

Employment, Technology and Development: A Review with Some Analytical Insights

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Abstract:

This paper reviews Amartya Sen's *Employment, Technology and Development* (Oxford, UK: Clarendon Press, 1975), prepared for the International Labour Office within the framework of the World Employment Programme, a seminal work that explores the interconnections between employment, technological choices, and development strategies in labour-abundant economies. Sen redefines employment beyond income, emphasizing its role in productivity and social recognition, while addressing disguised unemployment, surplus labour, and the challenges of measuring labour markets in India. By analysing modes of production, labour classifications, and the valuation of labour, Sen argues for technologies appropriate to the socio-economic context of developing nations. This review attempts to draw analytical insights from Sen's arguments and assess their relevance to labour market dynamics in countries like India, where the balance between technology adoption and employment generation remains a critical issue for inclusive development. *Keywords:* Technology, Employment determination, Surplus labour, Shadow price.

I. INTRODUCTION:

In developing countries there are several problems like unemployment, poverty, choices of proper technology, surplus labour, unutilized capacity and exploitation. These problems are correlated and connected to each other but we should have a clear knowledge about their modes and types of interrelations. In his book, *Employment, Technology and Development* (Oxford: Clarendon Press, 1975), prepared for the International Labour Office within the framework of the World Employment Programme, Prof. Amartya Sen has given us an idea about these interrelations by sharing his view with proper familiar types of examples and also suggests us about different types of policies that can be adopted to solve such problems. Published in 1975, this work combines economic analysis with complex relationships among several above-mentioned challenges of developed economies with offering clear examples and thoughtful policy suggestions to address them.

I have chosen this book because it provides a rigorous yet accessible analysis of problems that continue to affect developing nations, including

India. Sen's ability to connect economic theory with real-world examples makes the work especially relevant for understanding how technology and policy can be harnessed to reduce unemployment and poverty. By reviewing all five chapters in detail, I aim to highlight the book's insights into the dynamics of labour markets, the role of technology, and the broader implications for sustainable development.

This paper is divided into four sections. Section 2 describes the summary review of the book, Section 3 provides an analytical insight, section 4 is the part of the conclusion.

II. SUMMARY OF THE BOOK:

In this section, the summary of the book is provided by reviewing each chapter individually.

A. Chapter 1- Basic Concepts:

This chapter introduces the fundamental concepts of employment, technology, efficiency, and the role of non-wage sectors. Prof. Amartya Sen examines these themes systematically, and I will discuss his views one by one.

1) *Sub-chapter 1- The Concept of Employment – An Overview:* Employment and unemployment are often understood in simplified terms, yet the reality is far more complex. Many people assume that anyone receiving remuneration for a job is “employed.” However, this may in fact be *underemployment*, meaning the person is not fully utilized. Similarly, seasonal or part-time work may not constitute full employment, and labour engaged in activities with zero marginal productivity—such as surplus workers on a farm—cannot truly be considered employed. Even receiving income without performing any work does not qualify as employment.

Prof. Sen clarifies employment determination by distinguishing three key aspects:

- **Income Aspect** – Employment provides income to the worker.
- **Production Aspect** – Employment contributes to output through positive marginal productivity.
- **Recognition Aspect** – Employment gives individuals a sense of purpose and social recognition.

The recognition aspect emphasizes satisfaction: if someone accepts a job out of necessity but finds it inadequate or unrelated to their skills, they may not regard themselves as genuinely employed. The production aspect highlights productivity: if a worker’s withdrawal does not reduce total output, that worker is disguisedly unemployed. Finally, the income aspect stresses that employment must generate earnings proportionate to the value of the service provided.

Through these distinctions, Prof. Sen demonstrates that employment cannot be defined merely by wages or job titles. Instead, it must be assessed by income, productivity, and recognition—criteria that together determine whether a person is truly employed.

2) *Sub chapter 2- Technology and efficiency:* The choice of technique is a critical issue for any developing economy, as it determines whether a country can overcome the deadlock of

underdevelopment and achieve sustained growth. According to Prof. Amartya Sen, technology encompasses far more than the mechanical processes of transforming raw materials into finished goods. A broader perspective is required to understand technological problems. For instance, if social and economic conditions permit multiple-shift operations in factories but not in household production, this contrast becomes a relevant technological consideration. Similarly, when household production relies on domestic labour unavailable for factory work, the two forms of labour must be treated as distinct inputs, thereby complicating the technological comparison.

