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CENTRE FOR FORMATIVE AND OPERATIONAL RESEARCH (RESEARCH PROMOTION COUNCIL) SREE NARAYANA COLLEGE CHERTHALA, KERALA, INDIA



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(Editorial)

Troubled waters are what seem to be awaiting human race in the near future. What with scientists predicting climate changes and frequent natural disasters, the world needs to work together for possible solutions. It is time to move beyond specializations and forge bridges between disciplines. There is an imminent need for new kinds of knowledge and methodologies, and among the most cited of these is the concept of transdisciplinary research.

The emerging trans-disciplinary approaches take us beyond water tight compartments of mono, multi and interdisciplinary realms of knowledge. The very word trans itself is multidimensional -- it refers to that which is between, across, outside and beyond all disciplines, thus hinting at a limitless horizon to explore. And explore we must, in order to overcome the obstacles that man himself has thrown across his path.

Contemporary environmental, economic and societal issues faced by the world have to be solved. The fact that people work together to address these challenges is heartening to note and delivers an important message. It is vital that scientists and laymen sit together, frame questions and problems and communicate in a language that is understood by all. It is high time we adopt a communication strategy that is not just about sharing the information but applying it smartly. Such approaches can result in novel, unexpected answers to many a familiar question. Transdisciplinary research moves beyond bridging isles within academia to engage with the production and use of knowledge outside the academia. While both inter- and trans-disciplinary research offer great hope for bringing holistic, out-of-the-box thinking to an increasingly-specialized workforce of experts, it is necessary to outline some of the main roadblocks for the effective execution of these approaches in social and environmental research.

Principal

Dr. K, B. Manoj

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Guidelines to the authors

Academic Spectrum is a Multidisciplinary Peer Reviewed Annual Research Journal of Sree Narayana College, Cherthala, Alappuzha devoted to the publication of original research papers in all disciplines. Manuscripts should be submitted through e-mail, addressed to

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Title: Manuscript title should be a brief phrase describing the content of the paper.

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Manuscripts for submission should not normally exceed 15 pages of typing. The font shall be Times New Roman and the font size for titles shall be 14, and the font size for the body of the article shall be 12.

AGROCHEMICALS AND RICE CULTIVATION IN KUTTANAD

¹K. Shiny Sreedhar and ²Aswathi, S. R.

¹Sree Narayana College, Chengannur, Alappuzha, Kerala. ²Sree Narayana College, Cherthala, Alappuzha, Kerala.

Abstract

The major occupation in Kuttanadu, a low lying area in the southern end of Vembanad Lake, is farming. Farmers depend on various agrochemicals such as pesticides, synthetic fertilizers and other chemical growth agents to increase farm productivity. The fertilizer acts as a direct input in production, and the pesticide as an external factor, which decide the level of production. These chemicals have high pollution potential which results in significant environmental and health risks. In the present investigation the agricultural methods practised and the intensity of the use of various agrochemicals in the development of paddy cultivation in Kuttanad are surveyed based on a scheduled questionnaire. The study revealed the indiscriminate use of pesticides and chemical fertilizers for increasing the productivity in paddy fields.

Key Words: Kuttanad, agrochemicals, factamfos, survey, pesticides.

Introduction

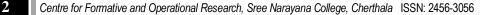
A vast majority of the population in Kerala is engaged in agriculture. The total area under paddy cultivation is about 16.58 percent of the total area under crop in Kerala. The region has also helped the state to retain its relatively better position in rice productivity at the all India level. Rice accounts for nearly 95 percent of the total amount of food

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grains produced within the state. Almost all of the paddy growing lands in Alapuzha, Kottayam and Pathanamthitta districts lie in Kuttanad region.

The increased production of crops per unit of land area require the proper management of farm. Greater attention is given to such matters as farm operations, cropping systems, fertilizer and pesticide applications, the keeping of farm records, etc. (Wortman and cummings,1978). Kerala Agricultural University (KAU) has developed a complete package on rice management by giving recommended dose of organic and inorganic fertilizers, weedicides, pesticides, etc. for different crops and crop periods for all the major ecosystems of Kerala (KAU, 2011).

The success of a fertilizer depends heavily upon the increased yield per hectare of the crop cultivated. After independence the use of fertilizers in India in the last 50 years has increased nearly 170 times. Ewell (1974) assessed the success or failure of Green revolution in developing countries by considering the fertilizer as a limiting factor. Tandon (1993) studied season-wise fertilizer consumption pattern in Indian agriculture and observed gradual changes over the years. The economics of long term fertilizer use and yield sustainability in various agro-climatic zones of the country was studied by Narain *et al.* (1990) which indicated the need for applying balanced dose of NPK at recommended levels for increased crop production and economic returns. The increase in about two and a half times in the yield of food-grain in India in 2000-2001 was mainly brought about by a more than 12 fold increase in the use of chemical fertilizers during that period (Wadhwa, 2001).



India occupies the first position among the manufacturers of basic pesticides in Asia and ranks 12^{th} globally. Among the predominant classes of pesticides used in India, insecticides account for 75 per cent of total consumption, followed by fungicides (12 %) and herbicides (10%) (Mathur, 1999). Webster *et al.* (1999) stated that considerable economic losses would be suffered without pesticide use.

In India, most of the people depend on agriculture. The health risks faced by agriculture workers most often exceed than those faced by workers in other sectors. As a result, the social cost of health risks is relatively high as compared to other sectors (Navamukundan, 2005; Wang, 2007; Suke, *et al.*, 2007). The present investigation is aimed to examine the agricultural methods practised and the intensity of the use of various agrochemicals, such as fertilizers and pesticides, in the development of paddy cultivation in Kuttanad.

Materials and methods

An enquiry on agricultural practices and the use of fertilizers and pesticides for the paddy cultivation in Kuttanad was conducted based on a scheduled questionnaire during January to May 2014. About 50 families who are engaged in agriculture in various places of Kuttanad, viz., Nedumudi, Monkompu, Pulimkunnu, Champakkulam, Kavalam, Kainakari, Rajapuram were interviewed. The data collected were pooled and analysed to know the agricultural practices in Kuttanad.

Result and discussion

Kuttanad, the granary of Kerala or the rice bowl of Kerala, is a low lying area in the southern end of Vembanad Lake covering Kottayam,

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Alappuzha and Pathanamthitta districts. The major occupation in Kuttanadu is farming. Farm productivity is directly proportional to the use of agrochemicals, such as pesticides, synthetic fertilizers and other chemical growth agents. Indiscriminate use of agrochemicals is regularly practised in Kuttanad to boost the agricultural production of the area.

During the study period the farmers and agricultural labourers were interviewed according to the scheduled questionnaire. The categories of farm area owned and the socio-economic status of the persons interviewed are given in the Table 1 and 2.

Category	Area	No. of families
Marginal	Up to 1 ha	16
Small	1.01-2.00 ha	18
Semi-Medium	2.01-4.00 ha	12
Medium	4.01-10.00 ha	3
Large	Larger than 10 ha	1

Table 1. Ownership of land of the respondents in Kuttanad area.

