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Impact of Skill Development Initiatives on Construction Workers: A Study of Assam

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1. Introduction

The construction industry is a critical engine of economic growth and infrastructure development in India, employing over 60 million people and contributing significantly to the nation's GDP (Rao et al., 2006). The construction sector is one of those sectors that significantly contributes to both local and national economies. It constitutes 11.5% of India's gross output (MoSPI, 2024) and about 13.0% of Indian workers are employed in the industry, which makes it a major contributor to the nation's labour force participation rate (Economic Survey 2023-24).

The sector occupies a vital position in India's economic development, providing employment to millions of workers, the majority of whom belong to the informal and unorganized segments of the labour market. In Assam, as in the rest of the country, construction work is not only one of the most labour-intensive sectors but also one of the most precarious, characterized by casual employment, absence

of social security, and low wages (Majumdar & Borbora, 2013; Rao et al., 2006). According to the PLFS 2023-2024 annual report 80.6 percent of workers in the construction sector are casual workers. Despite its contribution to infrastructure and growth, the sector remains heavily dependent on unskilled or semi-skilled workers, often recruited through informal contractor systems, where training is largely absent and skills are acquired haphazardly on-site (Shivakumar et al., 1991). This has led to persistent vulnerabilities such as wage discrimination, gender segregation in occupations, and exploitative work relations (Khurana, 2017). They are one of the most vulnerable groups within India's informal labour force in terms of job security and social protection (Kalyani, 2015). The role of migration further complicates the workforce structure, as a significant portion of construction workers are migrants, recruited and controlled through social networks and contractors, reinforcing informality and limiting access to training opportunities (Fernandes & Paul, 2011; Fellini et al., 2007).

Skill development initiatives, therefore, have emerged as a policy priority to address these structural gaps by enhancing employability, improving productivity, and ensuring upward mobility of workers. Human capital theory posits that investment in skills enhances productivity and wages (Rosen, 1999), yet evidence from the Indian construction industry suggests that work experience, rather than formal education, remains the strongest determinant of wages, particularly in the informal segment (Chheda & Patnaik, 2016). Moreover, gender barriers are stark, with women confined to low-paid, unskilled roles and often excluded from formal training opportunities (Baruah, 2010; Khurana, 2017). Skill development, when effectively implemented, can empower workers by improving their bargaining capacity, enhancing safety practices, and enabling access to more stable employment. However, the success of such programs is contingent upon overcoming entrenched challenges, including weak enforcement of labour rights, inadequate coverage of welfare schemes, and employer reluctance to invest in training for a largely temporary workforce (Chaitanya, 1991; Hussain & Wani, 2011).

Given this context, the present study focuses on Assam, where the construction industry not only provides livelihoods for a large population but also reflects the broader structural problems of India's unorganized sector. Understanding the weightage of this sector, Assam Building and Other Construction Workers Welfare Board (ABOCWWB), Labour Department, Government of Assam launched a skilled training program (STP) in order to increase the efficiency and productivity level, and to bridge the current knowledge to enhance the income of the labour workers. This

study therefore seeks to critically assess the efficacy of these initiatives by examining how a Skill Training Program (STP) influences employment security and attempts to analyse its impact on the real wages of trained construction workers in Assam, evaluating whether skill development can translate into tangible improvements within a complex and constrained labour market.

2. Review of Literature

The basic objective of development planning is to raise the standard of living of its population. It is a multi-dimensional concept that encompasses the economic opportunities available and the ability of the people to take advantage of the same along with prevalence of conditions conducive to a healthy and productive life. Employment opportunities constitute a major segment of economic opportunities. Quality of employment is an another important aspect that has several dimensions such as adequacy of income, stability of employment, terms of employment, working conditions and access to social securities. In India, agriculture has always been a major component of the economy, although the share of agricultural workers in total employment decreased from 48 per cent in 2011-12 to 42 per cent in 2017-18. Consistent with this change is an increase in the share of non-agricultural workers in total employment from 52 to 58 per cent[1]. Employment in India is overwhelmingly informal: 90 per cent of all workers are employed under informal arrangements. Sinha's (2007) work showed that it is informal economy that drives both growth and jobs. Legislation in India relating to social security benefits for workers includes the Employee's State Insurance Act, 1948, which provides medical, sickness, maternity and disablement benefits, and the Employee's Provident Fund & Miscellaneous Provisions Act, 1952, which provides retirement benefits. However, these Acts apply only to industrial establishments employing more than 10 workers and therefore do not cover most establishments in the country. The national government is now in the process of enacting a uniform labour code to integrate and redefine existing laws and regulations. Informal construction comprises the largest of the worker groups nationally at 11 per cent of total employment and is among the largest of the worker groups in urban India at 9 per cent. It is the most important source of employment for men nationally (13 per cent) and in urban India (11 per cent). Informal construction workers are primarily casual workers (86%). It has been noted that unskilled and skilled workers account for a substantial part of the workforce in construction. According to Suryanarayanan (2004) such workers, or construction labour as they

[1] https://www.wiego.org/wp-content/uploads/2020/10/WIEGO_Statistical_Brief_N24_India.pdf

may be collectively referred to consist of three segments viz i) the Naka/Mandi, ii) the Institutional and iii) the intermediaries' segments. The first is the most informal and transient segment and refers to the mass of people who assemble at market places in towns and cities for being hired by contractors and other requiring workers for construction works. The second is the workforce employed by construction companies who are engaged in contracting and Government agencies who undertake execution of construction works and repair and maintenance jobs and his segment include the work charged staff retained by different Government agencies. The last one is the contract labour hired for work in construction sites through intermediaries and sub-contractors. The last segment constitutes the bulk of the construction labour. Moreover, the expansion in technological development led a small fraction of the construction workers[2] under the purview of gig economy[3]. As the construction works are not available on a regular basis and the labour input in the works depend on the changing workload in the worksite, the agency which undertakes the construction job likes of retain just the required workforce at any particular point of time and keep the additional labour that may become necessary at any time later 'on call'.

As the nature of job in construction industry is neither stable or high paying therefore a natural question arises regarding who and how people enter into this industry. A study in Assam by Das (2006) reveal that the entry to the construction jobs to a large extent is push from rural areas. For majority it is compulsion to get engaged in any form of livelihood. Limited cultivable or unsustainable land, low income of parents, lack of scope for higher education due to financial constraints or incapability of the person reflected by repeated failure in academic examination and lack of any other viable livelihood opportunities in rural areas are the major reasons for the push. Also, this could be largely because construction work has become a means of immediate employment in urban areas as it guarantees day to day earnings.

A variety of skills like masonry, carpentry, plumbing, bar bending, electrical work, glass fitting and tile laying, polishing and glazing are used in construction. Most of these skills are use to be transferred from father to son on hereditary basis but in recent years the mode of this skill transfer has gradually been replaced by on-the-job training. Majority workers join this industry as unskilled workers and acquire skills over a period of time through working with the head worker of that particular

[2] https://acuitylaw.co.in/india-rules-governing-the-gig-economy/

[3] The NITI Report considers 'gig workers' as those engaged in work outside the traditional employer-employee arrangement.

job and thereby upgrade to the level of semi-worker and further to the level of skilled worker. This process normally takes about five to ten years and is mostly confined to male workers. The Industrial Training Institutes, have for long been conducting courses on construction trades like mason, carpentry plumber, painter and wireman. Skill development and training programs play a crucial role in enhancing employability, particularly in sectors like construction, where labour-intensive tasks demand specific technical and practical skills. The effectiveness of such programs in bridging the gap between demand for and supply of skill labours has been widely studied through various theoretical lenses.

For instance, the Human Capital Theory (Becker, 1964; Mincer, 1974) emphasises that investment in education and training enhances workers' productivity, leading to better employment prospects and higher wages. This theory highlights the direct correlation between skill acquisition and economic returns, positioning training programs as strategic investments in workforce development. Furthermore, education and capital formation are interlinked in a dynamic way. Education does not mean only formal education; it may be any kind of systematic knowledge or skill that helps to gain productivity. According to Blundell et al., (1999), there are two main components of human capital with strong complementarity: early ability (whether acquired or innate) and skills acquired through formal education or training on the job. The first applications of human capital theory in economics are by Becker and Mincer of the Chicago school. According to Becker (1962), investing in human capital means "all activities that influence future real income through the embedding of resources in people". Human capital investments are expenditures on education, training, health, information, and labour mobility (Weisbrod, 1966). The accumulation of human capital takes place in three ways: formal schooling (i.e. the individual devotes his whole time to learning), on-the-job training (i.e. post-school training provided by the current employer), and off-the-job training (i.e. post-school training provided by "for-profit" proprietary institutions) (Lynch, 1991). These investments involve initial costs (direct tuition expenditures, foregone earnings during schooling, and reduced wages during training) in order to gain a return on this investment in the future (Becker, 1992). The return to education is based on two interrelated channels: increased earnings for the worker and higher productivity for the firm as well as increased employment probabilities (Bloch and Smith, 1977). The key element in the model by Becker (1964) is that education is an investment of time and foregone earnings for higher rates of return in later periods.

From a broader socio-economic perspective, Amartya Sen's capability approach emphasises that skill training does more than just improve employability; it expands individuals' capabilities, empowering them to make informed career choices and enhance their quality of life. Additionally, the dual labour market theory (Doeringer & Piore, 1971) and labour market segmentation theory highlight the structural barriers that prevent workers in informal or secondary labour markets, such as construction, from accessing better employment opportunities. Training programmes can act as a bridge, helping workers transition to more stable and higher-paying jobs.

Despite the recognition that investment in human capital leads to better employment outcomes, structural barriers often restrict equal access to such opportunities, particularly for women. Suri (2000) highlights the unique and paradoxical role of women in the construction industry, describing their participation as an exception rather than a norm on a global scale. In most countries, women's involvement in construction work is minimal, with the sector being heavily male-dominated. However, India stands out as one of the few countries where women are actively involved in the actual construction process. This significant participation, ranging between 20% to 40% of the construction workforce, challenges conventional gender roles and presents an intriguing dynamic for research. Despite their numerical strength, women in the Indian construction industry are largely associated with secondary roles, often confined to tasks categorised as unskilled labour. They are rarely seen in positions of authority or technical expertise, such as supervisors, foremen, or contractors. While the industry does see women excelling in specialized professional roles, such as architects and designers, their representation remains limited to these two extremes: low-skilled labourers on one end and highly qualified professionals on the other. In contrast, men occupy roles across the entire spectrum of the construction industry, from unskilled workers to senior management and technical positions.

This occupational segregation shows the structural and cultural barriers that prevent women from advancing within the construction sector. An important impediment in the utilisation of skills provided to women workers and therefore, to skill development and vertical mobility of women workers is the cultural mindset that prefers to let women workers unskilled or least skilled. The absence of women in mid-level roles, coupled with the lack of opportunities for upward mobility, perpetuates their marginalisation in the industry. Furthermore, societal perceptions and workplace cultures often reinforce these barriers, rendering the construction industry a predominantly male and gender-unfriendly space.