Prof. Sen also examines the concept of technical efficiency, widely discussed in the literature on resource allocation. A situation is technically efficient if it is impossible to move to an alternative that yields “something for nothing.” For example, suppose we produce a bundle of goods x using inputs y through technique A . If another technique B can produce more of one output without reducing any other output and without requiring additional inputs, then choosing A over B is technically inefficient. Likewise, if technique C can produce the same outputs while using fewer inputs, then A is again inefficient. Only when no such superior alternatives exist can a technique be considered technically efficient.

Efficiency, therefore, is the first step in evaluating technology: if a superior option exists, it should be adopted immediately. Yet determining whether alternatives like B or C are truly available is not straightforward. Availability does not simply mean the existence of blueprints; technologies can be discovered or invented through deliberate search. Moreover, the superiority of a technology is often judged by its profitability. Efficient technologies typically yield the highest level of output, and any shift to an inferior technique reduces productivity. Thus, technical efficiency is fundamental to measuring economic efficiency and plays a decisive role in shaping development strategies.

3) *Sub chapter 3- Employment modes and nonwage sector:* In this chapter, Prof. Amartya Sen examines the different modes of employment

within an economy. He identifies three major sectors—agriculture, manufacturing, and commerce—each of which contains diverse forms of employment. These can be classified into five categories: employers, unpaid family labourers, own-account workers, employees, and non-classifiable workers. Drawing on empirical data from the International Labour Organization (ILO) during the 1950s and 1960s, Sen demonstrates how participation rates across these categories vary significantly from country to country, reflecting differences in social and economic structures.

Beyond employment modes, Sen also discusses the concepts of supply prices of labour, real labour costs, workers' contributions, and their gains. His analysis highlights how labour is not only a factor of production but also a determinant of economic efficiency and social welfare. By examining both the structural composition of employment and the economic implications of labour costs, Sen provides a nuanced understanding of how employment patterns shape development outcomes.

B. Chapter 2- Some Measurement Problems:

This chapter comprises surplus labour and disguised unemployment and capital intensity and technology. And we are discussing these here.

1) *Subchapter 1- Surplus labour and disguised unemployment:* Surplus labour is a defining characteristic of underdeveloped economies. Theories such as the Lewis model and the Ranis–Fei framework explain how this excess labour can be mobilized for national development. In countries like India, large numbers of workers remain tied to agriculture, yet their withdrawal from the land does not reduce total output. These workers are therefore considered disguisedly unemployed.

Prof. Amartya Sen argues that employment must be assessed through three dimensions: the production aspect, the income aspect, and the recognition aspect. However, when applied to disguised unemployment, these aspects often conflict with one another:

- **Production Aspect:** Workers with negligible or zero marginal productivity, whose removal does not affect total output, are disguisedly unemployed.
- **Income Aspect:** A person working on family land who receives income—whether in food, shelter, or monetary form—is considered employed, even if his productivity is minimal. This directly contradicts the production view.
- **Recognition Aspect:** A worker may be disguisedly unemployed in both production and income terms, yet if he perceives himself as engaged in meaningful activity, he may not regard himself as unemployed.

Sen illustrates further complexities. For example, members of a joint family living in urban areas may receive income from land ownership without contributing to agricultural production. Such individuals cannot be classified as employed under either the production or income aspect.

Through these examples, Sen highlights the tensions between different criteria of employment determination. His analysis shows that unemployment cannot be defined solely in economic terms; it must also account for income distribution and personal recognition, making the concept of disguised unemployment multidimensional and contested.

2) *Subchapter 2- Capital intensity and technology:* This chapter focuses on the aggregation of capital and its role as a factor of production. Prof. Amartya Sen argues that the relationship between the value of capital and the value of consumer goods is closely tied to the rate of profit. The discussion also extends to the question of what constitutes appropriate technology in this context.

A central issue raised is the conflict of views regarding the choice of techniques in economies with abundant cheap labour. When one recommends adopting less capital-intensive techniques, the statement is essentially about *future investment decisions* rather than the existing stock of capital. Thus, the debate revolves around the proper technology that should be selected in an

economy, taking into account its level of capital intensity and labour availability.

Sen's analysis highlights the complexity of balancing capital efficiency with labour utilization, showing that technological choices are not merely mechanical but deeply embedded in the economic and social conditions of a country.

