from unhealthy and unsafe practices (Kukoyi et al., 2021). Challenges associated with H&S, which include accidents, fatalities, and deaths are significant threats to productivity performance in construction operations.

Change orders have characterized construction projects and are believed to be unavoidable in construction projects (Kermanshachi et al., 2021). During the construction process, clients and consultants usually have the need to make certain changes to some areas of the project to satisfy clients' needs. Sometimes, it is late before contractors receive notifications for the required changes. The changes, especially those that are major and not promptly communicated, would undoubtedly contribute to increasing project costs and could further slowdown production process, thereby extending project completion dates.

Discussion of the findings

The unquestioned state of labour productivity in construction is its unsatisfactory performance in projects and the industry levels. There is evidence of either slow growth or decline of CLP in most developing countries (Ahmad et al., 2020; Moselhi & Khan, 2012; Nasir et al., 2014). Both continuous industry CLP appraisal, and the contractors' competence in determining the extent of growth or decline on their projects, are essential. Construction stakeholders should address the questions of why and when an organisation, and the industry, record productivity growth or decline. This could contribute to developing a better knowledge of frameworks that could promote construction productivity growth. Several drivers of change describe the litany of CLP. These have been broadly classified into internal and external causations. Internal factors include socio-economic and technology drivers. External causations include environmental, political, and government policies. The political, socio-economic, legal, technological, and environmental causes of CLP identified in Table 1 require addressing as a system, since none of the factors exist in isolation. According to Dai et al. (2009), CLP drivers are usually dependent on one another; one factor usually results in the occurrence of others. Research projects have largely addressed the factors as separate entities. Addressing the factors holistically could provide an improved intervention to CLP growth.

There are dominant perspectives that drive the social causes. CLP performance reportedly depends on various primary construction stakeholders: the clients, consultants, and contractors. Most of the systemic causes of low labour productivity—especially the internal causations—are associated with these major construction stakeholders. Clients desire to spend less to achieve quality facilities. Consultants take pride in being the representative of the clients on projects, therefore, having a sense of control of the project. Contractors focus more on quick delivery of the project to achieve optimum profit for their organisations. Their key construction players guide and promote their interests above others, while some level of adjustment is usually required to accommodate the perspectives of other parties in the interest of achieving the overarching project objectives. The clients, consultants, and contractors should not only promote their personal or organization's interests, but should be more concerned about collaborative efforts to achieve project success. For any change to happen, the worldviews of CLP, being dependent on these primary stakeholders, must be challenged. Whilst they play critical roles in achieving project success, construction project productivity is affected by intrinsic and extrinsic factors, which are sometimes beyond the control of these stakeholders. Consequently, changing this perspective could be the beginning of creating the needed change. In order to engender long term productivity growth strategies, other construction stakeholders must be considered. The industry should begin to interrogate the system and determine the roles of every party within a project, including the government, clients, regulators, sub-contractors, suppliers, funding bodies, users, communities, principal contractors, consultants, developers, educational institutions etc. All project stakeholders are corporately responsible for construction productivity growth. Therefore, all-inclusive frameworks are essential for CLP growth.

Automation is considered a panacea to the skill problem confronting the construction sector. It is largely believed that technology will eliminate the need for skilled construction artisans. This is a long-held belief which cannot be substantiated for the nature of construction operations. Certainly, higher productivity is possible with AI robotics, machine learning, and other tech-enabled applications. The nature of construction projects still requires the presence of a skilled workforce to deliver specific aspects of the projects. Emerging technologies could be deployed for skill development in construction. Augmented reality is useful for experiential learning. Some of the main factors that have hindered the wider implementation of remarkable technologies in developing countries are low awareness and