The participation of women in the construction industry not only raises questions of representation and inclusion but also brings attention to the issue of wage disparities. Even when women are engaged in similar types of work as men, their earnings often remain disproportionately low due to factors such as occupational segregation, undervaluation of women's labour, and informal employment arrangements. Hence, an examination of wages within the construction sector becomes essential to understand the broader dimensions of inequality and labour market segmentation.

The determination of wage rates has long been a central topic in labour economics. Understanding the key factors influencing wage determination is crucial for informing policy decisions aimed at enhancing labour market efficiency and promoting equitable wage distribution. Wage rates are influenced by a range of variables, spanning individual characteristics, institutional frameworks, and broader macroeconomic conditions.

One of the foundational perspectives on wage determination comes from the neoclassical theory of labour markets, which emphasizes the role of supply-side factors in determining wages. According to this theory, wages are largely determined by the supply and demand for labour, with individual workers' wages being a reflection of their skills, education, and experience. The human capital theory (Becker, 1964; Mincer, 1974) further extends this view, positing that investments in education and training enhance workers' productivity, leading to higher wages. Human capital theory suggests that wage disparities arise due to differential investments in skills and education, with more educated or skilled workers commanding higher wages due to their increased marginal productivity. Furthermore, this theory acknowledges that higher wages are also associated with jobs that entail unattractive attributes, such as high risk or difficult working conditions. However, this approach has been criticised for overlooking key labour market issues such as wage inequality, unemployment, and discrimination (Leontaridi, 1998), prompting the development of alternative models.

Segmented labour market theory (Leontaridi, 1998) challenges the neoclassical model by introducing the concept of labour market segmentation. According to this theory, labour markets are not homogeneous but consist of distinct segments that operate under different rules. These segments, which may be influenced by institutional barriers and social factors, often reward human capital unequally. For example, certain segments of the labour market may disproportionately reward

workers with specific skills, while others may have limited access to well-paying jobs despite having similar qualifications. This view shifts the focus from purely supply-side factors to the demand-side, emphasizing the influence of institutional and structural factors in shaping labour market outcomes. The theory suggests that segmented labour markets may perpetuate wage inequality due to the differing rewards allocated to various worker groups.

In India, the wage rate to construction workers varies significantly in rural and urban areas. The minimum rates of wages showing the basic rates and Variable Dearness Allowance payable in 2022 is 663 for unskilled worker in Area A and 443 for the same in Area C. Similarly, for highly skilled construction worker it is 876 and 734 respectively[4]. However, in real field this may vary with respect to type of job, gender and employer. Owing to the wage differences a large number of construction workers are seen to migrate from rural to urban areas (Manasi, 2021[5]). Due to rapid urbanisation the demand for construction workers gradually increased in urban areas. The wage difference further exaggerates this movement.

This industry is the second largest employer in India and has one of the largest shares of employees with more than 50 million workers working in the industry (Gandhi et al., 2013 & Dehdasht et al., 2021). Previous studies by Gandhi et al., (2013) & Chakraborty et al., (2017), reflect that the market size of the construction industry is estimated to be approximately 35,640 million. In addition, it is predicted that by 2025, the industry will become the third largest construction market worldwide (Ahuja et al., 2018). However, despite being one of the largest employment generating industries in the nation, and having huge growth potential, currently the industry is contributing only 11% to its GDP (Prasad 2019). However, its contribution to national income is considered one of the most important drivers for economic development and hence considered as one of the most crucial industries of Indian economy (Chia et al., 2014). Dehdasht et al., (2021) argue that the industry needs adequate investment to increase its contribution to the national income.

In Assam, in 2011, the construction industry provided employment to 6.62 lakh people, which is around 43 % of total employment in the state, which is 5.5 lakh.

[4] https://clc.gov.in/clc/sites/default/files/mygov_16488104261.pdf

[5]https://www.isec.ac.in/wp-content/uploads/2023/07/PB-45-Migrant-Construction-Workers-and-Question-of-Inclusiveness-Final.pdf

In addition, the industry has experienced a secular trend in employment generation, and in 2018, 8.66 lakhs persons, that is, around 49 % of the total employees of 17.8 lakhs, were employed in the construction industry of the state (Hira, 2021). However, during the same time, the contribution of the industry to gross state domestic product (GSDP) decreased from 7.6 % to 5.4 percent in the state (Hira, 2021), whereas in absolute terms, the contribution to GSDP increased from ₹10,887.47 crores to ₹17,129.11 crores between 2011 and 2018.

The increase in employment on one hand and decline in the contribution to the economy reflects the structural challenges the industry is encountering in recent pasts. El-Gohary & Aziz (2014) argue that, despite various efforts to boost productivity the industry is grappling with the challenges of skill employment and quality of work. The lack of sophisticated technology is another challenge highlighted by the scholars (Durdyev & Mbachu, 2017; Ofori, 2007). Therefore, in developing economies like India, manual labour substitutes for technology for sophisticated work. In addition, as previously found, a low level of educational attainment works as a hinder in attaining required skill levels and finally impact productivity and quality of work (Agrawal & Agrawal, 2017; Wang et al., 2008).

3. Major Skill Development Initiatives by the Government of India

Skill development has emerged as a crucial driver of socio-economic transformation in India, with significant emphasis placed on equipping the workforce with industry-relevant skills. India's skill development journey began immediately after independence with the establishment of Industrial Training Institutes (ITIs) in 1950 under the Craftsmen Training Scheme[6], recognizing the need for a trained workforce to support industrial growth, which laid the foundation for skill training in the country. The second Five Year Plan laid emphasis on rapid industrialization with particular focus on the development of basic and heavy industries. Therefore, technical training becomes imperative. Moreover, the Government of India designed a policy framework with the aim to develop skill in the country. The skill development eco system includes the Apprentices Act, 1961, a formal way of skills acquisition. It also includes, The National Skill Policy, which lays down the policies and procedures for skill enhancement and the National Skills Qualification Framework (NSF). The

[6]https://prsindia.org/policy/report-summaries/industrial-training-institutes-and-skill-development-initiative-scheme

Act aims at making it mandatory for the public and private sector establishments to provide on the job training to the students hence giving them a real world exposure to skills and process and making them employable in the labour market[7]. With the advent of economic liberalization during 1990s, new sectors grew rapidly including IT and service sector. With the diversification and technological advancement in the economy, the Government of India (GoI) launched the Skills Development Initiative (SDI) scheme in 2008, with the aim to train 1 million persons on demand-driven vocational skills over the next 5 years and 1 million each year after that to support skill training, certification and upgradation in the unorganised sector. The World Bank (2006)[8] highlighted that vocational training is considered a stigma in India. This argument though does look at the issue from the students' point of view and how students do not regard skill training as consistent with their aspirations, it does not look at how skill development programs can be made more attractive to students. Therefore, effort was made to bring more private sector organisation into the skilling ecosystem. Accordingly in 2009, National Skill Development Corporation (NSDC)[9] was incorporated which nurtured private sector organisation to be part of the skilling value chain either as training partner, mobilising partners, placement partners or encouraging innovations in skill development. During 2008 and 2009 India experienced a rapid growth which has resulted the need for increased demand for better quality of goods and services. Unfortunately, India only had 10% of workforce who received skill training according to Planning Commission Report, 2007. Therefore, it was noted that employers find it difficult to fill up jobs. In 2012, the difficulty to fill up jobs is indexed at around 48%, which is above the global standard of 34%[10]. Hence, there was a huge gap in supply and demand of skilled labour. In 2015, another flagship initiative the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) was launched under the Skill India Mission. According to Press Information Bureau (PIB) 2024, the Ministry of Skill Development and Entrepreneurship aims to empower youth by providing them with skill training, certification, and employment opportunities. Since its inception, the scheme has successfully trained over 1.42 crore individuals, with 1.13 crore receiving certifications across its Short-Term Training (STT), Special Projects (SP), and Recognition of Prior Learning (RPL) components.

[7]https://sciresol.s3.us-east-2.amazonaws.com/IJST/Articles/2016/Issue-48/Article297.pdf

[8]https://ccs.in/sites/default/files/2022-10/Demand%20for%20Skill%20Training%20Aspirations%2C%20Challenges%20and%20Recommendations.pdf

[9]https://skillsip.nsdcindia.org/sites/default/files/kps-document/NSDC%20Skilling%20Landscape%20in%20India_1.pdf

[10]https://ccs.in/sites/default/files/2022-10/Demand%20for%20Skill%20Training%20Aspirations%2C%20Challenges%20and%20Recommendations.pdf

The program has also introduced 119 new-age and future skill courses across eight key sectors, aligning skill development initiatives with evolving industry demands. Notably, PMKVY has made significant strides in gender inclusivity, increasing female participation from 42.7% in FY16 to 52.3% in FY24, thereby creating a more balanced and inclusive workforce.

From the above discussion it follows that post-independence, India's education policy heavily emphasised on higher education, leaving vocational training largely neglected. It was only with the 11th Five-Year Plan (2007-2012) and subsequent initiatives such as the National Skills Policy (2009) and the National Skill Development Mission (NSDM 2015), vocational education began receiving policy attention.

Industry connection is crucial to any large-scale skilling program, enabling contemporary relevance and employability and ascertaining demand to absorb the newly skilled workforce. In cognizance of this, the Skill India Mission actively collaborates with the industry through National Skill Development Council (NSDC) driven partnerships for skill development, reskilling, and upskilling. Until March 2024, 131 projects have been undertaken by NSDC, with 62 corporate organisations benefiting over 3.10 lakh persons across the country, including 42 aspirational districts.

Launched in 2021, the Skill Impact Bond leverages an innovative and results-based finance mechanism - Development Impact Bond model - to attract private sector funds and expertise for skill development, job placements, and retention. This initiative by NSDC and its coalition partners targets training 50,000 youth, ensuring at least 60 per cent are female, through selected and monitored NSDC affiliated training partners over four years. Between November 2021 and March 2024, 29365 candidates have been enrolled in over five cohorts, 23464 have been certified, 19209 have been placed and 13853 reported job retentions. The program has reported 74 per cent women enrolment so far.

India's efforts in skilling at global standards are also reflected through strategic initiatives such as the Skill India International Centers (SIIC) and partnerships facilitated through Government-to-Government (G2G) Memorandums of Understanding (MoUs). The establishment of 30 SIICs, as announced in the FY24 interim budget, marks a significant step towards enhancing India's global

skilling footprint. Currently, operational centers in Varanasi and SDI Bhubaneswar exemplify this initiative's early success, with plans finalized for seven more centers in the first phase. Additionally, India has forged MoUs with prominent countries including Australia, Denmark, France, Germany, Japan, Qatar, UAE, and the UK for cooperation in Information Exchange, Standard Setting, Mutual Recognition of Qualifications, etc. Such partnerships not only enhance international mobility but also promote the recognition of Indian qualifications abroad. Moreover, the establishment of NSDC International Limited in 2021, for ethical and transparent international recruitment of skilled Indians, drives the Skill India International Mission with a focus on priority sectors such as Information Technology, Construction, and Hospitality. Efforts include capacity building through 20 NSDC affiliated training centers and language training at 12 centers, contributing to the deployment of over 26,000 skilled candidates across multiple countries. In tandem with these national efforts, the Government of Assam has launched its Skill Training Program (STP) specifically designed for construction workers. This initiative aims to address the skill gaps prevalent in the construction sector, one of the largest employment-generating industries in the state. By equipping workers with technical expertise, industry-specific knowledge, and hands-on training, the program seeks to enhance their skills and employability.

