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A Relationship Between Economic Growth And Human Development : An Analysis Of Cross-Country Experienes

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INTRODUCTION

The ultimate aim of development is to improve human well-being in a substantial and sustainable way. The trend of human development along with the economic development thus, is the main concern of many developing countries. Progress has been made in all the major world regions. Globally, real GNP per capita has increased by more than 3 percent a year on an average since the mid-1960s and in developing world, the increase is on an average 3.5 percent a year during the period 1960-93 (WB 1996). In human development front, improvement has also been made in almost all developing countries. The world today is healthier, better educated and better fed than it was some three decades ago. In fact, developing countries have made much more progress in human development than income increment. Between 1960 and 1993 life expectancy in developing countries has increased by more than a third—from 46 to 62 years at birth. Similary, the average infant mortality fell by more than half-from 150 to 70 per thousand live births; and population with access to safe drinking water almost doubled—from 36 percent to nearly 70 percent. Improvement has also been seen in the field of education—net enrollment ratio increased from 48 to 77 percent at the primary level and from 35 to 47 percent at the secondary level during 1960-91 (HDR 1996). But these achievements are spread very unevenly over the world with vast discrepancies across regions and countries. Some regions, especially sub-Saharn Africa and South Asia are still lagging far behind others. In sub-Saharan Africa, life expectancy is particularly low as compared with other world regions, and infant mortality is very high. Similarly, in South Asia, more than half of the children under 5 are underweight and adult literacy of 48 percent is lower than in any other regions. The most striking fact is that the variation in these indicators

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across the regions was less marked in 1960s than it is now in 1990s. Besides these discrepancies, economic growth has alos been spread very unevenly over the past three decades—the ratio of the global income shares of the richest 20 percent and the poorest 20 percent increased from 30:1 to 60:1. Poverty remains pervasive. More than a quarter of the developing world's people still live in poverty—about a third, 1.3 billion people live on incomes of less than US $1 a day. South Asia has the most number of people in poverty, about 515 million (HDR 1996). Despite substantive economic and social progress in the past few decades, there is still much human suffering and the links between growth and human development have failed in the many countries as a result of lopsided development. Thus, the challenges of development and human development are not the same across all regions and countries. Development may come about in a variety of ways but different types of development process may have entirely different effects on people's lives and on poverty. Development entails not only material wealth and its distribution, but also progress in education, health, nutrition and in many other social dimensions of life. In this context, the large and growing literature on the relationship between economic development and human development has produced both optimistic and passimistic views. Development economists have emphasised the complementarities and trade-offs between these twin objectives of development. The question of who benifits from development and how development is related to the well-being of the people is again becoming the central focus of development analysis. The development experience, thus underlines the need for paying close attention to the link between economic development and human development.

MEASURING HUMAN DEVELOPMENT

Development is a more general term and is associated with societal change, encompassing the political, economic and social dimensions of life. However, economic development, as used here, is considered to entail economic and human development both. It is well recognised that per capita income is not the same thing as human development, although it is relevant to the latter. As such, development in this paper refers to the increases in per capita GDP or GNP, as conventionally measured, but the concept of human development is much broader and deeper than what can be captured in any index or even by a detailed set of statistical indicators. Differences in countries' human development may reflect in part due to differences in the social indicators used. Thus, the concern of measuring human development is to decide which indicators to include and which to leave out.

In this regard, an early attempt to consider issues other than per capita income was made by McGranahan et. al. (1972). In their poineering efforts at United Nations Research Institute for Social Development (UNRISD), they examined several development indicators—some relating to mortality and morbidity, others to such social factors as urbanisation and still others to economic factors. This perspective leads to a consideration of various indicators—such as infant mortality rate, life expectancy at birth, literacy rate, access to safe drinking water, per capita GDP, etc. — which are declared to be core indicators. With these long list of indicators, the important issue is whether these different indicators could provide different aspects of development performance. Moreover, there remained the problem of combining these various indicators into a single measure, in analogy with income.