Table 2. Socio Economic Status of the respondents in Kuttanad area.

Personal status	Minimum	Maximum
Age (yrs)	25	70
Education	7^{th}	Graduate level
Annual income (Rs.)	1800	500000

Table 1 categorizes the number of respondents according to the area of the crop field owned. More number of respondents owned the farm area by less than 4 ha. The socio economic status of the farmers interviewed

Agrochemicals and Rice Cultivation in Kuttanad

(Table 2) reveals that the respondent belonged to the age group between 25-70 yrs. Most of the respondents had their education only at school level or below higher secondary level, but some had studied up to graduate level.

Kuttanad is a homogenous area in terms of physical features and cultivation practices. Paddy fields are situated below the mean sea level (0.6 to 2.2 metres). The area is submerged with brackish water during the greater part of the year and fresh water during monsoon season. These special features of Kuttanad make the method of paddy cultivation unique and complex. Based on physiographic and soil characteristics, the paddy fields in Kuttanad are classified into three types: Karapadom, Kayal and Kari lands. Paddy fields are usually demarcated as contiguous blocks known as *padasekharams*, bounded by waterways. Most of such *padasekharams* are reclaimed lands from the bed of backwaters and water-logged throughout the year. There are 1192 *padashekharams* varying in size from 2 to 1000 hectares (KSSP, 1992). Each *padasekharam* is owned by several cultivators and group farming is practised in Kuttanad.

Rice cultivation in Kuttanad is of an intensive nature compared to many other parts of the state. Nearly 90% of the farmers sow highyielding varieties necessitating the use of high levels of chemical fertilizers. These fertilizers are expected to give immediate results in agricultural production. In agriculture field, there are different types of fertilizers used to boost up the health of plant. They include synthetic fertilizers, organic fertilizers, potassium based fertilizers, nitrogen based fertilizers, time relase fertilizers and fertilizer with pesticides. Table 3

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gives the present practice of nutrient management by farmers in Kuttanad. The inorganic fertilizers, viz., factamfos, urea and potash were extensively used in the field in different quantities. The farmers applied wide ranges of fertilizers in different places of Kuttanad. During the interview it was understood that the farmers manipulate the dosage prescriptions of fertilizer use given by the authorities to get greater yields.

Manuring is an important step in the process of cultivation. The first doze of fertilizer is applied within 10-15 days of sowing, the second dose within 40 days and the third dose within 60 days. The information collected about the fertilizer use and the pesticide use during rice cultivation in Kuttanad is given in Table 3. After 10 - 15 days of sowing, the attack of pests cause the destruction of the fleshy green leaves of the plant which leads to the farmer's application of pesticides.

Fortilizons	Quantity applied (Kg/ha)			
Fertilizers	I Application	II Application	III Application	
Factamfos	10-100	10-100	0-50	
Urea	5-50	5-50	5-50	
Potash	5-90	5-100	5-50	

Table 3. Fertilizers used in rice cultivation in Kuttanad

The use of chemical fertilizers and pesticides has played a positive role in increasing agricultural productivity. Fertilizer consumption is steadily increasing in Indian agriculture over a period of time. In a study conducted by Panikar (1983) during 1975-76 it is revealed that the use of nitrogen fertilizers ranged from 72 to 118 kg/ha, against the recommended dosage of 60 kg/ha for high yielding short duration varieties in the upland and 70 and 90 kg/ha for high yielding short duration and medium duration varieties respectively in the wet lands. In Kuttanad during 1981 the average use of nitrogen, phosphorus, and potash per hectare was found to be 73, 49, 60 kg respectively, as against the standard recommendation of 70, 35, 35 kg per ha for short duration varieties and 90, 45, 45 kg per ha for medium duration varieties (KAU,1981; Joseph *et al.*, 1990). During 1980-1990 the Rice Research Station, Moncompu, Alappuzha also envisaged the use of nitrogen, phosphorous and potassium fertilizers more than the recommended dosage by 58 to 63 percent by the farmers.

Agro Chemicals	Trade Name	Active Ingredient	Chemical group
Fungicide	Contaff	Hexaconazol	Triazole
	Follicure	Tebuconazole	Triazole
Pesticide	Asataff	Acephate	Organophosphate
	Tatamida	Imidachlorprid	Neonicotinyles
	Metacid	Methyl parathion	Organophosphate
	Ekalux	Quinalphos	Organophosphate
	Fame	Flubendiamide	Phthalic acid diamides
	Takumi	Flubendiamide	Phthalic acid diamides
Herbicide	Almix	Metsulfuron methyl and Chlorimum ethyl	Alkanoics Sulphonyl Ureas
	Clincher	Cyhalofop butyl Alkanoics	Phenoxy
	Nominee Gold	Bispyribac Sodium	Pyrimidinylthiobenzoates
	Rice star	Fenoxoprop-	Aryloxyphenoxy-
	2, 4-D	P-ethyl Fernoxone	propionate Phenoxy
	2, 4- D	remoxone	Phenoxy

Table 4. Agrochemicals used in paddy field in Kuttanad

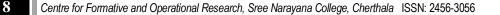
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The incidence of plant diseases and rate of crop failures are relatively higher in this area. The list of agrochemicals used in the area, its active ingredients and chemical group are given in the Table 4. Thirteen chemicals were used to destroy pests, fungus and weeds. The most commonly used chemicals were Asataff, Contaff and Nominee Gold. Compared to organochlorines, organophosphates and carbamates are less persistent but more toxic (Devi, 2007).

The use of these chemicals was also found to be much higher than the recommended dose suggested by the Kerala Agricultural University in most of the area surveyed. The farmers use the manufacturer's prescription as the guide. Sometimes, the quantity of the formulation was well in excess of the recommendation and the water used was below the recommended level. Moreover, in some other places in Kuttanad which are not covered in the survey the farmers use the chemicals not recommended for rice.

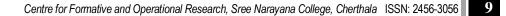
The application of chemical fertilizers and pesticides helps to increase the agricultural production. But their continuous application cause nutrients enrichment, which results in high biological oxygen demand, depletion of oxygen, etc., thereby, creating an imbalance between organisms and the environment. It also causes the reduction and destruction of some organisms like fish, frogs, snakes, and some useful pests and insects. Among these chemicals the pesticides cause great harm to the ecosystem.



Increase in the use of pesticides can result in various environmental and health problems. The pesticide use cause massive fish deaths due to ulceration in fish in Kuttanad (Devi, 2007). Occupational exposure to pesticides can result in short term and chronic disease among exposed farm workers. It causes acute poisoning, cardiopulmonary disorders, neurological impairment, skin diseases, foetal deformities, miscarriages, lowering the sperm count, cancer, etc. (Takagi, *etal.*, 1997; Bag, 2000; Arora, 2007).