In India, to make skill training more attractive the government sometimes arrange stipend. However, in a study by Das (2014) highlighted that the government should support economically weaker students through subsidies and not stipends (as is the case with the STAR Scheme of the NSDC program). In this case, countries like China and Korea provide subsidies to students rather than stipends. Provision of a stipend does not ensure that courses are student demand oriented because many students seemed to be joining the course simply as a back-up which suggests that they were possibly taking the short courses only to collect the stipend. Therefore, the study suggested that, while the government should continue to provide monetary incentives to students, it should mainly be in the form of subsidizing the fees of individual students. This discussion further raises the question that whether in a developing country like India the working people specially the casual labours are ready to upgrade them by forgoing their daily wages. In this case, stipend minimises their losses of forgone wage while learning the course and give an opportunity to enhance their skill.

In Assam, the State Government in collaboration with the Union Government in recent times has taken a chain of initiatives to enhance various skills across different industries. In line with this it has established a number institutes for instance Assam Skill University, North East Skill Center, Industrial Training Institute spread across different locations and Advance Skill Training Institute followed by a number of other private institutes. In this regard, one of the early intervention is the State Institute of Rural development (SIRD) Assam was notified by the Government of Assam in March 1981 and was brought under the Centrally Sponsored Scheme in September 1987. The Institute was registered in April 1998 under the Societies Registration Act 1860. Initially the institute did not have Faculty to implement the different training programs. Therefore, in April, 1998 a Director and Faculty Members were posted and the Institute started to function in a full- fledged manner. Over the years the Institute has been making experiments to diversify its training programs so as to encompass different courses for building capacity of the rural people to improve their socio- economic condition.

In recent times, to align with the goal of Skill India Mission with state initiative 'Advantage Assam' Assam Skill Development Mission (ASDM) (2015) is formed to create a pool of skilled manpower. The Mission is working under Skill, Employment & Entrepreneurship Department, and Government of Assam with the visions of capacity building of unemployed youth and to deliver quality skill training leading to meaningful employment to stimulate economy of the state. ASDM started its functioning from January, 2017 as an apex body of all skill initiatives in the state to achieve skilling target of 1.50 lakhs youths in a year. To achieve its vision and objectives, ASDM has come up with various initiatives such as setting up of Placement Linked Skill Development Training Program (PLSDTP), implementing Pradhan Mantri Kaushal VikasYojana 2.0 in the state, key collaboration with the Institute of Technical Education -Education Services (ITEES), Singapore as the global knowledge partner to establish the North East Skill Centre (NESC) etc.

4. Skill Enhancement and Up-gradation by ABOCWWB

Given the pivotal role of construction workers in the infrastructural progress of emerging and developing economies, the emphasis on their education and training cannot be overstated. Therefore, to address these challenges, the government and various stakeholders have introduced various programs at the national and regional levels. At present, India has three different training schemes to provide

skills to construction workers. These are the Craftsman Training Scheme (CTS), Apprenticeship Training Scheme (ATS), and Skill Development Initiative Scheme (SDIS). The SDIS is the most recent and advanced training scheme for workers in India. Under the SDIS, training is imparted for more than 90 trade disciplines, which is far larger than the previous training schemes (Johari & Jha, 2019).

The Govt. of Assam constituted the Assam Building and Other Construction Workers Welfare Board (ABOCWWB) in 2008. One of the features of the Act is to create a welfare fund to provide social security benefits to registered and eligible construction workers. The social security benefits include medical assistance, maternity assistance, death benefits, funeral assistance, marriage assistance, educational scholarships to the children of registered construction workers, loans, general, disability, and family pensions, job oriented technical and vocational training to the eligible children of the registered construction workers. Additionally, the board also took responsibility for proving skill trainings to the eligible construction workers. Under the provision of skill training program, registered workers may get skill-based formal training and receive a skill certificate after successful completion of the training. Hence, the ABOCWWB, Government of Assam initiated a Skill Training Program (STP) in the year 2018-19 in two phases covering 30 districts of Assam. STP was an attempt to uplift the existing skills of the construction workers alongside providing social security benefits to them. The skill development initiative is implemented through a well-designed format whereby training and assessment partners along with industry partners are involved in providing the requisite skill training. The overall architecture for this skill enhancement process includes four steps: Assessment, Skills Training, Final Assessment and Certification, and Tracer Study.

The STP was initiated in two phases. The first phase was initiated at 13 districts of Assam. Those are, Barpeta, Nalbari, Baksa, Chirang, Bongaigaon, Darrang, Kamrup, Dibrugarh, Tinsukia, Dhemaji, Sivasagar, Jorhat and Udalguri.

A total of 30,607 construction workers is registered for the STP out of which 28,118 (92 percent) completed the programme. The STP was launched with a duration of two months in each of the districts with eight (8) hours of training sessions per day. The trades (occupations) included under the STP are plumbing, masonry, painting, carpentry, bar bending, and electrician. Each of the participants of the STP was provided with a stipend of Rs 280 per day (subject to a minimum attendance of 50% i.e., 30 days).

5. Objective of the Study

Thus, the study is focused on assessing the learning outcome of STP. Specifically, the study addresses the following two objectives:

1. To examine how STP helps to secure employment.
2. To analyse the impact of STP on the real wage of the trained workers.

6. Methodology and Analytical Framework

6.1 Sampling Methodology

The study utilizes both primary and secondary data to address the objectives. The study was conducted across 13 districts of Assam viz. Barpeta, Nalbari, Baksa, Chirang, Bongaigaon, Darrang, Kamrup, Dibrugarh, Tinsukia, Dhemaji, Sivasagar, Jorhat and Udalguri. A sample of 945 trainees were estimated[11], ensuring 2% of margin of error at a 95 % confidence interval, with a population proportion of 90% from a total pool of 30,607 registered construction workers for STP. In order to compare the outcome of the training, the same number (945) of non-trainees were also taken into consideration using a snowball sampling method as their information regarding population size was unknown. The sample size for trainee was distributed proportionately to the total number of trainees in each respective district. In the next step the estimated sample was collected through a randomized control experiment[12] spanning over a variety of 5 trades viz., plumbing, carpentry, masonry, electrical, bar-bending and painting. The required data was then collected using random sampling with replacement in case where a respondent was unavailable or unwilling to participate in the survey.

In order to address the first objective, a total of 1075 sample units (trainee) were used. While for the second objective i.e. for wage rate, a total of 398[13] (199 trainee and 199 non-trainee) sample units were utilized. It is further elaborated in the *Analytical Methodology* section (Section 6).

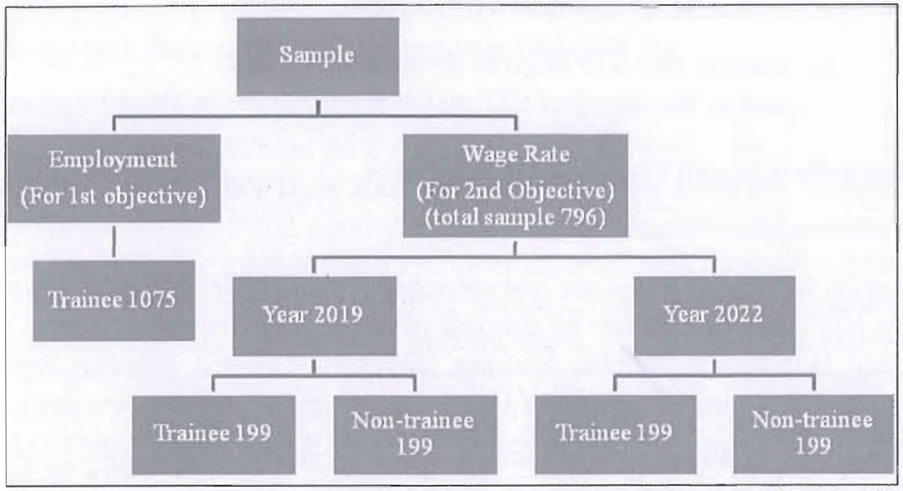
[11]To enhance the certainty and reliability of the research outcome the actual sample size was purposively increased to 1075 from the initially estimated sample size of 945.

[12]The randomization is done using computer generated random number.

[13]Due to two time periods (before and after) the final observation become 796.

This is shown with the help of the Flowchart-1.

Chart 1: Sample Distribution Flowchart



6.1.1 Sample Profile

Table 1: District-wise Distribution of Sample Trainees and Non-Trainees (In % & n=2150)

District	Trainees	Non-Trainees	Overall
Baksa	8.8	8.7	8.7
Barpeta	8.6	7.6	8.1
Bongaigaon	2.6	2.4	2.5
Chirang	4.6	4.4	4.5
Darrang	11.4	10.8	11.1
Dhemaji	3.4	2.1	2.7
Dibrugarh	29.0	30.5	29.8
Jorhat	0.7	1.1	0.9
Kamrup	8.3	7.7	8.0
Nalbari	6.0	5.8	5.9
Sivasagar	2.9	3.2	3.0
Tinsukia	9.4	10.8	10.1
Udalguri	4.5	5.0	4.7
Total	**100**	**100**	**100**

Source: Primary Survey, 2023

District-Wise Sample: *Table 1* illustrates the share of sample beneficiaries across districts, categorizing them into trainee, non-trainee, and overall groups. Dibrugarh emerges as a focal point, contributing significantly with 29.0% of trainees and

30.5% of non-trainees each. Districts like Jorhat, Bongaigaon, Sivasagar, Dhemaji, Udalguri and Chirang have a lower representation of sample beneficiaries which is lower than 5.0%.

6.1.2 Background of the Construction Workers

Table 2: Descriptive Statistics of the Sample (n=2150)

Variables	Percentage
STP	
Trainee	50
Non-trainee	50
Age*	37.49*
Sex	
Male	56.88
Female	43.02
Social group	
ST	20.33
SC	12.65
OBC	36.00
General	31.02
Religion	
Hindu	89.21
Muslim	10.42
Christian	0.37
Educational Attainment	
No formal education	7.21
Literate	9.67
Primary	13.72
Middle	34.42
High school	15.35
Higher secondary	14.56
Graduation and above	5.07
Occupation	
Plumber	1.26
Carpenter	7.63
Electrician	2.88
Mason	27.91
Painter	4.28
Others	56.04

** Imply mean age*

Source: Primary Survey, 2023

Table 2 presents the demographic and socio-economic characteristics of sample units, showing the mean or percentage distribution across various variables. The mean age of sample units is 37.49 years and majority (56.88) of them are male. Furthermore, across all the occupations the share of female is significantly low. In terms of social group 36% belong to OBC followed by General (31%), ST (20.33%) and SC (12.65). Religion on the other hand show a higher proportion of Hindu compared to other religions. The education levels of the construction workers reflects that a majority of 34.42% of them have educational attainment up to middle school. It depicts that a large section of them somehow failed to complete the High school level. The sample constitute 43.96% of individuals whose primary occupation align with the provided training trades and the rest belong to other occupations.