C. Chapter 3- Institutions, Technology and Labour:

In this chapter we are discussing about Dual labour market, Ownership classes and allocation, and Seasonal variations and employment.

1) *Subchapter 1- Dual labour markets:* A common feature of most developing countries is the existence of a dual labour market. Wage levels differ across sectors of the underdeveloped economy, and these disparities create dual structures within the labour market. In the case of non-wage labour markets, duality is defined by the *appropriate cost of labour*, which is determined by the rate of substitution between output and non-work that the labourer finds acceptable.

Prof. Sen points out that identical labour may sometimes be sold at different prices due to artificial distinctions. A striking example in India is the employment of highly educated workers in jobs that do not require such qualifications. This mismatch illustrates how dual markets can exist even when they are not immediately visible.

Through this analysis, Sen highlights the complexity of labour allocation in developing economies, showing that wage differences, social structures, and artificial barriers all contribute to the persistence of dual labour markets.

There are different causes of existence of these kinds of dual markets such as-

- Labourer's job preferences: The workers may like to work in their own farm than in towns with wage employment. And it is not irrational to work with a lower income in own farm than being wage slave in some factory with a higher yield.
- Indivisibilities in labour supply: A labourer could not spend half time in farm working and

half time in factory in a day due to location and organizational problem. Therefore, he has to choose any one for a long time due to indivisibilities in labour supply. Again, the high level of transportation costs including monetary and psychological costs of settling in many persuade the labourer to stick to his farm unless the reward in elsewhere is very high.

- Loss of share of family income: Since by disguisedly unemployed a person can get a share of family income which comes from farm, so the peasant in the question may have an economic incentive not to move, even when his marginal contribution to the family output is negligible or low.
- Lower legislation and union pressure: In many countries there is a labour legislation specifying a minimum wage for labour and if demand of labour falls short of supply of labour then also wage rate does not decline and due to union pressure also wage rate does not decline. So, we can get comparatively a higher wage rate than farm income.
- Employers' incentive for paying high wages: Since the cost of rapid labour turnover can be very high, so in some cases employers may be better off by paying higher wages. And we can get a difference between farm income and industrial wage income.

Now science for these reasons there is a dualism of market labour and the urban sectors provide higher wages than traditional, so there is a chance of migration of labourers from rural to urban sectors. If probability of getting higher wage employment in town (p) is higher than p^* then more and more worker will move to town otherwise not. Where, $p^* = y/w$ and $y =$ income of the person in the unorganised sector and $w =$ income in the high wage sector.

2) *Subchapter 2- Ownership, Classes and Allocation:* In this chapter, Prof. Amartya Sen discusses the different categories of labourers, their classes, and their allocation within the economy. He distinguishes between two broad types of workers: own labour and hired labour.

- Own Labour: These workers are engaged on land they own or rent. Within owned land, labour may take the form of peasant farming, where family members work collectively, or cooperative farming, where multiple families share responsibilities. Own labour can also operate under systems such as fixed rent or sharecropping.

- Hired Labour: These workers are employed through wage systems or, in some cases, bonded labour arrangements.

Through this classification, Sen highlights the diverse ways in which labour is organized and utilized in developing economies. His analysis underscores the importance of understanding not only the economic role of labour but also the social structures that shape its use.

3) *Subchapter 3- Seasonal variations and employment:* There is a conflict between the existences of surplus labour in agriculture when we consider the factor of seasonality. Science seasonality is a major factor in agricultural production, and it cannot be assumed that labour applied in the slack season is a perfect substitute for that applied in a busy season. And hence it has been argued that if the seasonality of the production process is taken into account, then surplus labour cannot exist. Thus, if labour is withdrawn from agriculture, then output will be diminished. But Prof. Sen has argued that the amount of labour supplied in different periods to the year is perfectly substituted to each other and hence there exists surplus labour.

But we cannot replace a day's work at harvest time by a day's effort at sowing time and hence the view of Prof. Sen comes in the question of criticism.

To make a critique firstly consider that x be the amount of labour time that an individual can put and x^* be the maximum labour time that an individual can put in. Now if $x \leq x^*$ then total output Q cannot be affected by withdrawn of some labourers and there exists surplus labour.

But the crucial difference rests in Stiglitz's assumption that in at least one of the seasons of the year, each person is already doing maximum work that he possibly can and this combined with the fact

that labour applications in different seasons are not perfectly substitute and immediately produces the no surplus labour consequence.