World Health Organization has reported 30 lakhs cases of pesticide poisoning and 2.2 lakhs deaths annually across the world (Rosenstock, *et al.*, 1991; Pimental, 1992; Kishi, *et al.*, 1995). Organo phosphorous pesticides are found to be responsible for deaths in more than 70% of the cases of pesticide-poisoning in India

Compared to the other rice producing areas in the state, productivity of paddy crop is higher in Kuttanad region. Similarly, the per- hectare cost of cultivation is also found to be higher in this region. The wetland eco system of the region faces the excessive growth and spread of weeds and insects. The incidence of plant diseases and rate of crop failures are relatively higher in this area. The high degree of human intervention in the region coupled with the indiscriminate use of pesticides and chemical fertilizers over the past several years has caused irrevocable damage to the ecosystem in Kuttanad.



Acknowledgement

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DEVELOPMENT ECONOMICS FROM THE PERSPECTIVE OF PSYCHOLOGY

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Abstract

The most neglected thing in Development Economics is human needs based on human nature. Hence it proceeds with its theorizations and index formulations without articulating the connotation of the term "development" and ends up with a notion of development that is geared to market driven human wants which ultimately serves nothing but money production and its accumulation in the hands of a few. In order to remedy this, alternative economic theoreticians speak of placing man in the center of their economic deliberations. But their indices do not seem to have given anything more than lip service to the all-important human factor. In order to remedy this situation this paper advances the need for a deeper understanding of human nature and suggests taking cues from Maslow's hierarchy of human nature, and Statesmen's Watch which enables us to watch with objectivity the spending of time and resources.

Introductory

From the humanistic perspective, whatever aims at improving the human conditions are laudable. Thus, in all the endeavors from Psychotherapy to Political Science we have an array of enterprises that are undoubtedly laudable. If Psychotherapy aims at improving the

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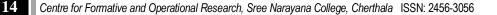
¹ Developed by Fr. George Kandathil S. J. of the Institute for Counseling and Transactional Analysis, Kochi

behavior of the individuals who seek its help, Political Science seeks to improve the human condition in general even if no one is specifically seeking its help. But the sad fact is that all these undertakings are taken in an upstart fashion. This is so because of the lack of understanding of human nature. A repairman who does not know the structure and function of a machine can only meddle with the thing, but cannot repair it. In spite of the fact that there are more than 200 systems of therapeutic psychology in the world, besides the traditional and the modern psychiatric practices, psychological problems like neurosis, psychosis, suicidal tendencies and unhealthy life styles are ever on the rise.

Similar is the case with Development Economics too. The connotation of the word 'development' is highly ambiguous. It would gain clarity only when the questions like, "Development of what?", "Development for whom?", "Development in what ways?" "Development as per what priority/ direction?" And, a host of similar questions are answered. In the absence of such clarifications, Gross Domestic Product was considered the index of development. The GDP was reckoned in terms of money value. There are now alternative theories in economics that advocate the placing of man as the central norm, for assessing the standard of living of a country. But this is done without a proper understanding of man and his needs as distinct from the market-driven wants.

First Thing First

But so far, the economists do not seem to have paid any attention to human needs which are Nature driven. What is more, their reckonings do



Development Economics from the Perspective of Psychology

not make any distinction between human needs and human wants. If human needs are Nature driven, human wants are market driven. Making such distinctions deserves to be considered the first thing in development economics if it is not to end up in the quagmire of confusion directly caused by the multiplicity of economic development indices.

The failure in making such fine distinctions could be owing to the academic compartmentalization of knowledge. Psychology, Ethics and Economics belong to different compartments, that is to say, different departments. Thus, we have now indices like Physical Quality of Life Index, Happy Planet Index, Gross National Happiness, Human Development Index, Inequality Adjusted Human Development Index, Genuine Progress Indicators, Measures of Economic Welfare, and Global Prosperity Index etc. But are these indices based on human needs? For that we have to first of all grapple with the question "What is man?" It seems even Maslow had not addressed that question. In the 1990s that question was taken up by Fr. George Kandathil S. J²., who has defined man as the relational animal, and has encapsulated his answer to the question 'what is man?' in the form of an equilateral triangle known as G. K. frame.

Alternative Indices to GDP

Before we discuss the question of placing man at the center for assessing the standard of living of a country, and exploring its possibilities in practical ways, we have to critically examine the indices advanced by the alternative theories in economics to see to what extent they are alternative.

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² The founder of "Institute for Counseling and Transactional Analysis" Kochi.

- Human Development Index: This Index is made up of three other 1. indices each in 1/3 portion of its original value, thus: HDI=1/3life expectancy index+1/3 education index+1/3 GDP index. Commenting on HDI, R. Subhash and B. Sudheer in their article in Academic Spectrum³ have stated that changing the development perspective, the World Bank in its World Development Report 2000-2001, has included in its depiction of poverty items, so far excluded from its reckoning: income, health, education, vulnerability, powerlessness and the like. They emphatically state that, "However, the Bank's perspective of development remains unaltered from the basic approach of market-oriented development." More over this shift in perception has had no positive impact even in the academic circles, not to speak of the political and social circles. The reason for this wet cracker effect is not far to be sought. The expression 'marketoriented development' instead of the more appropriate 'marketdriven development' signals an underestimation of reality.
- 2. Inequality Adjusted Human Development Index: Inequality is a socio-economic reality and it has to be quantified and deducted from each one of the three dimensions upon which HDI is determined. The core of the IHDI being HDI, whatever criticisms are leveled against HDI, is at least partially applicable to IDHI too.

What the application of IHDI gives, is something like assessing the losses and damages caused to a country through natural calamities or war. Inequality has historical roots. This is especially so in a

³ A multi-disciplinary peer reviewed journal (Vol. ix) published from S.N. College, Cherthala.

tradition bound country like India where the tradition dates back to thousands of years. Developing strategies and tactics for overcoming backwardness is an onerous task development economics has to tackle along with other branches of social science.

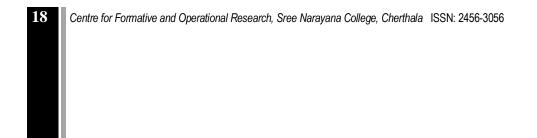
- 3. *Gross National Happiness:* GNH was an initiative by the Bhutan King in the year 1972 to highlight the positive impact of Buddhism in the country. There are nine domains around which GNH is structured. The contribution of each domain to the overall happiness is quantified in percentage to the total. If GDP measures the quantum of commerce in the country, GNH seeks to measure, in its place, the quantum of happiness. The findings were based on a nationwide survey in Bhutan involving people above 14 years of age. The households were the sampling units. The data were collected on the basis of rural urban divide, and also district-wise geographical divisions. The nine domains were the following:
 - a) Psychological well-being
 - b) Health
 - c) Time usage
 - d) Education
 - e) Cultural diversity and resilience
 - f) Good governance
 - g) Community vitality
 - h) Ecological diversity and resilience
 - i) Living standards

The initiative by Bhutan was nothing short of a revolutionary departure from the market driven indices of the main stream development economists. But like their indices, GNH too had the flaw of simply being a monitoring device by not having anything to do with directionality. In the absence of a clear understanding of human needs based on a deep understanding of human nature, directionality naturally remains inconceivable.