7. The Impact of Skill Training on Employment: Analysing Occupational Transitions

The STP has covered the training in key occupations like carpentry, electrical work, masonry, painting, bar bending and plumbing in the first phase of the training across the 13 districts of Assam. *Table 3* shows a district-wise disparity in training distribution. Training programmes were not evenly covered, in some districts some occupations received more attention compared to others. It is observed that in districts like Baksa, Barpeta, Darrang and Tinsukia the trainings were relatively evenly covered. While in Dhemaji it has a high percentage of carpentry (34.7%) and masonry (39.3%), with no training provided for electrical work and paintings. A similar pattern was also seen in Sivasagar, where carpentry (34.7%) and masonry (32.3%) dominated, but no electricians were trained. Additionally, in Chirang it is found from the sample that, most of the enrolled workers had given training on plumbing (39.4%) but a low percentage of trainee on masonry (8.7%) was covered. Notably, training on bar bending was not seen in the initial time of first phase, it was included later.

Followed from the preceding discussion it is essential to shade light regarding the implementation of the initiative. The initiative was implemented through a well-designed format whereby the training and assessment partners along with industry partners was involved in providing the requisite skill training. One of the approaches of this program is the recognition of prior learning whereby skills and knowledge gained by the individuals beyond the formal learning process are assessed and granted formal recognition.

Table 3: Percentage distribution of the sample who were trained in respective occupation within districts

District	Carpenter	Electricity	Mason	Painter	Plumber	Total
Baksa	15.1	21.9	22.4	17.7	22.9	100
Barpeta	24.3	29.3	14.6	13.9	17.9	100
Chirang	11.4	20.0	8.7	20.6	39.4	100
Darrang	22.5	21.3	16.4	19.6	20.2	100
Dhemaji	34.8	0.0	39.3	0.0	25.9	100
Dibrugarh	9.7	29.6	12.5	26.5	21.7	100
Jorhat	29.3	0.0	30.8	15.8	24.1	100
Kamrup	20.5	16.3	34.6	15.2	13.5	100
Nalbari	19.2	11.2	26.5	38.4	4.7	100
Sivasagar	34.7	0.0	32.3	6.1	26.9	100
Tinsukia	22.1	12.3	22.6	18.0	25.0	100
Total	**17.4**	**21.6**	**18.8**	**21.5**	**20.8**	**100**

Source: Assam Building & Other Construction Workers' Welfare Board, 2022

Note: Data of Bongaigaon and Udalguri are included in Chirang and Darrang respectively.

From gender point of view, the programme had a balanced inclusion from both males and females in districts like Baksa, Chirang, Dibrugarh, Jorhat and Tinsukia. However, in the districts including Barpeta, Darrang, Dhemaji and Kamrup relatively less participation of females can be noticed from *Table 4*.

Table 4: Gender-wise percentage distribution of the sample who were trained within districts

District	Female	Male	Total
Baksa	47.65	52.35	100
Barpeta	33.63	66.37	100
Chirang	52.91	47.09	100
Darrang	32.91	67.09	100
Dhemaji	24.09	75.91	100
Dibrugarh	46.78	53.22	100
Jorhat	52.63	47.37	100
Kamrup	30.37	69.63	100
Sivasagar	70.04	29.96	100
Tinsukia	49.14	50.86	100
Total	**42.7**	**57.3**	**100**

Source: Assam Building & Other Construction Workers' Welfare Board, 2022

This disparity may be attributed to one of the requisite conditions for applying in STP i.e, for registering as a construction worker and participating in the STP one

must engage in construction work for not less than 90 days during a year. A number of studies reveal that female participation rate in the above mentioned (Table 3) construction related works where certain amount of skilled is required, is quite low (Pamidimukkala & Kermanshachi, 2023; Norberg & Johansson, 2021). However, many women engage in minor construction tasks such as loading, unloading, and assisting on-site. Interestingly, in districts like Sivasagar (70.0%) and Jorhat (52.6%), the female participation rate in STP was significantly high. This high percentage can be attributed to a special case where they are attracted by the stipend amount. The respondents from different districts reported that each of the participants of the STP was paid with a stipend of around Rs. 280 per day subject to a minimum attendance of 50%. Initially many male workers were reluctant to join STP as the given stipend was lower than the prevailing market wage rate.

Table 5: Percentage Distribution of Primary Occupation Before STP (n=1075)

Primary occupation Before STP	Male	Female	Overall
Bar-bender	0.3	0.0	0.3
Carpenter	4.7	0.0	4.7
Electrician	3.1	0.1	3.2
Mason	10.7	0.1	10.8
Painter	4.0	0.0	4.0
Total Construction Workers	**22.8**	**0.2**	**23.0**
Cultivator	4.8	0.4	5.2
Livestock Rearing	0.7	1.9	2.5
Housewife	0.0	26.4	26.4
Plumber	0.5	0.0	0.5
Regular salaried private	2.6	0.5	3.1
Retail Trader	3.9	1.8	5.7
Skilled workers other than construction	2.1	0.2	2.3
Student	4.8	1.4	6.2
Tailor	0.2	1.0	1.2
Unemployed	3.1	1.0	4.1
Unskilled workers	8.8	4.0	12.8
Weaver	0.1	5.3	5.4
Others	0.7	0.9	1.7
Total Non-Construction workers	**32.3**	**44.7**	**77.0**
Grand Total	**55.1**	**44.9**	**100**

Source: Primary Survey, 2023

To address this gap, the training partners reportedly enrolled more women by categorising them as helpers in masonry, carpenter, earth cutting activity roles

that aligned with the common engagement of female workers in rural areas under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA) in the initial period of the first phase. However, it was also reported that during Covid-19 pandemic, a shift in participation trends was observed. Most of the informal male worker, having lost their jobs, opted to join STP to receive the stipend rather than being unemployed in the later period of the first phase. This inclusion was also examined by analysing the prior occupation of the sample in Table 5.

From Table 5, it is observed that 77.0% of trainees had prior occupations not related to construction works. Among these, 26.4% were previously homemakers, followed by unskilled workers (12.8%), students (6.2%), retail traders (5.7%), weavers (5.4%), cultivators (5.2%), and others, raising concerns about the accuracy of their inclusion as construction labourers or in the STP. Only 23.0% of trainees reported their prior occupations as construction workers.

From *Table* 6 it is observed that 70.7% out of 10.8 % mason workers enrolled in the same training program, followed by electrical work (8.6%), plumbing and painting (6.9%), carpentry (6.0%), and bar bending (0.9%) in the STP. Likewise, 4.7% of trainees' whose prior occupation was carpenter, 78.0% were enrolled in carpentry, followed by plumbing (8.0%), painting and electrical works (6.0%), and masonry (2.0%). Out of the trainees whose previous occupation was identified as painter (4.0%), 74.4% of them were enrolled in painting courses, with lesser percentages opting for plumbing (11.6%), carpentry (9.3%), and electrical work (4.7%). Approximately 3.2% of participants, whose previous occupation was electrician, enrolled in electrical work, with 82.4% choosing this specialization. Similarly, 0.5% of sample with a prior occupation as plumbers achieved full enrolment in plumbing courses. Notably, 0.3% of trainees earlier engaged in bar bending work found 100% enrolment in plumbing, revealing potential gaps in courses offered or trainer availability in certain training centres. These data emphasise the mismatch among the occupations where they belong and the occupation they joined for training.

Table 6: Percentage distribution sample associated with respective trainings within different prior occupation

Prior Occupation	Bar bending	Carpentry	Electricity	Masonry	Painting	Plumbing
Bar-bender	0.0	0.0	0.0	0.0	0.0	100.0
Carpenter	0.0	78.0	6.0	2.0	6.0	8.0
Cultivator	0.0	14.3	19.6	23.2	16.1	26.8
Electrician	0.0	0.0	82.4	0.0	2.9	14.7
Housewife	2.1	17.6	7.8	27.5	29.2	15.9
Livestock Rearing	3.7	7.4	14.8	14.8	18.5	40.7
Mason	0.9	6.0	8.6	70.7	6.9	6.9
Others	0.0	0.0	33.3	16.7	16.7	33.3
Painter	0.0	9.3	4.7	0.0	74.4	11.6
Plumber	0.0	0.0	0.0	0.0	0.0	100.0
Regular salaried private	0.0	9.1	39.4	12.1	21.2	18.2
Retail Trader	0.0	13.1	29.5	16.4	19.7	21.3
Skilled workers other than construction workers	0.0	8.0	40.0	12.0	12.0	28.0
Student	0.0	4.5	46.3	3.0	17.9	28.4
Tailor	0.0	15.4	30.8	7.7	38.5	7.7
Unemployed	0.0	6.8	29.6	13.6	22.7	27.3
Unskilled worker	2.2	11.6	16.7	27.5	23.9	18.1
Weaver	1.7	15.5	10.3	13.8	36.2	22.4
Total	**1.1**	**14.5**	**19.0**	**23.5**	**23.0**	**18.9**

Source: Assam Building & Other Construction Workers' Welfare Board, 2022

Therefore, the subsequent analysis (*Table 7)* evaluates whether participants, especially those from non-construction backgrounds, transitioned to construction-based (Bar bender, Electrician, Mason, Painter, Plumber, and Carpenter) employment after completing the STP training.

Table 7 outlines the primary occupations adopted by non-construction workers after completing the STP. It indicates that only 5.1% (42 individuals) transitioned into construction-based jobs, with minimal female representation (0.2%). Despite receiving specialised training, most participants continued in their pre-training occupations. Female participants, in particular, remained concentrated in homemaking (32.7%), livestock rearing (3.3%), and weaving (6.6%). The findings from the preceding tables indicate that although the STP aimed to enhance employability, its impact on the labour absorption within the construction industry remains limited. A key observation is the limited entry of the non-construction

workers to the construction work post-training. This highlights barriers to translating acquired skills into formal employment. This further suggests that either the demand for construction labour is insufficient, there is no placement mechanism after training, or trained individuals encounters challenges in securing jobs due to informal hiring practices prevalent in the sector.

Table 7: Percentage Distribution of Primary Occupation of Non-Construction Workers after STP (n= 824)

Primary Occupation After STP	Male	Female	Overall
Bar bender	0.12	0.00	0.12
Electrician	0.97	0.00	0.97
Mason	2.43	0.12	2.55
Painter	0.61	0.00	0.61
Plumber	0.61	0.00	0.61
Carpenter	0.12	0.12	0.24
Transition to construction workers	4.86	0.24	5.10
Cultivator	5.34	0.49	5.83
Housewife	0.00	32.65	32.65
Livestock Rearing	1.33	3.28	4.61
Regular salaried govt	0.36	0.24	0.61
Regular salaried private	4.37	0.97	5.34
Retail Trader	5.70	2.67	8.37
Skilled workers other than construction	3.64	0.24	3.88
Student	0.61	0.61	1.21
Tailor	0.36	2.06	2.43
Unemployed	2.91	1.58	4.49
Unskilled workers	10.56	5.46	16.02
Weaver	0.12	6.55	6.67
Others	1.46	1.33	2.79
Total	**41.63**	**58.37**	**100 (N=824)**

Source: Primary Survey, 2023

From *Table* 6, it is evident that most of the women are homemakers, enrolled in the STP program, but even after training, they are not absorbed in the labour market, probably due to the structural constraint which restricts women's mobility in the sector. Furthermore, the analysis reflects that even after training, the participants opted for alternative employment opportunities, such as retail trade or self-employment. This also indicates inadequate post-training employment support, a mismatch between training content and real-world job opportunities, or that workers never attended this training programme for skills but rather to access the social security benefits offered for registering as a construction worker and stipend associated with the training programme.