Another effort in measurement was made by the Washington-based Overseas Development Council (ODC). In response to this, M.D. Morris (1979) put forward the Physical Quality of Life Index (PQLI), Which is an aggregation of three widely available indicators of the basic human needs variety: life expectancy, infant mortality rate, and literacy rate. But Larson and Wilford (1979), for example, using simple correlation coefficients, argued that the PQLI was redundant in that it ranked countries in a statistically indistinguishable fashion to GNP per capita (McGillivray and White, 1993). Obviously, there is considerable overlap between the first two indicators—life expectancy and infant mortality—particularly for developing countries, as they both relate to longevity and are connected by a precise relationship.

Similarly, a most recent attemt was made by UNDP (HDR 1990) to capture both means and ends aspect of human development, and put forward the human development index (HDI). The HDI is a composite index which combines measures of life expectancy, literacy and per capita GNP. In attempting to measure human development, UNDP argues that, even if sufficient data are available, it may not be desireable to include all indicators or variables in the construction of an index, as the result would be a perplexing picture. Thus, three factors, longevity, knowledge and income. are specified as the variables to enter the index.

Still a problem with these studies is ambiguity over the extent of statistical association, as measured by a correlation coefficient, that actually determines one variable redundant with respect to another. For example, McGillivray and White (1993) concludes that the HDI to be largely redundant vis-a-vis GNP per capita at varying degrees for various country samples. However, they show the HDI is least redundant, and therefore, make its greatest contribution to assessment of inter-country development level, when used to compare broadly similar groups of countries.

In general, human development concept has been viewed by all as conceived by human development reports. However, the HDI (HDR 1990) has been re-calulated by excluding the effect of income on other two variables—which also allow to assess how effectively countries convert income into human capabilities. Thus, the human development is proxied by the two widely used and readily available indicators—life expectancy at birth, and adult literacy rate, which are the key components of human development. Further, it is seen that the longevity is not only intrinsically valued but it is also a precondition for achieving other goals and it is correlated with other factors. That is to say, life expectancy is an outcome variable of many other human development indicators, such as access to health facilities, safe drinking water, nutrition, etc. As for example, reductions in infant mortality rate or under five mortality rate usually reflect improvements in nutrition as well as achievements in educaton, especially female literacy, which in turn, contribute greatly to higher life expectancy. Furthermore, it is an end itself, that needs no further justification. Similarly, literacy is basic to virtually all learning, it is a necessary componet of human development. It is a means of lower reproductivity and higher productivity, which is also correlated with many other human development indicators, such as fertility rate, maternal/child mortality rate, nutrition level and health status. Thus, it is viewed that the selected indicators are well enough to reflect the human development, as both the indicators are readily available and closely correlated with other human development indicatorts.

CROSS-COUNTRY EVIDENCE

Broadly speaking richer countries do possess a higher level of human development, since higher levels of income may provide resources needed for their welfare expenditure, thus, they are more likely to avoid illiteracy, hunger and poverty. In short, the basic human capabilities such as life expectancy and literacy tend to be higher in richer countries than in poorer countries. This may lead one to think that economic development is the key to human development and economic development should be at center stage in discussion of how to promote human development in poor countries. But the data show that countries with similar levels of income can have very different level of human development, thereby denying any inevitability of the development process impacting favourably on human development. Of course, economic development may generate higher incomes, but will not necessarily translate into human development. Several countries attained better social improvements even without achieving high income levels. Thus, the GNP per capita caputures only one element of the development process, not its entirety.

This can be seen from the fact that the ranking of countries by a conventional income measure do not always match with ranking by human development index. From the comparison between the ranking, it is clear that human development ranking of countries measured by the HDI (1996) differs significantly from their income ranking, as reflected by real GDP per capita in PPP US $. This indicates that many countries are in the category of high human development despite their low per capita income status, while many others are in the lower or medium human development category despite having higher income levels. Some examples of this are shown in Table 1.