the cost involved (Chen et al., 2018). With the advent of open-source mobile toolkits the cost of these applications is getting lower, therefore their application should continue to expand to small-to-medium construction organisations, while awareness of their benefits is intensified. Appropriate integration of AI and the incorporation of construction sector human resources would produce better results, rather than the continuous clamor for AI, whilst completely jettisoning the need for skill development within the industry. Certainly, no technology can turn a poor project manager into a good project manager; neither can the best technology turn a poor contractor into a good contractor. There must be improved participation of the public and private sectors in skill development initiatives. The industry must take a wider, intensified and more committed approach to developing skills for construction. For many decades, South Africa has maintained an effective apprenticeship system that develops skills for construction. The industry was able to meet the skill demands of the industry for many years. Unfortunately, the industry has in recent years failed to meet its skill demands, which suggests that the apprenticeship system has either become less effective, or the growing demand for infrastructure is overwhelming. The system can be initiated in more developing countries and reinvented in countries where it has become less effective. Fully equipped, free apprenticeship training centers and contractors' resilience in regard to on-the-job training would contribute to producing more skills in construction without the need for contractors to spend a fortune on training their workforce. To achieve proper integration of an organization's human assets and automation, the industry's policy makers must focus on both construction workers and management teams, since technology still requires some level of human effort for optimal functionality.

Table 1: Towards Construction Labour Productivity Growth

Layer	Current reality			New reality	Transformed future
Litany	Low CLP is a critical challenge (Jarkas, 2015); Low CLP is a chronic problem (Gupta et al., 2018); A frequent cause of delay is low CLP (Agrawal & Halder, 2020).			Multi-factor productivity growth	Multi-stakeholder satisfaction
System	Political, economic, social, technology, environmental and legal (PESTEL) causations			PESTEL drivers - a single unit	A systemic approach
Worldview	Client: *I want it*	Consultant: *I am in charge*	Contractor: *Finish it quick*	We and other participants are one	Project success precedence
Myth	"Robots build better" "Workers are dispensable"; "An inherently unsafe environment" "Inevitable change orders"			AI and HR optimized	Fully integrated systems

The construction industry working environment is considered to be more dangerous than many other economy-dependent sectors. Construction environments could be challenging to operate in. Workers, managers, and site visitors require emotional intelligence for H&S. However, with commitment to proper planning and construction H&S regulation guidelines, every organisation can create the desired working environment. Consequently, construction work can be risky, but it is not inherently unsafe. Managers' and workers' compliance to H&S regulations should rather be at the center of advocacies. It is possible to ensure complete H&S of all staff on sites using a very strict set of health and safety guidelines that must be followed to the letter. This includes proper protective clothing guidelines, training on how to operate the machine, and proper first aid skills. These work together to ensure that workers understand the best course of action in any situation in the field. Over the last few decades, many accidents have occurred on construction sites. With strict regulations, the number of occupational accidents has dropped drastically. Some of the notable moves include more training and safety meetings, tools and equipment capabilities, and a focus on risk management planning.

Change orders prevalent in construction are considered unavoidable. The acceptance of this existential challenge as the norm can be averted through strategic planning from the pre-tender stage of construction contracts. In this respect the lead consultant has a significant role to play in ensuring a close working relationship with the client, educating the clients on every detail of the project and helping to appoint the right team for the job. Since change orders are usually issued by consultants and clients, a competent team of consultants with a good working relationship with the client can prevent change orders that can impede CLP. In the design-bid-build procurement system, early involvement of contractors at the design stage could contribute to averting future reasons that may necessitate calls for change orders, due to buildability or maintainability problems. Systems that strategically integrate all construction resources and AI must be developed. There must be a synergy amongst every project participant to achieve long-term productivity growth in the construction sector. Systemic frameworks that take cognizance of PESTEL productivity drivers and promote project objectives over individual interests would contribute to multi-factor productivity growth, and ultimately, could improve multi-stakeholder satisfaction.

Conclusion

The universal changes in business environments are compelling business owners in every sector to rethink their business management operations in search of a competitive advantage. CLP was examined through the four layers of CLA. The existing studies report low CLP as one of the major challenges confronting contractors in developing countries. The foregoing portents a detrimental effect on construction delivery cost, which makes it difficult for the construction sector to meaningfully contribute to economic development. The systemic causes of low CLP are socio-economic, political, technological, legal, and environmental. Dominant stakeholders' perspectives that drive the social causes were examined. It is believed that CLP performance depends on clients, consultants, and contractors. The four principal myths associated with CLP include: "robots build better", "construction workers are dispensable", "the construction working environment is inherently unsafe", and "change orders are unavoidable in construction". Addressing these myths, the study concludes that emerging technologies, construction managers, workers, and every project participant are each essential for productivity growth. Construction managers should create the desired environments for accidents and fatality-free construction operations, whilst strategic planning by clients and consultants could help to avert change orders during construction. This study advocates for fully integrated construction operations to promote CLP growth.

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