4. Happy Planet Index: HPI owes its origin in 2006 to the London based New Economics Foundation. HPI is arrived at through a two-pronged approach: one was the survey-based data on life satisfaction, and the other consisted of what they called their "hard" variables. HPI is calculated according to the following formula: HPI=Life Expectancy+ Life Satisfaction+ Ecological Footprint. No doubt HPI was a welcome Index as it could throw up a challenge to both the GDP per capita and the HDI. The critical observation on GNH is applicable to HPI too.

General Critical Remarks on the Indices:

- 1. How much money is produced is the sole concern of development economics; but how much of it is produced from the armament industry, from both the lawful and the unlawful drug industry, do not figure anywhere in the reckonings.
- 2. The Indices show how badly a country is being governed by the prevailing political dispensation rather than how well directed are its plans for the present and the future.



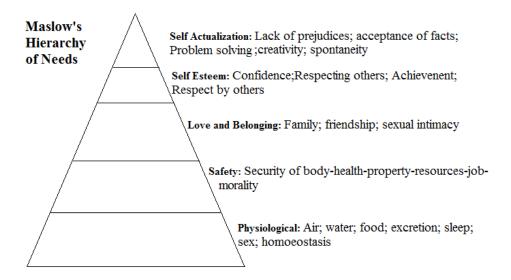
- 3. Utter negligence and callousness prevail in the Indices when it comes to the provisions for the distant future.
- 4. Responding appropriately to the need of the hour without sacrificing the future needs of the coming generations is what statesmanship is all about. In the Indices, signs of statesmanship are conspicuous by their absence.
- 5. The primary concern of good governance is how far the Physiological and the Safety needs are met. In a world where it is estimated that more than a million children die every year of malnutrition, it is obvious that good governance has not yet become the concern of development economists.
- 6. The Indices are tools for monitoring what goes on in a country on the economic front. All the reckonings in economics revolve around its prime concern: the quantum of money produced. As yet there is no tool for measuring the quantum of human well-being produced.
- 7. There is nothing in any of the Indices for giving directionality based on the certitude of the needs of the country for the present and the future.
- 8. It is proposed here that all these could be remedied with the help of Maslow's Need Hierarchy, G.K. frame and Statesmen's Watch.

Maslow's Hierarchy of Human Needs: In 1946 the psychologist Maslow happened to write a paper on human needs which were conceived by him in the form of a pyramid. He had argued that unless the needs at the lower strata are fulfilled, the needs at the higher strata cannot be achieved. This

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should serve as an eye opener to our planners both from the academic and the political arena.

Speaking of development without articulating the very concept of development is going to be a blind exercise. But it will have a definite utility for the 'haves'—to pull the wool over the eyes of the 'have-nots.' Though the resulting "development" could be measured in academically impeccable manner, the gap between the 'haves' and the 'have-nots' will be forever widening which, of course, could be explained away using the sophisticated jargon of the development economists. It seems economists cannot extricate themselves from the quagmire of their computations unless someone with a firm foot hold from outside economics extends a hand to pull them up.



If we take Maslow's ideas into account, we have to concede that development has to be conceived in terms of an upward journey from the

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base to the apex of the need pyramid of man. The multiplicity of indices shows that economics has failed in truly understanding the need progression of man as indicated by Maslow in his hierarchy of human needs. That could be the reason why in spite of all these indices to take guidance from life on earth appears to be increasingly conflict ridden—to put it briefly. It could be caused by the haphazard prioritizing done under narrow partisan political pressure or under the gigantic financial clout, or both.

The alternative theories in economics that advocate the placing of man at the center for assessing the standard of living of a country can ill afford to ignore Maslow's pyramid. The items listed under each strata of the pyramid are also pyramidal in structure. The pyramidal structure points to the inherent rationale of prioritizing development projects. Any deviation from this prioritizing would create conflicts—among the people on the one hand, and on the other hand, between mankind and the rest of Nature.

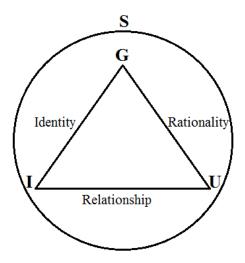
Pure air, pure water and pure food are the things that deserve the highest priority. If these are relegated to a lower rung of priority, it could be found out then, what other things have usurped their positions, and also who stand to derive monetary benefits from the said usurping of priority.

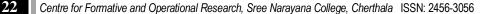
If the priority is maintained and the good results are quantified that would constitute the real Index of development. At the same time if the usurping of priorities is discovered and quantified that would reveal the nature of pseudo-development forced on the world by the agents of Mammon. Pseudo-Development Index and Real-Development Index will have an inversely proportional relationship with each other. These indices

for a period of five years might provide authentic data for correction in the realm of Political Economy.

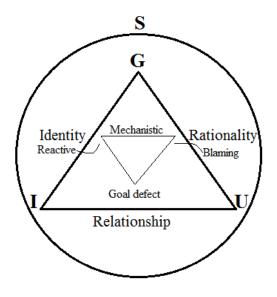
G. K. frame: Originally conceived by Fr. George Kandathil S. J., GK frame consisted simply of an equilateral triangle whose three corners starting with the bottom right corner "U" representing the Universe, going round in the clock wise direction to the next corner "I" representing the individual, proceeding further and finally reaching the apex "G" which represents the Goal beyond which there is no other goal. The triangle was not conceived by its originator as *sui generis*, that is to say *self-caused*. Therefore, later on, one of his students enveloped the triangle with a circle with the letter "S" representing the ultimate source of the manifest world which is represented by the triangle, placed outside the circle.

Relationship is for meeting the needs and wants of the individual. The individual is related to the others, the Universe. Of all created things, the universe came first. But as far as the individual is concerned, it could be rightly said that the first among the other is the mother.





The needs are the biologically indispensable things; whereas the wants are emotional preferences based on pleasurable experiences of the past. Or, it could be newly created through subtle emotional hijackings as in the case of advertising using the emotional clout of celebrities chosen from the fields of sports and arts.



Power hungry politicians and money thirsty business tycoons in cohorts with each other decide the development paradigm of the world. And the academic pundits formulate justifications for the present dispensations.

If the needs and wants are met, it will give rise to satisfaction. If the needs and wants are not met it will lead to dissatisfaction. Be it satisfaction or dissatisfaction, it will have three components: thoughts, emotions and sensations. All the three taken together is called 'enhavior' which is the energy source behind behavior. Need based satisfaction give

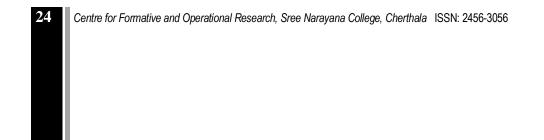
a lot of room for goal progression which can culminate in God realization. On the contrary, want-based development paradigm can lead man into ecological disaster and self-destruction.