Table 1

Human Development Rank

Similar Income but Dfferent Human Development 1993			Similar Human Development but Different Income 1993		
Countries	Real GDP per Capita (PPPUS$)	HDI Idex	Countries	HDI Idex	Real GDP per Capita (PPPUS$)
Kuwait	21,630	0.76	Spain	0.91	13,660
Canada	20,950	0.94	Switzerland	0.90	22,720
Spain	13,660	0.91	Greece	0.88	8,950
Saudi Arabia	12,600	0.67	Italy	0.88	18,160
Oman	10.420	0.59	Armenia	0.86	2,040
Korea, Rep. of	9,710	0.84	Luxembourg	0.85	25,390
Dominica	3,810	0.83	U. Arab Emirates	0.81	20,940
Egypt	3,800	0.60	Sri Lanka	0.80	3,030
Georgia	1,750	0.83	Malaysia	0.76	8,360
Senegal	1,710	0.36	Kuwait	0.76	21,630
Viet Nam	1,040	0.74	Saudi Arabia	0.67	12,600
Nepal	1,000	0.42	Cape Verde	0.67	1,820

Source : Human Development Report 1996: Table 1.

Table 1 shows the fact that countries can have similar income levels but very different level of human development. The differences between rankings highlight the far from perfect correlation between income and human development in many countries. More specifically, higher income does not guarantee higher level of human development and vice-a-versa.

LONG TERM PATTERN OF ECONOMIC DEVELOPMENT AND HUMAN DEVELOPMENT

Although there is not a perfect ralationship, economic development may be seen to have a positive impact on several human development indicators. At the same time, human development is an important determinant of the rate of development. Thus, the two can be seen to be mutually reinforcing.

In the long-run, economic development and human development generally move together and tend to be either mutually reinforcing or stifling. That is, the record of economic development and human development over the past three decades shows that a country cannot follow a course of lopsided development or vice-a-versa.

High level of human development helps to promote economic development which in turn, can promote human development. Conversely, weak human development is likely to result in low development further undermining the prospect of future human development. Thus, the strength of a chain depends on the strength of each link. Basically, there can be four types of links that a typical country can follow: Strong Link (high HD-high ED), Weak Link (low HD-low ED), and Unbalanced links (high HD but low ED called HD-lopsided), high ED but low HD, (called EG-lopsided). Here, the weak link does not mean that the association between the relationship is still strong but both the indicators are at the lower level. In fact, the terminologies are taken from the Human Development Report 1996.