If we consider the income aspect then we can say that there does not exist surplus labour even if peak agricultural season and this result may have conflict with production aspect. In agricultural peak season some members of family who live outside come to the family for helping other members but this would not increase total output and hence these are surplus labourers according to the production aspect but since these persons have a share of family income, so there does not exist surplus labour according to the income aspect.

D. Chapter 4- Policy Objectives and Employment:

In this chapter Prof. Sen has discussed about the employment objective and Employment in the long run. Let us discuss these concepts one by one.

1) *Subchapter 1- The employment objective:* Prof. Sen have argued that there are mainly three aspects of employment: production aspect, income aspect and recognition aspect. In this chapter Prof. Sen has discussed about the objective of employment. That means how employment should be regarded as a benefit or as a cost? In one hand employment gives someone a certain level of income and also an establishment and satisfaction. Thus, we want that more persons should be employed but on the other hand employment also finds that how much out is produced that means what is the real labour cost? Since employment gives someone an establishment in the society, so it is argued that why they receive income instead of paying for being employed? In some societies these luxuries can also be seen. But in general, since people are giving services when they are employed so they receive an income. Therefore, employment gives output to the nation for consumption and also earning and establishments to the individuals for being employed. Employment, therefore, serves a dual purpose: it contributes to national production and consumption, while also offering individuals

income, recognition, and social establishment. From a policymaker's viewpoint, employment has additional positive consequences. Worklessness can lead to vagrancy and crime, which impose significant social costs. Similarly, the expansion of female employment can act as a powerful force for social change, challenging traditional norms and fostering progress.

Sen's analysis makes clear that employment involves far more than production and income alone. It is a multidimensional phenomenon, deeply tied to social stability, personal fulfilment, and broader developmental goals.

2) *Subchapter 2- Employment in the long run:*

In this chapter it is discussed that what is more essential, employment in today or in tomorrow? Yes, simply it is a choice, since tomorrow's employment depends on the growth of productive capacity which again depends on today's employment level. Let us consider the consequence of applying a unit of labour which contributes less to output than the wage that is to be paid to it, i.e., $q < w$. Thus, increase in consumption is higher than increase in output and clearly the volume of investible surplus is now lower, so the growth of future productive capacity is less and given other things the future output and employment will be lower as well. Thus, in this chapter Prof. Sen has discussed about the conflict of choices between present and future employments and also between their interrelations with consumption and investment in present and future and also about this composition.

E. Chapter 5- Economic Evaluation:

This chapter contents the concept regarding shadow prices and resource allocation, the valuation of labour and hence we are discussing these one by one.

1) *Subchapter 1- Shadow prices and resource allocation:* In developing economies, labour should not be valued at its market price but rather at its **shadow price**, which reflects its true economic worth. Resource allocation in such economies is therefore based on shadow prices. In this chapter, Prof. Amartya Sen compares and

contrasts different interpretations of shadow pricing.

- **Programming and Duality:** Shadow prices can be derived from optimization problems. When maximizing an objective function subject to concave constraints—including one that represents the excess supply of a resource—the shadow price is the implicit value of that resource.
- **Decision-Making Signals:** Shadow prices act as signals for decentralized managers or project evaluators. If communicated effectively, they guide decision-makers toward choices that maximize the planning objective within given constraints. In this sense, shadow prices are those values that lead to an optimal programme when shadow profits are maximized.
- **Market Equilibrium:** Shadow prices may also be understood as the set of prices that equate demand and supply in a perfectly competitive market.
- **Adjustment Mechanism:** Finally, shadow pricing can be seen as a tool to adjust results in the right direction. In this view, the exact values of shadow prices may be chosen somewhat arbitrarily, serving more as corrective signals than precise measures.

Through these perspectives, Sen highlights the complexity of shadow pricing and its central role in resource allocation. Shadow prices are not merely theoretical constructs; they are practical tools for guiding investment, policy, and development strategies in economies where market prices fail to capture the true social cost of labour and resources.

2) *Subchapter 2- Valuation of labour:* Here the author has pointed out that what is the exact valuation of labour. If someone is employed in the enterprise and hence output of the project is q and the wage paid to the person is w , then $(q-w)$ is the project profit and here the person gains because his income rises from y to w , here he gets y amount of income when he was involved in family business

and contributes m unit of effort here. Therefore, he gets $(y-m)$ amount of income as reward from joint family that is they are giving y and getting back m . Therefore, from the discussion it is clear to us that in this chapter Prof Sen has discussed about the true value of labour what an individual gives and how much this contribution produces and what he earns from this contribution.