However, there is a potential that, even though there is a very limited number of trainees choose to take up construction related work as their primary occupation, some may have engaged themselves in the sector as secondary workers. Therefore, in *Table* 8 an attempt is made to identify the trade in which trainee individuals are engaged as secondary workers. There is less than 10.0% of trainees, who are currently adopting construction-related jobs as their secondary occupation. Even, in the secondary occupation, most of them are male while only 12.3% are fond to be female. Among the different trades of training, Electrician training generates most of the opportunity as secondary job opportunities, followed by mason, painter, carpenter and plumber, respectively. From *Table* 8, it is clear that, even though the STP created few opportunities in the labour market it is not significant enough to argue for the positive impact of the STP. Rather, it indicates the nature of rural labour market and the nature of casual jobs, where in absence of the sustained employment opportunity for the longer period, people often choose to work in different occupations for their livelihood.

Table 8: Percentage Distribution of Secondary Occupation of Non-Construction Workers after STP (n=73)

Secondary occupation	Male	Female	Overall
Carpenter	13.7	0.0	13.7
Electrician	28.8	1.4	30.1
Mason	23.3	2.7	26.0
Painter	13.7	6.8	20.5
Plumber	8.2	1.4	9.6
Total	**87.7**	**12.3**	**100**

Source: Primary Survey, 2023

In brief, the analysis of STP on occupational transition reflects that even though, the primary goal of the STP was to enhance the skills of construction workers, only a few of them participated in the training and the majority of participants came from non-construction backgrounds. Therefore, the analysis reveals that the impact of the STP on employment is somewhat not significant and only for a few have transitioned to the construction industry. The primary motivation behind enrolment in STP was to earn the stipend offered during the program, rather than upskilling or find new employment opportunities among the trainees (refer Case - I).

Another way to explore the impact of STP is how wages change for the participants of the STP, who remained in the same occupation prior and post-STP. Therefore, the

subsequent analysis focuses on wages, and whether there is any positive effect on wages after the STP for its participants.

Case-I

A beneficiary from Darrang district shared her experiences after completing the Skill Training Program (STP). She mentioned that she received training in masonry and can now construct and repair small structures. However, she is currently engaged in livestock rearing and homemaking, as she finds it difficult to secure construction-related jobs in her locality. Her husband, a marginal farmer, often struggles to meet household expenses, which motivated her to join the STP with hopes of earning additional income.

When asked why she did not transition to construction-based work, she explained that societal norms and biases against women working in construction persist. Despite her skills, contractors' local builders are reluctant to hire female workers, particularly for skilled tasks like masonry. Instead, women are often limited to unskilled roles such as carrying materials, which do not align with her training. She added that the physically demanding nature of construction work, coupled with her responsibilities at home, made it impractical for her to pursue such opportunities.

She highlighted that several women from her batch faced similar challenges, with most of them continuing in their pre-training occupations. For instance, one of her friends who trained as a painter has returned to weaving, a skill she mastered before the program, as it allows her to work from home. In her own case, she finds livestock rearing more feasible, as it is less time-intensive and provides a steady, but modest, income. She emphasized that while the training was valuable and empowering, structural barriers such as limited job opportunities, societal stigma, and inadequate support for female workers in the construction sector prevent women from utilising their skills fully.

The beneficiary expressed her satisfaction with the stipend received during the training, which helped her purchase feed for her livestock and repair a leaking roof in her home. She also appreciated the dedication of the trainers, some of whom still check on her progress. However, she suggested that future training programs should cater to occupations, such as tailoring, weaving, and livestock management. She also recommended that the government introduce initiatives to create employment opportunities for female trainees in sectors that support flexible work hours.

When asked how she learned about the scheme, she credited a local village president who encouraged her to enrol. She concluded by expressing her hope that more women-centric training programs would be launched in the future, with increased capacity and better alignment with local job markets.

This case shows the challenges faced by female STP participants in breaking into construction jobs, highlighting the need for targeted interventions to overcome societal and structural barriers.

8. Wages: How it change after STP

Table 9 represents the prevailing wage rates in the market for construction workers across different trades, as collected during sample survey. The data indicate that among all occupations, plumbers have the highest wage rate at ₹567 per day, followed by electricians (₹507), painters (₹505), masons (₹461), and carpenters (₹444), respectively. However, the average wage rate for the construction industry, as estimated from our sample survey, is ₹388 per day.

Table 9: Average Market Wage across the Construction Occupation

Occupation	Average market wage (in Rs.)
Carpenter	444
Electrician	507
Mason	461
Painter	505
Plumber	567
Overall	**388**

Source: Primary Survey, 2023

Table 10 presents gender-wise differences in the average daily wages of trainees engaged in various occupations prior to and post-STP. There is a significant gender wage gap in daily wages, with male workers earning significantly more than female workers. Before STP, the average daily wage for construction workers was ₹ 341, where the average wage for males was ₹ 343, while it was just ₹ 100 for female workers. Even after STP, the wage differences persist, even though there was an increase in wages for both males and females. After STP, the average wages of construction workers were ₹ 487, where the wages of males were ₹ 488, and for females, it was only ₹ 150. Overall, in all the occupations, there was an improvement in wages, but except for carpentry, no female was engaged in the same occupation before and after STP.

Table 10: Gender-Wise Composition of Average Daily Wage of the Workers from their Primary Occupation before as well as after STP (Those who are currently engaged in the trained occupation)

Name of Occupation	Average daily wage (in Rs.)					
	Before STP			After STP		
	All	Male	Female	All	Male	Female
Carpenter	321	327	100	454	462	150
Electrician	350	350	-	505	505	-
Mason	342	342	-	470	470	-
Painter	359	359	-	521	521	-
Plumber	333	333	-	567	567	-
Total	**341**	**343**	**100**	**487**	**488**	**150**

Source: Primary Survey, 2023

Although, *Table* 10 reflects a positive change in wages after STP, they might also be due to market forces or economic factors such as inflation can play a role in determining wages. While the STP may contribute to improved skills and productivity, the change in wages after the STP required further investigation of labour market conditions. Therefore, to find whether this increase in wages is due to STP or due to external economic or market factors, DiD method and two regression models are employed which are discussed in the subsequent sections.

9. Analytical Methodology

The study utilises two distinct approaches to examine the impact of STP on the wage rate of workers. In the first approach Difference-in-Differences (DiD) technique is used which shows the program's impact on wages. In the second approach, two regression models are used to examine whether the change in wage rate after a period of time (3 years) aligns with a gradual change in inflation or not. That is, to strengthen the analytical rigor, a second regression approach is incorporated. This serves to validate the results obtained from the DiD analysis, which may not directly reflect the gradual change in the inflation rate. These two approaches are further explained in the subsequent sections.

9.1 Difference in Difference Approach

Initially, 1075 observations are collected for each group: trainees and non-trainees. However, within 3 years, a majority portion of individual shifted their occupations.

Although this shift is not largely different from the previous occupations, the wage rate somehow is different for each occupation. Hence, the wage rate of two different occupations in two different time intervals cannot be compared to assess the change. Thus, only those observations having the same initial and current occupations at the time of the survey are taken into consideration.

Counterfactual trend analysis for a DiD (Difference-in-Differences) is a statistical method used to estimate the causal effect of a treatment or intervention by comparing the change in outcomes over time between a treatment group and a control group. The basic idea is to estimate what would have happened to the treatment group in the absence of the intervention and then compare it to what happened with the intervention. The formula for the Counterfactual outcome of the treatment group in a Difference-in-Differences (DID) analysis is:

Counterfactual outcome of treatment group = Pre-Treatment Outcome of Treatment Group -Observed Change in Control Group.

- "Pre-Treatment Outcome of Treatment Group" represents the average or observed outcome of the Treatment Group during the period before the treatment or intervention.
- "Observed Change in Control Group" represents the change in the Control Group's outcome from the pre-treatment period to the post-treatment period.

This formula represents the counterfactual scenario by assuming that, in the absence of the treatment, the outcome of the treatment group would have followed the same trend as the outcome of the control group.

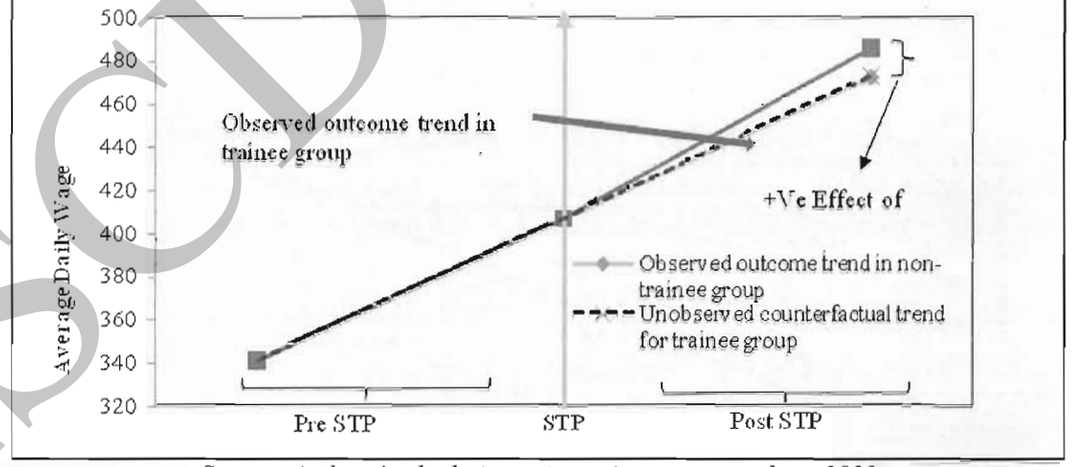
9.1.1 Impact of STP on Workers' Wages Using DiD Method

Table 11 demonstrates that both non-trainee and trainee workers observed improvements in their average wages after the introduction of the Skill Training Program (STP). Non-trainee workers experienced an average wage increase of Rs. 132, while trainee workers had a larger increase of Rs. 145. Consequently, the Difference-in-Differences (DiD) estimates of Rs. 13 indicate that, after the implementation of the STP, trainees, on average, earned Rs. 13 more than their non-trainee counterparts. This shows a favourable impact of the Skill Training Program on trainees' wages compared to what would have transpired in the absence of the program. Figure 1 provides a visual representation of these results.