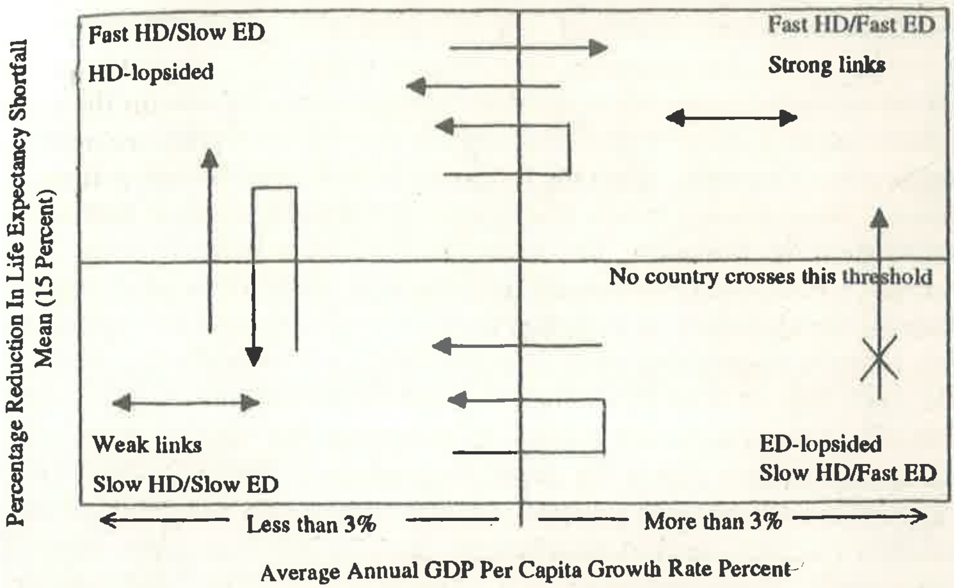
Human development and economic development with the average performace of the developing coutries appear as either strong links or weak links; a significant number fall in HD-lopsided category, and very few in ED-lopsided one. The strong links countries enjoyed rapid improvements in both human and income development sustained over three decades in a mutually reinforcing virtuous circle—resources generated by economic developement have finançed human development. The weaklink categories, both economic development and created employment, while human development has contributed to economic development. The weak link categories, both economic and human development are at low levels, one undermining the other (i.e. mutually stifling). Without economic development resources needed to invest in human development are lacking—and with poor standards of health, education and nutrition, rapid economic development becomes very difficult. Thus, weak links can provoke a vicious circle, or at least result in lopsided development. Similary, unbalanced links may result lopsided development in two ways: a) good economic development but slow human development (i.e. ED-lopsided). In this category links become unbalanced in translating economic development into human development due to, for example, low social expenditure ratio, and b) rapid human development but slow economic development (i.e. HD- lopsided). In this category, resources are directed towards the welfare of the people and appropriate public action is adopted to improve human development, but there is lack of opportunities, especially employment, to absorb the increased supply of human resources.

Countries in the unbalanced link are more likely to be transitional. Put differently, coutries with strong or weak links may continue on the same tracks for a long period, but countries in an unbalanced links are unlikely to persist, either move toward strong links—appropriate policy action can propel economic development and human development so that both move forward in a dynamic and mutually reinforcing way; or move toward weak links—social or political upheaval may well lead to decline in both economic and human development. Thus, either the weak partner in the linkages or cycle eventually acts as a break on the partner , leading to a weak link, or if the linkages are strengthened, leads to a strong link. However, the important issue for policy purposes is how a country may move across different linkages. Much can be learned about this by looking at the ways in which countries have moved across over time.

The decade-by-decade changes in economic development, as reflected by average annual GDP per capita growth rate percent and human development, as measured by the percentage reduction in life expectancy shortfall measures for selected developing countries (Figure 1) shows a general trend with respect to human development and economic development over the three decades. Countries having high human development in each of the three decades may well achieved higher growth. On the contrary, countries with low human development could not achieved high economic development and even if development occurred in one decade, that could not sustained in the next decade. In fact, the Figure 1 is a very simplified version of the general trend that observed from the decade-by-decade performance of countries, in which each arrow-head denote the movement of countries from one quadrant to another during the course of development. The Vertical and horizontal grid lines in the figure represent the average performance for the period.

Figure 1

Long Run Movment of Countries With Respect To Human Development And Economic Development



Source : Adapted by the Author Based on HDR 1996.

Note : In the Figure 1, the vertical line, which demarks Fast and Slow growth, is drawn at 3 percent since it is assumed that 3 percent GDP per capita growth is the rate that would double per capita income in a generation; and the horizontal line, which demarks Fast and Slow human development, is arbitrarily drawn at approximate mean value of 15 percent of the data included.