The above description depicts human nature and human possibilities in a nutshell, and it might even serve as a monitoring device for noting the direction in which development economics is leading mankind. Another monitoring device could also be devised for the same purpose. This is for observing the commissions and omissions of the rulers in an objective manner.

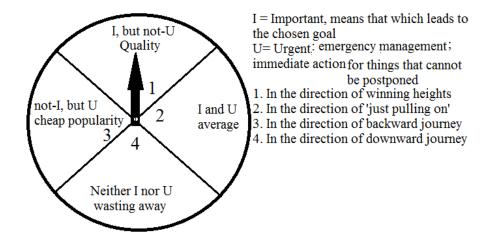
Statesmen's Watch

Introductory: Development Economic regimes could be understood as belonging to 4 broad categories, if we look at the way they prioritize their goals and the manner in which they time-frame their practical activities. For the ease of remembering the 4 categories, and also for ready-reference whenever it becomes necessary, the above-said four may be depicted as the four quadrants of a dial with a needle to show how things are going at a particular moment.

The quadrants of the statesmen's watch represent four types of development economic regimes. Only the first quadrant represents planned economy. All the other three are disorderly and chaotic inviting all sorts of economic problems upon the heads of all the people, including the "haves". This ruin of all through accumulation of wealth was foreseen and repudiated in the Bible.



Development Economics from the Perspective of Psychology



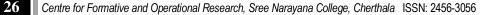
Quadrant One: Quadrant one represents quality governance which could be achieved by giving utmost importance to long term plans and projects that will lead to all round prosperity for all the people of the country. It has been observed by thinkers long back that the difference between politicians and Statesmen is that the statesmen think of the next generation whereas the politicians think of nothing but the next election. It meant, what is good for the country in the long run, is of prime importance for the Statesmen. They would ensure the quality of their governance by giving utmost priority to conserving and putting to the best possible use the natural resources of the country. The entire mineral and the fossil fuel deposits of the land belong not only to the present generation but also to the numberless generations yet to come. This does not mean that we should not use them, but it means we should not use them up in a hurry to fuel our development economic dreams of prosperity.

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That which leads to the goal, is what is called important. Since such important things are done not on a war footing but at a leisurely pace, things can be done to the utmost glossy finish. Linking up the Indian rivers to irrigate all the arable land stretches of India, is an idea that can be marked as "I but not-U". In the account's books of such a project, the huge funds required for it will find a prominent place; but it may not show anything in the income column for years to come.

Second Quadrant: The second quadrant represents activities that are both important and urgent. Hence the quadrant is labeled "I and U". Tasks in this quadrant demand emergency operation. If they are not attended to and done on a war footing, it would invite failure. It's something like a school boy postponing studies till the exams are very close bye, and yet still not attending to his studies even at the time of the exams. Governance of that sort might be called 'emergency management regimes'. There is no foresighted preparation to ensure the physiological and safety needs of the people. Business people might prosper under such a regime. And rosy statistics may hide the hideous condition of the people of the land. Politicians also, undoubtedly thrive if the economic activities of the land belong to the second quadrant.

Third Quadrant: The sign of the third quadrant is "not-I, but U". It means that the activities of the present are not those leading to the goal. At the same time, they are urgent in the sense, if not done now, it cannot be done later on. Suppose there are very many poor people in a country who crave a color TV, but they are unable to own one. A politician would take advantage of the opportunity and make a gift of color TVs to all the poor



families. This is very good for gaining cheap popularity for the politician. But nothing constructive is done with the public money. Such spending of time and resources are the signs of demagogues who devote all their creativity for fooling the ignorant public. While this fooling is going on, the rich will be gaining more and more money. Those who complain of the widening gap between the rich and the poor will be silenced with statistics of economic developments.

Fourth quadrant: The 4th quadrant is filled with activities that are neither important nor urgent. A country under the despotic governance of a dictator belongs to the 4th quadrant. No statistics are required to silence any critic for the simple reason that there are no critics to dare such things as the airing of criticisms.

Conclusion

Like in all categorizations, pure categories may be very hard to come by. But the reality of most countries will be a blend of these categories. However, the concept of development, be it based on economic production or the production of happiness, is reductionist, as they both do not seem to operate from a holistic perspective on man; and therefore, they lower the stature of man.

Progression as per human potential and needs alone can serve as a measuring tool of human development. Though the pursuit of happiness remains enshrined in the constitution of the United States of America, and the Americans are actively pursuing happiness with all their armed might, that has not made that country any better than any other country on earth.

If the above discussion helps in demystifying the arcane subject of development economics and emboldens the laymen to have a look at what goes on behind the curtains of economics, accounting auditing and political planning, through the twin peep holes of common sense and psychology, this paper would have served its purpose.

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HIDIMBI AS THE EMBODIMENT OF CASTE AND GENDERED SUBALTERNITY: ANALYZING *THE MAHABHARATA* FROM A SUBALTERN PERSPECTIVE

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Abstract

Epics like The Mahabharata and The Ramayana allow open reading rather than a closed reading. They no longer exist as just old texts written in an old context but hold high contemporary relevance. They are like mirrors to the society, which give insight into the social values, practices and prejudices. The Mahabharata, considered as the greatest epic ever in the history of human civilization, is also a saga of marginality. Marginalization of people still continues to hold a prominent place in the society. Power always remains as the guarded possession of the highborn who strives to ensure that an outcaste remains a lowly outcaste. The oppression in a society can be looked upon from a threefold point of view: racial, economic, and sexual. When human beings cannot raise their voice against these different forms of oppression, they turn out to be subalterns. The Mahabharata is a reflection of much of the dilemma faced by these deprived groups. The present study intends to do a subaltern analysis of The Mahabharata with special relevance to the character of Hidimbi. It mainly focuses on the plight of Hidimbi as a victim of the caste system and gender subalternity.

Introduction

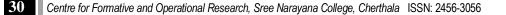
The Subaltern studies in India emerged in the eighties, in connection with a series of journal articles published by Oxford University Press in India. Its main goal was to rewrite history for the

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underclass, for the voices that had not been heard previously. In their writings, the group seeks to assemble a counter history of popular forms of action and culture to contest both colonial and nationalist accounts. This means that Subaltern studies have effectively contested what were until recently the dominant interpretations of Indian history, and more generally it has provided a framework within which to contest the dominant modes of knowledge.

Analysing the condition of the subaltern in India will provide better insights regarding the true picture of their existence, which is different from what is so far recorded in history. In the social context of India's rigid class and caste system, the location of the subaltern is further effaced by the layered histories of European colonialism and national independence. The issue of the subaltern could be clearly understood by an explication of the prevailing ideologies in Indian society, because the essence of India lies in the caste system that governs the citizens all their life.