Table 11: DiD Estimates of Workers for All Occupation

Group	Average wage		
	Pre-STP	Post-STP	Difference (Post-Pre STP)
Non-trainee (NT)	341	473	132
Trainee (T)	342	487	145
Difference (T - NT)	1	14	13
Counterfactual trend	341	474	-

Figure 1: DiD Estimates of Workers for All Occupation



Source: Authors' calculation using primary survey data, 2023

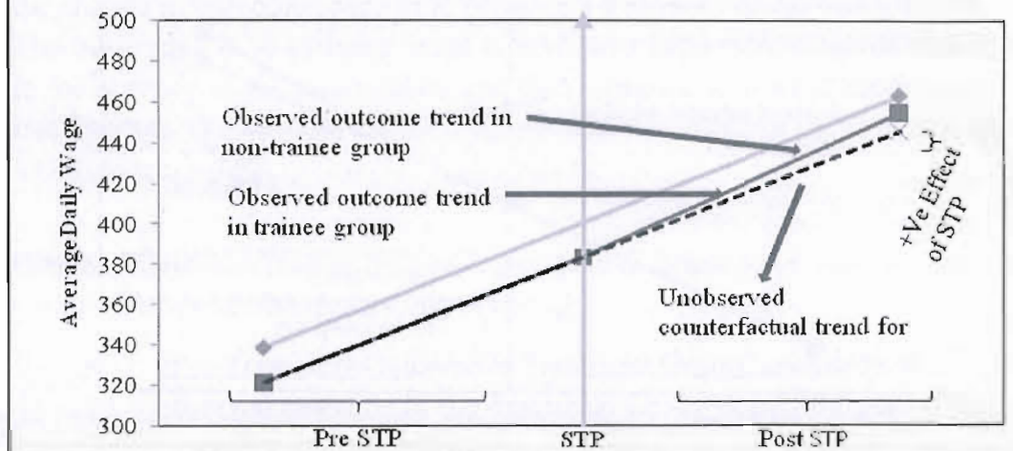
However, the impact of STP varies across occupational levels, and the following section will delve into the specific variation in STP's effects across different occupational categories.

Impact of STP on Carpenter: As shown in *Table – 12*, the initial disparity in average wages between the two groups (Trainee and Non-trainee) stood at Rs. -17 However, following the training program, this difference between the groups (T-NT) narrowed down to Rs. -9. Consequently, the Difference-in-Differences (DiD) estimates of Rs. 9 highlights that, post-STP implementation, carpentry trainees, on average, earned Rs. 9 more than their non-trainee counterparts within the carpentry profession. These findings reveal the efficacy of the STP in enhancing the earning potential of participating carpenters. *Figure – 2* provides a visual representation of these results.

Table 12: DiD Estimates for Carpenter

Group	Average wage (Rs.)		
	Pre-STP	Post-STP	Difference (Post-Pre STP)
Non-trainee (NT)	339	463	124
Trainee (T)	321	454	133
Difference (T - NT)	-17	-9	9
Counterfactual trend	321	445	

Figure 2: DiD Estimates for Carpenter



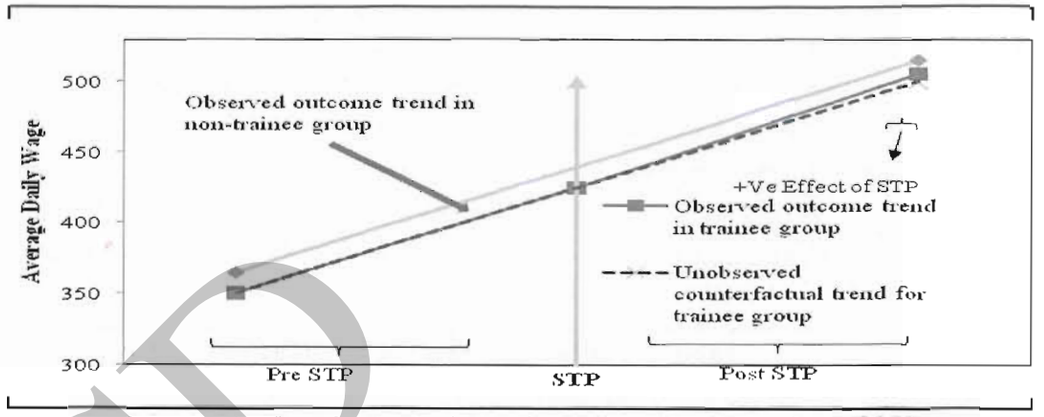
Source: Authors' calculation using primary survey data, 2023

Impact of STP on Electrician: As presented in *Table – 13*, DiD analysis reveals that the Skill Training Program yielded a favourable effect on the wages of trainee electricians, resulting in an Rs. 5 increase compared to the expected earnings based on the counterfactual trend. It is worth noting, however, that the impact of the STP on electricians remains relatively modest. *Figure – 3* provides a visual representation of these results.

Table 13: DiD Estimates for Electrician

Group	Average wage (Rs.)		
	Pre-STP	Post-STP	Difference (Post-Pre STP)
Non-trainee (NT)	365	515	150
Trainee (T)	350	505	155
Difference (T - NT)	-15	-10	5
Counterfactual trend	350	500	

Figure 3: DiD Estimates for Electrician



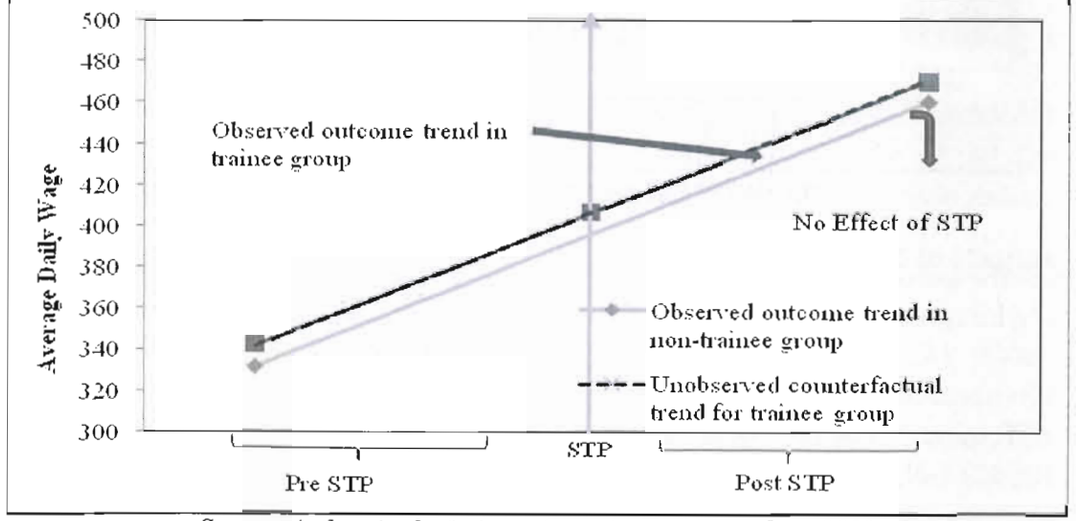
Source: Authors' calculation using primary survey data, 2023

Impact of STP on Mason: Table – 14 and Figure – 4 provide the DiD estimations for workers in the mason occupation. Notably, the DiD estimates, which stand at Rs 0, suggest that the Skill Training Program had no discernible impact on masonry workers.

Table 14: DiD Estimates for Mason

Group	Average wage (Rs.)		
	Pre-STP	Post-STP	Difference (Post-Pre STP)
Non-trainee (NT)	332	460	128
Trainee (T)	342	470	128
Difference (T - NT)	11	10	0
Counterfactual trend	342	471	

Figure 4: DiD Estimation for Mason



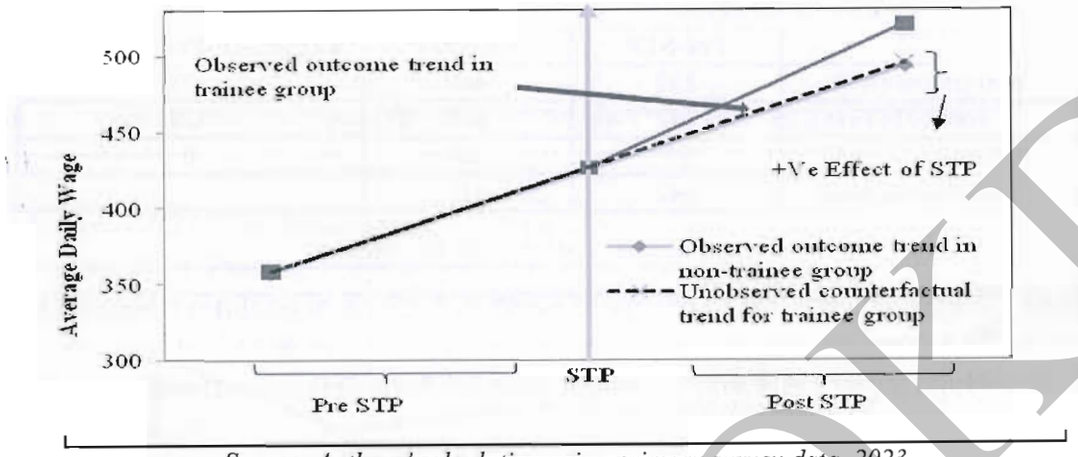
Source: Authors' calculation using primary survey data, 2023

Impact of STP on Painter: Table – 15 illustrates the positive impact of the Skill Training Program (STP) on painters' wages. Non-trainee painters saw their average wage rise by Rs. 137, while trainee painters experienced a larger increase of Rs. 162. Consequently, DiD estimates show that, on average, trainee painters earned Rs. 26 more than their non-trainee counterparts after the program. This highlights the STP's effectiveness in significantly boosting the earning potential of participating painters. Figure – 5 provides a visual representation of these results.

Table 15: DiD Estimates for Painter

Group	Average wage (Rs.)		
	Pre-STP	Post-STP	Difference (Post-Pre STP)
Non-trainee (NT)	357	493	137
Trainee (T)	359	521	162
Difference (T - NT)	2	28	26
Counterfactual trend	359	495	

Figure 5: DiD Estimates for Painter



Source: Authors' calculation using primary survey data, 2023

Impact of STP on Plumber:

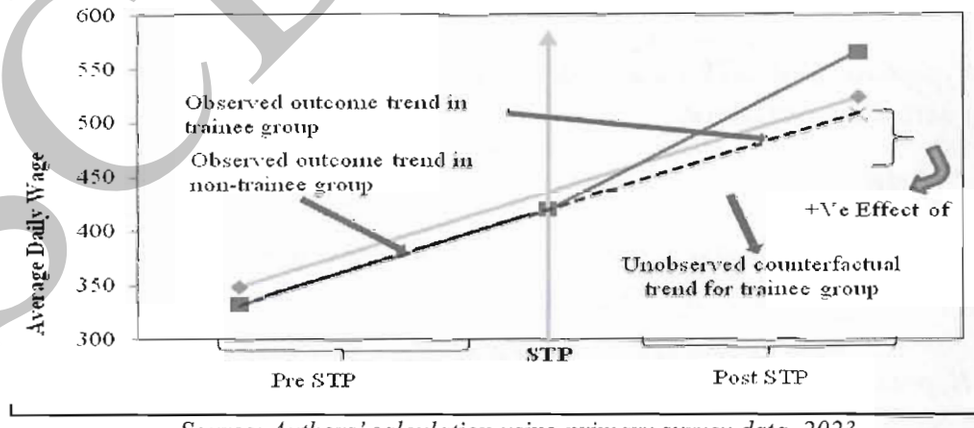
Table – 16 highlights the substantial positive impact of the Skill Training Program on Plumbers' wages. Initially, there was a wage gap of Rs. -17 (T-NT). However, post-STP, trainee plumbers' wages increased to Rs. 567, expanding the wage difference to Rs. 42 (T-NT). Additionally, the counterfactual trend indicates that, without training, trainees would have earned an average wage of Rs. 508. Thus, the DiD estimate of Rs. 58 demonstrates a significant positive impact of the Skill Training Program on

trainee plumbers' wages, resulting in a notable wage increase of 58 units compared to non-trainee plumbers. *Figure – 6* visually presents these findings.