It summarises the movements of countries over the three decades 1960-70, 1970-80, and 1980-93 with respect to economic and human development. Despite substantial variation in countries' exact movement patterns, the figure can be broadly interpreted as follows. Countries such as South Korea, Hongkong, Singapore, Thailand, Malaysia, enjoyed the high economic development and high human development in each of the three decades from 1960-93, showing a strong regional pattern, with East Asia heavily represented in the strong links quadrant; others have experienced low economic development and low human development over the same period, showing another strong regional pattern, with sub-Saharan African countries heavily represented in the weak links qudrant. These countries started with very low levels of human development, handicapping their development. They stayed in the same quadrant throughout the period, i.e. moved only within the same quadrant, indicating the similar point that countries in strong or weak links are likely to be persistent over long-run. But a number of countrie moved across different quadrants of human development-economic development relation over the three decades. Countries achieving fast human development with only slow economic development in one decade may well increase their economic development in the next. For example, HD-lopsided countries like Indonesia, China, and Chile moved to strong link quadrant—early progress in human development meant that they were able to take advantage of policy reforms in generting development. Similary, Colombia, Tunisia and Turkey also moved from HD-lopsided quardrant in the following decades. All these countries were unable to maintain the rate of economic development mainly due to the depressing effects of the 1980s debt crisis on growth and economic policies, so that they could not enjoyed the mutually reinforcing virtuous circle despite having high human development. Many countries, e.g. Argentina, Bolivia, Madagascar, Malawi, Morocco, Sri Lanka, India, Bangladesh, moved from weak links to HD-lopsided quadrant and only Argentina fell back to weak links quadrant. Countries such as Egypt, Philippines, Trinadad and Tobago moved from weak links to strong links quadrant, but no one could managed to sustain and subsequently fell back to HD-lopsided quadrant. Countries which were ED-lopsided in 1960-70 e.g. Tanzania, Papua New Guinea, Togo, none stayed in that quadrant throughout, but all moved into the weak links quadrant. Some countries, such as Brazil, Kenya, Nigeria, Paraguay, Uruguay managed to improve relatively fast growth and moved from weak links to ED-lopsided quadrant in one decade, but they did not utilise this opportunity to improve the levels of HD substantially and again fell back into weak links quadrant in the next. This indicates the fact that countries having only fast development with slow human development tend to experience slower development in the ensuing decade. Further, the lopsidedness is most likely a temporary phenomenon, as the case shows that no country stayed throughout in the lopsided quadrant. The countries' experiences show that HD-lopsidedness permitted movement towards strong links, but in the case of ED-lopsidness, all the cases reverted to a weak link or vicious circle. That is, this proved that the lopsidedness titled against human development is a dead end, and hence, human development must be strengthened before a virtuous circle can be attained. The important point is that no country manage to move directly from ED-lopsided quadrant, lower right quadrant, to strong links quadrant, upper right quadrant—the lesson learned is that human development must be strenthened to attain sustained economic and human development.

CONCLUSION

The relationship between economic development and human development over the long-run is varied and includes strong link—countries enjoyed rapid improvements in both human development and economic development over long run, weak link—low levels of both human and economic development, one undermining the other, human development lopsided—unbalanced with high human development but low economic development and economic development lopsided—unbalanced with high economic development but low human development. Countries can move from one type of relation to another during the course of development, especially those in the lopsided one. It has been found that lopsided relationships almost never persist over time. Over the long-run, countries that have high human development have a good chance to improve its economic development and can well move towards sustained overall development, i.e. strong links. But countries which are initially economic development lopsided, always eventually reverted to weak links mutually stifling vicious circle, as no country accomplish sustained economic development and human development directly from this category. Thus, human development must be strengthened to attain sustained development. The analysis of the causal relation between the economic development and human development suggests that countries which have given high priority to human development, have performed relatively better in terms of economic development whereas reverse is almost never true.