III. ANALYSIS:

Prof. Amartya Sen's *Employment, Technology and Development* provide a profound exploration of the interrelations between employment, technology, and development strategies in underdeveloped economies. The book offers both a conceptual framework and empirical insights, making it a valuable contribution to development economics.

- **Conceptual Framework:** Sen explains how existing technological knowledge can be harnessed as an employment strategy. He emphasizes that employment must be understood through three aspects—production, income, and recognition—highlighting its multidimensional nature.
- **Empirical Relevance:** The book addresses the practical problem of measuring unemployment in India, showing how definitions and determinants of employment vary across countries. Sen's use of ILO data from the 1950s and 1960s illustrates differences in employment modes and participation rates, grounding his analysis in real-world evidence.
- **Determinants of Employment:** Sen explores the various shades of unemployment—disguised, surplus labour, dual labour markets—and stresses that the actual determination of employment requires careful consideration of productivity, income, and recognition.
- **Technology and Policy:** A major contribution of the book is its discussion of appropriate technology for developing countries. Sen argues that technological choices must reflect labour abundance and capital scarcity, and he examines conflicts between capital-intensive and labour-intensive techniques.

- **Labour Allocation and Shadow Pricing:** The book also delves into resource allocation, showing how shadow prices, rather than market prices, should guide decisions in developing economies. This provides policymakers with tools to evaluate efficiency and equity in labour use.

Social Dimension: Beyond economics, Sen highlights the broader consequences of employment. Worklessness can lead to social problems such as vagrancy and crime, while expanding female employment can drive social transformation.

Amartya Sen's *Employment, Technology and Development* can be meaningfully connected with other major development theories such as Lewis's dual economy model (1954), the Ranis–Fei (1961) surplus labour framework, and the Harris–Todaro migration model. While Lewis and Ranis–Fei emphasize the transfer of surplus labour from agriculture to industry, Sen adds depth by redefining employment as not only income but also production and social recognition, and by stressing the importance of choosing technologies appropriate to labour-abundant economies. Similarly, Harris–Todaro's (1970) focus on rural–urban migration and expected income differentials complements Sen's concern with unemployment measurement and the impact of technology choices on labour absorption.

Again, Sen's reflections on employment and technology are firmly anchored in a broad intellectual tradition that spans historical analysis, theoretical modelling, and policy strategy. Bagchi's (1972) study of private investment in India provides the empirical backdrop for understanding how capital formation shaped labour absorption, while Bardhan's (1969) model of machine obsolescence highlights the dynamic tension between innovation and employment. Hirschman's (1958) linkage theory underscores the strategic choices that determine whether technology fosters inclusive growth, and Myrdal's (1968) *Asian Drama* situates these debates within the larger structural challenges of poverty and inequality in developing nations. Nurkse's (1953)

insights into capital formation stress the constraints faced by underdeveloped economies, and Schultz's (1961) pioneering work on human capital investment reminds us that technological progress must be matched by investments in people. Taken together, these contributions enabled Sen to argue that development policy must consciously integrate employment creation with technological and investment decisions, ensuring the broader discourse on inclusive growth.

Although largely analytical, the book also deals with empirical problems of unemployment measurement in India, making it both theoretical and practical. Sen's work remains highly relevant, as many developing countries continue to grapple with surplus labour, technological choices, and mismatched employment structures. By integrating economic theory with social realities, the book provides a holistic understanding of employment as both an economic necessity and a social institution.

IV. CONCLUSION:

By examining Prof. Amartya Sen's views on employment, technology, labour classifications, modes of production, and the valuation of labour, it becomes clear that this book provides a comprehensive framework for understanding these critical issues in developing economies. Through small yet insightful examples drawn from everyday realities—examples that are often overlooked—Sen helps us grasp the true measurement of employment, the relevance of appropriate technologies, and the complexities of labour allocation.

This book is therefore highly valuable in clarifying our perspectives on these subjects. At the same time, it must be noted that Sen's arguments have sparked debates and conflicts with other economists, reflecting the richness and diversity of thought in development economics. Such disagreements only enhance the importance of the

book, as it challenges conventional views and encourages deeper reflection on how employment and technology should be understood in the context of national development.

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