Table 16: DiD Estimates for Plumber

Group	Average wage (Rs.)		
	Pre-STP	Post-STP	Difference (Post-Pre STP)
Non-trainee (NT)	350	525	175
Trainee (T)	333	567	233
Difference (T - NT)	-17	42	58
Counterfactual trend	333	508	

Figure 6: DiD Estimates for Plumber



Source: Authors' calculation using primary survey data, 2023

9.2 Regression Models and Variable Specification

The Difference-in-Differences (DiD) model reveals that daily wage rates change for both trainee and non-trainee groups, with the wage increase being slightly higher for the trainee group. However, it is crucial to note that wage rates are influenced not only by skill levels but also by broader economic factors such as inflation, productivity, and the supply and demand for labour. Capturing all these external factors simultaneously is challenging. In this study, inflation is considered to examine an alternative scenario that adjusts the wage rates for inflation, assessing whether the increase in wages for both trainee and non-trainee workers are meaningful after accounting for inflation. The findings from empirical studies show that the real wage gap between workers in the public and private-informal sectors is significant, with informal sector workers earning 3.8 times less (Glinskaya & Lokshin, 2007). Furthermore, there is a lack of monitoring and enforcement of minimum wage laws in the unorganised sector, and anecdotal evidence suggests that minimum wage standards are rarely followed. Within this sector, the most significant factor

determining wages is productivity, which shows the strongest correlation with wage levels.

To evaluate whether STP training has helped construction workers to secure better wages and if these wages align with inflation, two regression models were employed in the present study. The analysis proceeds as follows:

First Model:

Dependent Variable: Monthly wage rate of all construction (Trainee+ non-trainee) workers.

Null Hypothesis (H_0): STP training does not have a significant effect on improving wages across the workforce.

Second Model:

Dependent Variable: Inflation adjusted (CIF) monthly wage rate of construction workers who have received STP training.

Null Hypothesis (H_0): The current wage (2022) is less than the inflation-adjusted wage

The dependent variables are transformed into logarithm so it becomes a log-linear model. In a log-linear model, the coefficients represent elasticities, meaning they indicate the percentage change in the dependent variable for a 1% change in an independent variable. The regression models used in the analysis are as follows:

Model – 1:

$$\ln(Y) = \beta_0 + \beta_1 Time + \beta_2 Trainee + \beta_3 STP\ time + \beta_4 Age + \beta_5 Sex + \beta_6 Religion + \beta_7 ST + \beta_8 SC + \beta_9 OBC + \beta_{10} Primary + \beta_{11} Middle + \beta_{12} High\ school + \beta_{13} HS + \beta_{14} Graduation\ \&\ above + \beta_{15} Plumber + \beta_{16} Painter + \beta_{17} Carpenter + \beta_{18} Electrician + \beta_{19} Age^2$$

Model – 2:

$$\ln(Y) = \beta_0 + \beta_1 Time + \beta_2 Age + \beta_3 Sex + \beta_4 Religion + \beta_5 ST + \beta_6 SC + \beta_7 OBC + \beta_8 Primary + \beta_9 Middle + \beta_{10} High\ school + \beta_{11} HS + \beta_{12} Graduation\ \&\ above + \beta_{13} Plumber + \beta_{14} Painter + \beta_{15} Carpenter + \beta_{16} Electrician + \beta_{17} Age^2$$

Where,

Y is the dependent variable, $\beta_{(0)}$ is the intercept term and $\beta_{(1)}$ through $\beta_{(n)}$ are the coefficients for each independent variable where *n denotes 1, 2, 3,……*

Independent Variables

Time:

First Model: A dummy variable where: 1 = Year 2022; 0 = Year 2019

Second Model: A dummy variable where: 1 = Inflation-adjusted monthly wage rate in 2022; 0 = Current monthly wage received by workers in 2022.

STP (Skill Training Program): A dummy variable where: 1 = Trainee workers; 0 = Non-trainee workers

STP Time (Interaction Term): A dummy variable representing the interaction of STP and Time, where: 1 = Wage of trainee workers in 2022; 0 = Wage of all workers (trainee + non-trainee) in 2019

Age: Measured in years

Age^2= This variable is included to capture the non-linear effect of age.

Sex: Male = 1, Female = 0

Religion: Hindu = 1, Muslim & others = 0

Social Group: Social group is a categorical variable with four categories: Scheduled Tribe (ST), Scheduled Caste (SC), Other Backward Classes (OBC), and General category. For estimation purposes, dummy variables are created, with the General category serving as the reference group

Education attainment: It is considered as categorical variable with six categories: Primary, Middle, High school, Higher Secondary, and Graduation & above and literate but no formal education. Dummy variables are created with the last category serving as the reference group.

Occupation: It is a categorical variable with five categories. Hence, dummy variables are created for Plumber, Painter, Carpenter, Electrician, with Mason serving as reference category.

It is to be noted that the second model is specially constructed for trainees only, hence, the variables "STP" and "STP time" are excluded from the model and include 398 samples only.

9.2.1 Adjustment of Wage Rate Using Cumulative Inflation Factor

The study utilises the cumulative inflation factor (CIF) to adjust the wage rate of construction workers over the study period. The cumulative inflation factor accounts for the compounding effect of annual inflation rates, ensuring an accurate adjustment of wage values over time. This approach is critical because inflation does not impact prices independently each year; rather, it builds on the price levels of previous years. By incorporating the cumulative effect, the method reflects the actual changes in purchasing power and cost of living more precisely.

For instance, when calculating inflation-adjusted wages, the annual inflation rates are converted into factors and multiplied sequentially to obtain a cumulative value. This ensures that the adjusted wage accounts for the compounded nature of inflation, providing a more realistic representation of workers' economic conditions over time. Such an approach is essential for meaningful economic analyses, particularly when comparing wages across different time periods.

The study considers the Consumer Price Index (CPI) for the working-class population under the base year 2016, specifically for Assam. This is due to the fact that the workers under study belong to Assam, and their workplace is also within the state. Therefore, the CPI of Assam is more relevant for this analysis compared to the All-India CPI. The data for CPI was gathered from the *Assam Statistical Handbook* for the respective years.

However, the CPI data for the year 2020 is not available due to disruptions caused by the COVID-19 pandemic. To address this gap, the CPI value for 2020 was estimated using the method of linear interpolation, based on the available CPI values for 2019 and 2021. The calculated CPI values, along with the corresponding inflation rates, are presented in *Table – 17*. This approach ensures the continuity and reliability of the data used in the study.

Table 17: CPI and Inflation Value of Working-Class Population

Year	CPI (base 2016)	Inflation rate
2018	105.24	-
2019	112.10	6.52
2020	119.75	6.82
2021	127.40	6.39
2022	138.90	9.03

Source: Authors' calculation Statistical Handbook of Assam

9.2.2 VIF Result

Collinearity among the chosen independent variables significantly impacts the model's performance. Tolerance and the variance inflation factor (VIF) are used to assess multicollinearity in the selected variables. Tolerance values below 0.2 suggest marginal multicollinearity, while values under 0.1 indicate a high level of multicollinearity. Likewise, a VIF value greater than 5 points to serious multicollinearity (Chien et. al., 2022). In this study, all the selected variables have tolerance values above 0.2 and VIF values below 5, indicating that the variables are not excessively correlated with one another. The VIF results are shown in *Table 18*.

Table 18: VIF Results

Variables	VIF	1/VIF
Time	1.98	0.51
Trainee	2.3	0.43
STP time	3.03	0.33
Age	1.37	0.73
Male	1.03	0.97
Hindu	1.31	0.77
ST	1.39	0.72
SC	1.35	0.74
OBC	1.5	0.67
Primary	2.23	0.45
Middle	4.01	0.25
High school	3.69	0.27
HS	3.06	0.33
Graduation and above	1.62	0.62
Plumber	1.10	0.91
Painter	1.18	0.84
Carpenter	1.24	0.80
Electrician	1.19	0.84
Mean VIF	1.92	

Source: Authors' calculation using primary survey data, 2023

9.2.3 Result from the Second Approach

In this approach, the study utilises two regression models to validate the increase in wage already shown by DiD approach. The results of the regression are shown in *Table – 19*.

Table 19: Results of Regression Analysis

Variables	Model 1	Model 2
	Coef.	Coef.
Time (Year 2019®in first model) (Current wage® in second model)		
Year 2022 in first model; Inflation-adjusted wage in second model	0.334*** (0.029)	-0.245*** (0.036)
STP (non-trainee®)		
Trainee	-114** (0.036)	NA
STP time (Trained + non-trained workers in 2019®)		
Trained workers in 2022	0.125** (0.047)	NA
Age	0.029*** (0.010)	0.028 (0.020)
Age square	-0.001*** (0.001)	-0.001 (0.001)

Sex (Female®)		
Male	1.198*** (0.045)	1.202*** (0.060)
Religion (Muslim®)		
Hindu	-0.207*** (0.050)	-0.301** (0.111)
Social Group (General®)		
ST	0.042 (0.041)	0.139** (0.057)
SC	0.038 (0.039)	0.040 (0.074)
OBC	0.067** (0.029)	0.100** (0.047)
Education (Below Primary®)		
Primary	0.055** (0.050)	-0.068 (0.095)
Middle	0.107*** (0.038)	0.055 (0.072)
High school	0.115*** (0.407)	0.054 (0.068)
HS	0.088*** (0.046)	0.045 (0.079)
Graduation and above	0.141** (0.081)	0.001 (0.106)
Occupation (Mason®)		
Plumber	-0.047 (0.065)	-0.103 (0.094)
Painter	0.053 (0.035)	0.022 (0.067)
Carpenter	0.012 (0.033)	0.051 (0.048)
Electrician	-0.034 (0.040)	-0.014 (0.060)
Constant	7.144 (0.218)	7.639*** (0.461)
	Number of observations 787	Number of observations 389
	F(19, 767): 179.53***	F(17, 371): 136.93***
	R-squared 0.31	R-squared 0.18

Note: The values in parentheses indicate standard errors
****, ** and * implies significant at 1%, 5% and 10% level*

Source: Authors' calculation

The regression analysis provides valuable insights into the factors influencing the monthly wage rates of construction workers, considering both the non-trainee workers and those who received STP training.