In the long-run, economic development is also crucial for determining whether countries can maintain progress in human development. A commonsense point is that economic development accompanied by improvements in human development is generally the most effective way to sustain overall development. Thus, there is no disagreement that ideally both human development and economic development should be jointly promoted, but the important point is that human development should be given priority where a choice is necessary. However, the policy-makers should not be mesmerised by the quantity of growth. They need to be more concerned about the human development dimensions in designing policy stategies rather than simply advocating development regardless of its structure, quality and implications. Policy reforms which focus only on economic development are unlikely to succeed. Thus, to ensure that the links work efficiently and effectively in both directions i.e. from human development to economic development and from economic development to human development, they need to understant the nature of these links. Moreover, whenever either or both links are weak, it is important to indentify where the links are, in order to devise the appropriate policies to strengthen such links. Policies should also be viewed in the context of a changing development environment. For example, the promotion of primary education may be appropriate at an early stage of development, while the promotion of secondary and vocational may be more appropriate at a later stage of development.

Generally, a basic level of human development must form the foundation of the process of economic transformation and sustainable development. Experiences suggest that no country undergoes a structural transformation of the economy without rising basic human capabilities. Thus, countries with weak links need a major efforts to generate and accelerate development through investment in human development. But human development alone cannot transform the economy. Human development efforts in the context of weak economic development may result in an educated but frustrated and unemployed youth, which may be socially dangerous. This implies that awareness of conditions governing both the supply of, and demand for, human capital are equally important. The admirable growth record of East Asian countries can be in part attributed to its wide pool of skilled human resources which absorbed in al labour demanding, export oriented sectors.

Finally, human development programmes must be carefully chosen and efficiently carried out. These programmes may be very costly and unsustainable, thus emphasis on low costs and targeting should be buit-in at the initial stage of programme design. It may well be that what is required is pruning of other unproductive expenditures, e.g. military expenditures to compensate for these programmes. Thus, effective development strategies require resources to be better restructured and reallocated Specifically, priority should be given to shifting resources away from services that mostly benefit the well-to-do. For the poor countries, this is likely to involve facilitating a better balance between curative hospitals and primary health care, between universities and primary schools, and between focusing attention on the cities and on the rural areas—where the majority of poor people live. Reallocations of this type require strong political will since the opposition to such reallocations are likely to be strong in developing countries.

SELECTED REFERENCES

Anand, S. and Amartya K. Sen (1994) *Sustainable Human Development: Concepts and Priorities,* Occasional Paper No. 8; Human Development Report Office, UNDP.

Birdsall, N., D Ross and R. Sabot (1995) "Inequality and Growth Reconsidered : Lessons from East Asia", *Economic Review,* Vol. 9, No. 3, pp. 477-508, World Bank, Washington D.C.

Dasgupta, Ajit K. (1988), *Growth, Development and Welfare: An Essay on Levels of Living,* Basil Blackwell, Oxford, New York.

Doessel, D.P. and Rukmani Gounder (1994) "Theory and Measurement of Living Levels; Some Empirical Results for the Human Development Index" *Journal of International Development,* Vol. 6, No.4,pp.415-35.

Hisk, Norman (1980), *Economic Groth and Human Resources,* World Bank Staff Working Paper No. 408, The World Bank, Washington D.C.

Isenman, Paul (1980) "Basic Needs: The Case of Sri Lanka", *World Development,* Vol. 8, pp. 237-58.

McGillivray, Mand H. White (1993) "Measuring Development ? The UNDP'S Huma Development Index", *Journal of International Development,* Vol. 5, No. 2, PP. 183-92.

McGranahan, D.V.C. Richand-Pronst, N.V. Sovani and M. Sabramanian (1972) *Contents and Measurement of Socio-economic Development,* Praeger, New York.

Morris M D (1979) *Measuring the Condition of the World's Poor: The Physical Quality of Life Index,* Pergamon, New York.

Ravallion, M. (1997) "Good and Bad Growth: The Human Development Report", *World Development*, Vol. 25, No. 5, PP 631-38, WB, Washington D.C.

Streeten, P. (1994) "Human Development : Means and Ends", *American Economic Review*, Vol. 84, No. 2, pp. 232-37.

UNDP (1990) *Human Development Report 1990*, Oxford University Press, New York, Oxford.