Caste system denotes a hierarchical stratification of Indian society. The core thought of Hinduism has provided the means of exploitation to the strong. The upper three levels—*the Brahmin* (priest), *the Kshatriya* (soldier) and *the Vaisya* (merchant)—are considered twice-born, as in addition to biological birth they are born a second time after initiation rites. The Shudra, the fourth level, includes a multiplicity of artisans and occupationally specialized Jatis who pursue clean (non-polluting) occupations. The Varna hierarchy ends here, but there is a fifth level which accommodates those following supposedly unclean occupations



that are believed to be polluting. They are *Antyaga*, that is, people outside the Varna system (outcaste). The *Jatis* at this level constitute what were known as the 'untouchables'. About half the population of India are of the *Shudra* caste, divided in turn into hundreds of subcastes.

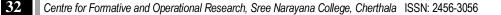
The members belonging to these lower castes and the outcastes in particular are treated worse than animals. Deprivation, alienation, humiliation and subordination characterize their existence. They have no spokespersons in the society they live in and so they helplessly suffer, and get marginal place or no place at all in the history and culture of which they are an essential part. This process of pushing certain groups to the margin, to the periphery, away from the vitality and vivacity of the centre, necessarily involves the process of cultural Othering. The subaltern is thus created. The subaltern is imbued with the negativity at all levels, be it social, cultural, sexual or personal. The subaltern is the one who is denied an authentic presence. He/she is the one bereft of voice or dignity—one who is a mere zero, with no essential meaning or a sense of being.

Marginalization makes a person or group feel less important or powerful. Those who are marginalized generally suffer from a crisis of identity and this perhaps leads to an increased social negligence towards that person. Women and the physically handicapped or mentally challenged are simply smothered and subdued into accepting without choice, whatever is offered to them, and views and beliefs are forced upon them. Spivak in her essay, "Can the Subaltern Speak?" makes a valid comment "...the subaltern as female is even more deeply in shadow" than subaltern men (193).

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The gravity of the situation is intensified when the subaltern is a woman, who is even denied a subject position. Being at the precarious juncture, criss-crossed by multiple forces of oppression, she occupies the lowest position in the social ladder. Her presence is not even authenticated; if at all it is done, it is only to enforce the superiority of the male counterpart. She is the deviant, deformant, signifying all the lacks and voids. As a victim of racism, classism, and most importantly, of the primarily subjugating ideology of patriarchy, the female subaltern is the most miserable of all oppressive states. Her life, dreams, hopes and the basic right to a dignified survival are thwarted by multiple forces of oppression. The dream of transcending the threatening powers of oppression rather remains elusive. The dominant powers have so naturalized the subjugation of women that she often fails to recognize the pitfall that she is in, often taking it as her ordained destiny to be always the erratic, the aberrant, and the abnormal.

Within the subaltern studies, gendered subalternity occupies a secondary position. The common approach in subaltern studies has been to take class as the primary entry point to any problem. Thus even within the subaltern studies group, women remain the subaltern. Theorists of subaltern studies have noted that gendered subalternity is particularly complex, as often, the restraints of gender transcend class, allowing for subalternity to exist outside of the lowest socio-economic sections of society. Women have a very limited role to play in the society as they are not allowed to think independently. They are pleased to live with their men and they carry out a lot of household duties that come under the category of unpaid labour. Though women are proficient in doing many jobs, they are not allowed to



make any kind of initiatives in their lives. The gendered subalterns are playing the role of mere shadows to please their men. The role of the shadow comes to an end when the light goes out of her husband. Then the woman has no more existence except to trace the shadow of the dead.

Many writers have attempted to give expression to the plight of the subaltern. They understood the need to document the lives of all the oppressed in India, such as workers and peasants, tribes and lower caste women and Dalits, whose voices were seldom heard before. There are numerous novels describing the plight of subalterns. For instance, works like *Untouchable*, *Coolie* and *Joothan: A Dalit's Life* by Mulk Raj Anand portray their miserable life. The role of epics as an eloquent source for the exploration of predicament of subalterns is noteworthy.

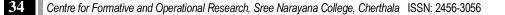
Hidimbi as an Epitome of Caste and Gendered Subalternity

The Indian epic *The Mahabharata* is a reservoir of the values and ethos of the Indian society, its inspirations, and conflicts. It is a massive collection of fascinating heroic and mythological legends, sermon like essays, worldly and spiritual advice, codes of law, popular apothegms and proverbs, and moral tales for the edification of its audience. *The Mahabharata* is a history of prehistoric times and a compendium of materials that throw light on the religious, social, political, ethical and moral ideals and practices of the people of ancient India. Thus the epic provides abundant material for exploring the plight of subalterns.

When the epics narrate the glory of armed and brave men, they totally negate the world of women, especially the subaltern women who are trapped under the narrative. They are doomed to be abducted, humiliated, pawned or

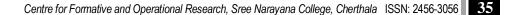
molested in some way or other. Thus, it is of vital significance to examine the life and experience of such silenced women in the epics, considering the impact of the two epics on the Indian psyche and culture. In *The Mahabharata*, there are many references to the people who could be termed as 'Subalterns' with respect to caste, class, race and gender. There are many characters that are either not mentioned, or mentioned only to be ignored. James Fitzgerald says *The Mahabharata* can be considered as a narrative of marginality, "the Veda of women and sudras" (185).

The great Indian epic is entirely a male-centred narrative. Men are the rulers of their actions and they ruled over the destiny of all around them. In a patriarchal society, woman is marginalized and is rendered silent. The case of subaltern women is even worse than this so called category of 'Women'. The subaltern woman occupies the lower strata in the general category of women. She is equally oppressed by upper caste males and females. Thus she is doubly marginalized. Viewing the epic from the perspective of a female subaltern helps in presenting her world in its entirety. It helps to represent a distinctly female subaltern way of the epic to subvert authority and focus on women's emotions and relationships. The character of Hidimbi can be considered as the best example for citing the horrors faced by subaltern women. It is through Bhima that the character of Hidimbi develops in the narrative. Bhima is the second of the Pandava brothers and as George Mason William states, "Bhima (the terrible) was the product of his mother's union with Vayu, the wind god. Bhima had a terrible temper but was courageous and a great warrior" (84). Hidimbi is the wife of Bhima and the mother of Ghatotkacha in *The Mahabharata*. She is also known as 'Bhutanadevi'.