9.2.4 First model

The regression results for Model 1 shown in *Table* 19, a log-linear model analysing the monthly wage rates of 787 construction workers, reveal that STP training has a notable effect on wages, leading to a rejection of the null hypothesis that it does not significantly improve wages across the workforce. Wages in 2022 were 33.4% higher than in 2019 ($\beta_{(1)}$= 0.334), reflecting a broad upward trend, but trainee workers in 2019 earned 11.4% less than non-trainees ($\beta_{(2)}$= -0.114) however, by 2022, trainees

gained an additional 12.5% increase (STP Time: $\beta_{(3)}$= 0.125, p < 0.05), yielding a net positive effect of 1.1% ($\beta_{(2)}$+$\beta_{(3)}$= -0.114 + 0.125) over non-trainees in 2019, suggesting STP modestly enhances wages over time when combined with the general increase. Control variables further indicate that wages rise with age at a diminishing rate (Age: $\beta_{(4)}$= 0.029; Age²: $\beta_{(19)}$= -0.001), males earn 119.8% more than females, Hindus earn 20.7% less than Muslims and others , OBC workers earn 6.7% more than the General category, and higher education levels (e.g., middle: $\beta_{(11)}$= 0.107; graduation: $\beta_{(14)}$= 0.141) significantly boost wages, while occupational differences (relative to masons) are insignificant.

9.2.5 Second model

The regression results for Model 2 shown in *Table* 19, a log-linear model examining the inflation-adjusted monthly wage rates of 389 STP-trained construction workers, indicate that current wages in 2022 are significantly higher than inflation-adjusted wages, leading to a rejection of the null hypothesis that the current wage is less than the inflation-adjusted wage in an unexpected direction. Specifically, the coefficient for Time ($\beta_{(1)}$= -0.245) shows that inflation-adjusted wages in 2022 are 24.5% lower than current wages, suggesting that wage growth has outpaced inflation for trainees. In other words, on average, wages in 2022 have outpaced cumulative inflation since 2019. Additionally, the current wage for the non-trainees also outpaced inflation and increased significantly but its intensity is less than the trainees (Appendix 1). Control variables reveal that males earn 120.2% more than females ($\beta_{(3)}$= 1.202), Hindus earn 30.1% less than Muslims and others ($\beta_{(4)}$= -0.301), and among social groups, ST ($\beta_{(5)}$= 0.139) and OBC ($\beta_{(7)}$= 0.100) workers earn 13.9% and 10% more than the General category, respectively, while SC shows no significant difference. Education, age and occupation variables are largely insignificant. Though some of the variables are not statistically significant, but indicate that demographic factors like gender and social group play a stronger role in wage variation among trainees than education or occupation.

10. Number of Working Days

The preceding discussion on wage rates following the implementation of the Skill Training Programme (STP) highlights a crucial observation: while wage rates are often calculated on a monthly basis, they inherently account for the number of working days. However, including the number of working days as a variable in wage determination models can create a direct proportional relationship with the

wage rate, potentially distorting the analysis. For this reason, the number of working days has been deliberately excluded from the econometric models employed in this study.

Despite its exclusion from the models, it remains important to recognise the changes in the average number of working days post-STP. The data presented in *Table 20* indicates an overall increase in the average number of working days across all categories of construction workers. On average, workers experienced an increase of two additional working days per month after completing the STP. Among the occupational categories, electricians witnessed the highest increase, with their average working days rising from 18 to 22.

While the STP does not directly guarantee an increase in the number of working days, it exerts an indirect influence through skill enhancement. The primary mechanism driving this relationship is the improvement in workers' productivity and efficiency resulting from the skills acquired during the training program. In the construction industry, higher productivity and greater efficiency increase the perceived value of a worker, which in turn enhances their likelihood of securing more consistent employment opportunities and additional working days.

Table 20: Average Number of Working Days

Time/Occupation	Before STP	After STP
Bar-bender	23	25
Carpenter	20	22
Electrician	18	22
Mason	20	22
Painter	19	20
Plumber	17	18
Total	**20**	**22**

Source: Primary Survey, 2023

The discussion follows that the STP indirectly contributes to an increase in the average number of working days by enhancing workers' skill levels, productivity, and overall market value. This finding shows the broader benefits of skill development initiatives in improving not just wage levels but also employment stability and labour market outcomes for construction workers.

11. Discussion

The aim of the STP was to enhance the existing skills. Measuring the enhancement of skill is a qualitative matter. However, the study shows the extent to which the program is successful in helping non-construction workers adopt this either as their primary or secondary occupation. While the effect of any skill training programmes in terms of employment is difficult to assess in a short span of time, some changes are observed during the study period. It mostly attracted people outside the construction industry whose opportunity cost of joining the programme is comparatively higher given the stipend amount. It is seen that a small fraction of the trainees have shifted their occupation to the construction industry in the post-STP. Also, it helped women to become self-resilient by earning some additional income from the learnt skills. Given the women are mostly found to perform the role of helper in the construction industry a little change is noteworthy to mention.

Apart from employment the analysis of wage dynamics among construction workers using both the Difference-in-Difference (DiD) approach and regression models provides a comprehensive understanding of the impact of Skill Training Programs (STP). The DiD approach reveals a general positive effect of STP on wages, with trainees experiencing an average post-training wage hike of Rs. 13, surpassing the gains of non-trainees. However, the impact varies across occupations. For instance, painters and plumbers observed the highest post-STP wage increase of Rs. 58 and Rs. 26, respectively, highlighting the program's effectiveness in these fields. Carpenters and electricians also benefited, with wage hikes of Rs. 9 and Rs. 5, respectively, while masonry workers showed no discernible change, indicating that certain occupations may require specific interventions to enhance the effectiveness of training. These findings highlight the varied impacts of skill development initiatives across different occupations, indicating that customised strategies could enhance their effectiveness.

The regression analysis adds rigor to the findings by examining wage increases through two distinct models. The first model confirms that STP participation significantly raises wages compared to non-trainees, aligning with the DiD results. The second model provides deeper insights by distinguishing between current and inflation-adjusted (CIF) wages. It reveals that the real wage of trainees has increased, as indicated by the negative and significant coefficient of the inflation-adjusted (CIF) wage variable. This improvement in real wages demonstrates that STP not only enhances earnings but also strengthens purchasing power, benefiting workers amidst inflationary pressures.

The analysis also reveals wage disparities across genders, with female workers earning less than their male counterparts, a trend consistent with findings by Shrestha et al. (2020) and Suri (2000) in the informal sector. This disparity may stem from differences in work experience, which were not accounted for in this study. Moreover, STP offered only basic training to the participants. From the survey it is observed that majority of women get attracted to this programme for the stipend provided for joining. Thus, due to differences in work experience level, builders and other employers are mostly reluctant to engage them in core positions. Hence, they are mostly engaged in job roles to carry raw materials. Furthermore, a non-linear relation between age and wage is found. Among other reasons like physical strength declines with age, a prime reason is the digital divide. The older age workers find it difficult to cope with modern technology that are being used in construction works. The STP also did not provide training for technological adaptation. As a result, the gap in technological proficiency and productivity between younger and older workers remains unaddressed.

Furthermore, educational attainment is found to have a significant influence on wage rates, though its effect may not be direct. Instead, education enhances workers' productivity, as suggested by Stephan et al. (2018), enabling them to utilise their skills more effectively and adopting new technology in a better way. These findings highlight the factors influencing wage dynamics in the informal sector and show the need for holistic strategies to address wage inequalities and maximise the benefits of training programmes.

12. Conclusion

This study investigates the impact of the STP on the wages and employment of construction workers in Assam using two distinct analytical approaches: Difference-in-Difference (DiD) and regression analysis. The study from the first phase of STP shows that it is partially successful in terms of transforming non-construction workers to adopt construction work as their primary or secondary occupation. Although the number of such people who have transitioned to construction work is very few, but it is noteworthy. It helped the trainees from outside the construction industry to learn new skills that help to secure employment. To some extent, women become self-resilient in terms of acquiring new skills which help them to utilise for their own use and also earn a little from their neighbours.

Moreover, the findings consistently highlight the positive role of STP in enhancing workers' earnings and purchasing power, with variations across occupations and demographic groups. The DiD analysis demonstrates that, on average, trainees experience a higher post-STP wage increase compared to non-trainees, with the magnitude of impact differing by occupation. Painters and plumbers showed the largest wage gains, while masonry workers exhibited no significant wage changes, indicating the need for occupation-specific interventions. In line with this, in recent times the government of Assam have already seen to launch a number of initiatives to address occupation specific needs to counter unemployment among the educated youth along with empowering women from all section of the society[14].

The regression models provide further insights into wage dynamics. The first model establishes that participation in STP significantly boosts monthly wages for trainees. The second model reveals that real wages have increased beyond inflation-adjusted levels, signifying an improvement in the purchasing power of trainee workers. These results underline the dual benefits of STP in not only raising current wages but also shielding workers against inflationary pressures.

The study also identifies persistent disparities based on gender, religion, and social groups. Male workers and individuals from specific social groups (e.g., Scheduled Tribes and Other Backward Classes) enjoy wage advantages, while female workers and Hindu face wage gaps. Education emerges as a critical factor, with additional levels of education showing the positive effect on wages.

It is essential to recognise that wages are inherently dynamic, influenced by a range of explanatory variables beyond skill development programs for instance the demand and supply of labour which is a potential research gap for the future researchers. For instance, an oversupply of labour in specific occupations can suppress wages, even for skilled workers, whereas high demand in certain sectors may drive wage increases. Other factors, such as regional economic conditions, bargaining power of workers, and industry-specific characteristics, also interact to determine wage outcomes. These complexities highlight the need for holistic policies that address labour market conditions alongside skill development initiatives to achieve sustainable wage growth.

[14]Atmanirbhar Asom Abhijan, Lakhpati Baidew, Chief Minister's Foreign Language Initiative for Global Human Talent (CM-FLIGHT)

The STP has proven effective in enhancing the economic well-being of construction workers. However, the findings emphasize the importance of enhancing skill development initiatives to address occupational needs and socio-demographic disparities. Policymakers should prioritise equitable wage structure, gender inclusion, and targeted skill enhancement strategies to maximise the program's impact. Future research could explore the long-term effects of STP on workers' livelihoods and examine complementary interventions to further improve outcomes in the construction industry.

Appendix

Appendix 1: Difference Between Actual and Expected (CIF-Adjusted) Wages: Regression Evidence

Dependent variable is log of inflation adjusted CIF) monthly wage of Non-STP construction workers	**Model 3**
Variables	**Coef.**
Time (Current wage® in second model)	
Inflation-adjusted (CIF) wage in second model	-0.12***(0.29)
Age	0.02* (0.01)
Age square	-0.01 (0.01)
Religion (Muslim®)	
Hindu	-0.15** (0.05)
Social Group (General®)	
ST	0.11** (0.05)
SC	0.01 (0.04)
OBC	0.02 (0.039)
Education (Below Primary®)	
Primary	0.10*(0.06)
Middle	0.12***(0.05)
High school	0.15***(0.06)
HS	0.09 (0.07)
Graduation and above	0.41***(0.13)
Occupation (Mason®)	
Plumber	-0.02 (0.09)
Painter	0.04 (0.04)
Carpenter	0.01 (0.04)
Electrician	-0.08* (0.053)
Constant	8.67*** (0.18)

Number of observations 398 F(16, 381): 3.63*** R-squared 0.13

*Note: The values in parentheses indicate standard errors ***, ** and * implies significant at 1%, 5% and 10% level*

Source: Authors' calculation

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