UNDP (1996) *Human Development Report 1996*, Oxford University Press, New York, Oxford.

World Bank (1996) *World Development Reports 1996*, Oxford University Press, New York.

—— (1997) *World Development Report 1997*, Oxford University Press New York.

—— (1993) *The East Asian Miracle : Economic Growth and Public Policy*, WB, Oxford University Press, New York.

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BOOK REVIEW

Roberson, Adam and Shisham Mishra (1997) *Forced to Plough : Bonded Labour in Nepal's Agricultural Economy,* Anti-Slavery International, London and Informal Sector Service Centre, Kathmandu, pp. xii + 98 plus Glossary and Index Including Appendices. Price NRs 100.

This readable and infomative book discusses poverty and the age old caste system which have created a vicious- circle of debt bondage regarding some of the most exploited groups of rural workers in Nepal and explains the conditions which have promoted this mechanism. Organised into four parts, the book also depicts a comparative picture of bonded labour situations of India and Pakistan with that of western hills of Nepal. A brain- storming discussion is presented, with urgent necessity for effective measures recommended to the government, nongovernmental organisations and international donor agencies, for the abolition of bonded and forced labour.

The very opening of the book is a conclusion of the situation in that "Behind its image as a beautiful country for foreign visitors, life in rural Nepal is hard. Women bend double with their loads, toil up the mountain paths, carrying fodder for the animals or manure for the fields. Men, barefoot and weather - beaten, work long hours with ox and plough, using age - old farming methods" (p.v).

The irony is that "...powerful families still control rural society in large areas of the lowland plains and make use of bonded and forced labour from the villagers who live on their estates... the exploited group, powerless to initiate change, have known no other way of life and have little option but to accept the status quo" (p.v). The authors point out that this situation continues despite the fact that slavery was officially abolished in Nepal in 1926 and the country is a signatory of the UN convention on the abolition of slavery of 1956. Contrary to the government's assertion that the problem of debt bondage is limited to few thousand people in only five districts of Nepal, the authors claim that the problem of bonded labour exists much widely throughout the rural areas of the country.

The first part of the book deals with caste-based system of bonded labour, mainly the *haliya,* (who plough land for landlords) in the western hills, then the authors explain their survey findings for *kamaiya* (the bonded labour) in the western terai. The seasonal labour obligation to the landlord in the form of semi-bonded is also explained. The slavery-level wage rates for women and children are pointed out while explaining the hardships associated with these groups of people who are exclusively dependent on land which does not belong to them, for their survival. The situation is alarming in that "...the child inherits the burden of a debt even at below the age of 10" (p.26) and thus children became extremely vulnerable to the worst form of exploitation.

The second part of the book identifies the root causes of bonded labour and the power structure which keeps the system continuing. The feudal legacy of landownership types are discussed, the failure of land reform (1965) pointed out and the process of marginalisation and landlessness are highlighted. The authors point out that "most farming is for subsistence (in Nepal) and of the 2.74 million households owning some land, approximately 70 percent own less than one hectare" (p.37). The ineffectiveness of civil code in the abolition slavery are also pointed out (p. 44).

The authors show concern about how amazingly little interest the government has shown towards addressing this crucial issue in the agrarian society of Nepal in part III. Similar features of such bonded labour system in India and pakistan are highlighted and the NGO efforts are described critically.

What makes the book particularly interesting is its clear cut implication-oriented recommendations to directly address the situation details listed in part IV. Commitment needed on the part of government is stressed, with other recommendation regarding enforcement of the already exisiting Acts, with rehabilitation measures and land reform, minimum wage, credit facilities and the need for NGOs to compaign against slavery. The book with actual cases presentation arranged in the boxes in the text further illustrates how painful is the life of bonded labourers and thus stimulates the readers towards serious thinking on the subject. The book certainly deserves wide reading by policy-makers-implementation agencies experts, etc. The price of the book makes it accessible to common readers as well as students.

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