Hidimbi as the Embodiment of Caste and Gendered Subalternity: Analyzing The Mahabharata from a Subaltern Perspective

Hidimbi is a victim of gendered subalternity. The portrayal of Hidimbi in The Mahabharata is that of a ferocious looking demoness, who transforms herself into a bewitching beauty the moment her fancy is captured by the physical charms of Bhima, the powerful son of Kunti. This indicates her marginalization as a subaltern woman. Hidimbi makes her entry in The Mahabharata in the 'Adiparva', the first book of the epic. 'Adiparva' consists of nineteen sections. The story of Hidimbi is depicted in the 'Hidimbavadhaparva', the ninth section of Adiparva. She belongs to the tribe who were termed as 'Rakshasas'. The tribe was probably cannibals and was despised by the Aryans. She is accompanied by her brother Hidimba who wants to kill the Pandavas and eat their flesh. She meets Bhima while he is travelling in the forest with his Pandava brothers and mother Kunti. After fleeing a burning palace at Varanavat, which was set up by their cousin Duryodhana to burn them alive; the Pandavas wanders into the deep woods at night. Hidimbi's brother, Hidimba, an alleged cannibal, sends her to bring him human flesh. But when she sees the handsome prince Bhima sitting in the glade, she falls in love with him. Instead of killing them and enjoying their flesh as Rakshasas are supposed to, she is infatuated by the strong and handsome Bhima. Here Hidimbi is being portrayed as someone being disloyal to her own brother. She transforms into a tall, dark-skinned and immensely beautiful woman dressed in ornaments and garlands and approaches him. She cautions Bhima of the impending danger from her brother and proposes to him. She also gives an assurance that she will protect him from the flesheating Rakshasa and tries to seduce him by offering other allurements.



When Hidimbi doesn't return, Hidimba comes to kill Bhima himself. When the Rakashasa Hidimba sees that his sister is soliciting a man, he becomes angry and accuses her of sacrificing the good name and honour of all the Rakshasas. He rushes to kill Hidimbi but is stopped by Bhima who now assumes the role of the protector of the damsel in distress. He even justifies her carnal desire. What follows is a dialogue between the two, at the end of which a dual is fought and finally the Rakshasa Hidimba is killed by Bhima. Hidimbi then asks Bhima to marry her, to which he is reluctant initially. But he accepts her after repeated requests. He agrees to spend the time from dawn to dusk with her on the condition that during the dark hours he would remain with his brothers, and this would continue till they had a son. She eventually bears Bhima a son, Ghatotkacha. When the Pandavas leave the forest, Bhima is forced to leave her as they are on a war campaign. The epic does not clearly mention whether they ever met again.

The way in which Hidimbi's story narrated in the epic shows her as a woman lacking self-worth. Her marriage with Bhima explores the treatments meted out to the subaltern women married into the Aryan family. The treatment given to Hidimbi and her son Ghatotkacha gives an indication of the way the marginalized people were treated and used by the clever Aryans to serve their purpose. It also gives an indication of the racial arrogance of the Brahminical Aryan society.

Hidimbi's plight as a subaltern woman becomes even clearer when compared with the character of Draupadi. In *The Mahabharata*, Draupadi is often acknowledged as the heroine. She is the central female character in the epic and is projected as a very dynamic role model for women. Draupadi is the daughter of King Drupada and is born through exceptional circumstances. She is the chief wife of Pandavas and the one known universally. Her descriptions, from the onset of the epic, focus on her astonishing physical appearance:

She was beautiful and enchanting; she had a lovely body and a waist the shape of the sacrificial altar. She was dark, had eyes like lotus leaves, and dark, wavy hair. She was a goddess who had taken on a human form. Her scent, like that of a blue lotus, perfumed the air for the distance of a mile. She possessed the most beautiful figure; none was her equal on earth (Sutherland 64).

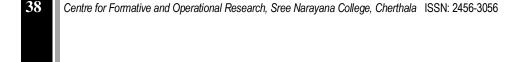
Women are made to be beautiful and desirable to men and Draupadi is so desirable that she becomes the wife of five men, the Pandavas brothers, who become her husbands through a contest. The epic also suggests that Pandavas have many other wives from various kingdoms. When the five brothers marry Draupadi, they make a vow not to bring any other wife in their palace. Draupadi will be the sole queen of their kingdom. Except for Subhadra, who is privileged because she is the sister of Krishna, all other wives remain in their parents' homes. The attempt made by the epic to portray Draupadi as a strong female character diminishes the role of Hidimbi and it relegates her to the status of the unacknowledged wife of Bhima. It purposefully glides over the fact that Hidimbi is Bhima's first wife, before Bhima and the other Pandavas marry Draupadi.

Hidimbi belongs to a different culture and she is a tribal and low caste woman. Being a non-Aryan woman and without any coffers to offer , the

only thing that she could give them was her only son, Ghatotkacha, to be sacrificed in the Kurukshetra War. Ghatotkacha, the eldest of all Pandava progeny, is thus used as a tool in the war, later rendered dispensable due to his position as the son of a subaltern. His dignified mother sends him to the war without ever complaining of the injustice having been meted upon her. Even if Ghatotkacha survived the war it was sure that he would not be made the king of Hastinapura due to his low caste birth. The very notion of 'Dharma' is questioned here. Dharma here emerges as the most ambiguous word as it is used according to the suitability of those who are in power. While *The Mahabharata* is an epic based on the premise of Dharma and justice, Hidimbi is deprived of both. Neither anyone cares to fulfil their dharma towards her nor does she ever get justice.

What makes Hidimbi unique is the fact that she is a subaltern within the category of subalterns themselves. In his *Subaltern Citizens and their Histories*, Pandey suggests that the foregrounding of differences of gender and the dominant classes have long been a way of organizing and naturalizing subaltemity. He says:

Men are not 'different'; it is women who are. Foreign colonizers are not 'different'; the colonized are. Caste Hindus are not 'different' in India; it is tribals and Dalits who are. White Anglo-Saxon Protestant (we should add heterosexual) males are not 'different' in the US; at one time or another, everybody else is. White Australians are not 'different', Vietnamese boat people and Fijian migrants to Australia, and astonishingly, Australian Aboriginals are (63).



Hidimbi as the Embodiment of Caste and Gendered Subalternity: Analyzing The Mahabharata from a Subaltern Perspective

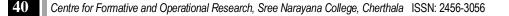
The references to the low-caste subjects in *The Mahabharata* are well-known. Characters like Ekalavya, Dronacharya, and Karna acquires symbolic overtones. During the Mahabharat period, the Shudra protests expressed themselves in the form of Ekalavya and Karna who were not allowed any upward social mobility within the caste structure as it was a threat to upper-caste dominants. They have been denied the place they deserved in the system. But they fought brilliantly against caste system. Thus men are not different, it is women who are different, and subaltern women are far more different from other women. They are subalterns among the subalterns. For instance, a comparison can be made between Hidimbi and Satyavati.

Satyavati is the daughter of a fisherman. She is dark-skinned and even referred to as Kali. She agrees to the demands of the sage Parashara for sexual union on condition that her virginity would remain intact, that she would lose her fishy odour and be blessed with eternal youth and that her illegitimate son Vyasa would be a renowned man. She later marries Santanu, the King of Hastinapura, on condition that her heirs would inherit the kingdom instead of her stepson Devavrata (Bhishma). Afterward, when Vichitravirya, the younger son from Santanu and Satyavati, dies without an heir, she unhesitatingly commands her illegitimate son Vyasa to impregnate Vichitravirya's widows in accordance with the *Niyoga* (an ancient, socially accepted custom used to proliferate the family line in which a woman whose husband had died or could not have a child, would take the help of another man in bearing a child). Thus, the aristocratic Kuru dynasty is replaced by the Nishada race propagated through Satyavati and Vyasa. Satyavati transcends the

limitations of her birth as a low-caste woman and displays exceptional shrewdness, keen sense of diplomacy and political acumen to emerge triumphant over the ruling Kurus to secure for herself and her descendants the right to the throne of Hastinapura.

In the case of Hidimbi, she never gets an opportunity to get outside the forest and enter the palace of Hastinapura as she is a tribal woman and a cannibal. As a forest girl, her way of living is totally different from that of the 'civilized ones'. Eating human flesh is her norm. Her lifestyle is in sync with nature. The Aryans who consider themselves as superior refuse to accept them as humans and call them 'Rakshasas'. Hidimbi thus belongs to the most oppressed category of subalterns.

Hidimbi emerges as the forgotten wife of Pandavas. After the departure of Kunti and Pandavas from the forest, Hidimbi is forgotten forever. It is also important to note that Pandavas during their exile after losing the game of dice, are reluctant to go to Hidimbi. The most probable reason for this might have been Draupadi, who probably is unwilling to accommodate Hidimbi. It is Hidimbi who is the first daughter-in-law in the generation of Yudhishtira. Kunti is probably afraid that she may claim her position of chief queen which will make the position of Kunti and her sons embarrassing. To avoid all this, she might have preferred to dump Hidimbi. Another possible reason for Pandavas' reluctance to have anything to do with Hidimbi is their totally different situation. On an earlier occasion, they were fugitive princes hiding secretly with the world taking them as dead, but now the situation is different. Yudhishtira, the eldest of the Pandavas had been a 'Samrat' who had performed 'Rajsuya



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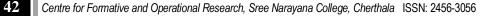
Yagya'. He is also accompanied by a Brahmin priest Dhaumya. During his period of exile many sages visit him and have long discourses. In this situation they probably thought it beneath their dignity to seek shelter with the Rakshasa tribe of Hidimbi. Taking help from Ghatotkacha is a compromise of lesser degree and as Ghatotkacha is called to the Pandavas and he serves them with all the humility of a son. It boosts the racial ego of the Pandavas without compromising much on their dignity as they can take a stand that it is Ghatotkacha who came to them and not the other way round. The Aryans were so hypocritically obsessed with the idea of the Varna system. They also believe that a mixture of 'Varna' (caste) is a very heinous crime.

The upper castes' obsession with caste system lays down many restrictions on the sexual union between the men and the women. But the conflict between instinct and the superimposed social norms is eternal. In spite of much restriction, unions between men and women of different castes as well with those who were outside the pail of caste system took place like the union between Bhima and Hidimbi. The cunning minds of the superior classes also sought out ways to use the offspring born out of the undesirable union for their own benefit.

A contrast between the death of Abhimanyu who was the son of Arjuna and Subhadra, and the death of Ghatotkacha makes it clear how the son of a low-caste woman is treated by the upper class society. The death of Abhimanyu is lamented by all. For instance, Subhadra's grief over her dead son and Arjuna's oath of avenging the death of Abhimanyu are described in detail whereas no such treatment for Ghatotkacha is mentioned in the epic.

Ghatotkacha has to face discrimination even in his death as well. This is because Abhimanyu is the son of Subhadra, the sister of Krishna, and Ghatotkacha, that of a Non-Aryan Rakshasi. All the humiliations encountered by Ghatolkacha points back to the sufferings faced by Hidimbi as a subaltern woman. They intensify the gravity of her plight. The absence of lamentations and of any Rakshasa women crying for their dead husbands and sons indicate the attitude of indifference towards them by the author of *The Mahabharata* as well as the society of those times.

Hidimbi's silence throughout the epic speaks volumes not just about her but about the contemporary society. Hidimbi being a strong and devoted woman, the society fails to acknowledge her. Hidimbi, basically a woman of virtues who is to be celebrated, has her greatness overshadowed by masculine interpretations. The society has taught that a woman must not openly declare her feelings and desires. In case of exposing their will, they may be termed lustful and seen as seductresses. She is often misinterpreted or looked down upon because of her status as a 'Rakshasi'. Despite all these misinterpretations, she is one of the few straight-forward and honest women in the epic. Being a Rakshasi, she has powers to travel quickly, transform herself and the like, and yet she remains quiet, does not pester her absconding husband, and lives her life in the forest with dignity, bringing up a brave and equally honest child. In the recent adaptations of the epic, makers have tried to be sympathetic about Hidimbi, but the epic itself does not allow Hidimbi the rightful place. Thus the dichotomy between the articulated and the submerged voices could be seen more clearly in the epic.



Conclusion

A Subaltern reading of *The Mahabharata* helps to dismantle the conventional notions regarding the characters of the epic. It also helps to find new meanings, giving more respect to the rejected and oppressed, to untouchables and to women. An analysis of the dilemma faced by these deprived groups show that there are some characters belonging to the peripheral sections who emerge as powerful individuals, and at the same time there are characters who are totally ignored by everyone.

Reading the epic through the lens of subaltern theory opens up new possibilities to identify the plight of the marginalized. The tale of Hidimbi exemplifies the way subalterns, especially female subalterns, are treated by the upper castes who consider themselves as refined. The subaltern perspective questions the *Kshatriya* universe and its obviously skewed values. Despite being the wife of Bhima and the first daughter-in-law of the Pandavas, Hidimbi is largely dismissed by everyone due to her 'otherness'. She is relegated to a small episode in the epic, and is denied her voice. Hidimbi's marriage with Bhima was one of the political strategies adopted by Pandavas.

Highlighting the characters in leading roles led to the sidelining of the significant roles played by the lesser known ones. Hidimbi, whose selflessness contributed a lot to the victory of the Pandavas against the Kauravas, could have been the queen of Hastinapur by virtue of her marriage to Bhima. But she chose to live in the forests and raise her son Ghatotkacha single-handedly. Despite being a married woman, she lived without her husband because of the condition put forth by him. The brief

tale of Hidimbi in the epic itself is an indication of her marginalization. This has resulted in the denouncing of the contributions and sacrifices made by Hidimbi which ultimately makes her an epitome of caste and gendered subalternity. A subaltern reading brings the character of Hidimbi into disturbing and serious confrontations with the reader. It is not just adequate to amplify the subdued voices of women like Draupadi and Kunti, but bringing to light the mute characters like Hidimbi who are denied voice and agency in a highly patriarchal and casteist society would need more serious analysis.

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ZOOMING IN ON URBANSCAPES: MAPPING THE MAN AND THE CITY IN M. PADMAKUMAR'S VAASTHAVAM

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Abstract

Cinema has often found cities to be a source of settings and subjects. Many filmshave come up with plots dealing with urban realities in its various forms. M. Padmakumar's Vaasthavam, the 2006 Malayalam political thriller, loosely based on Thakazhi's novel Enippadikal, is one such attempt. In the film, the story of an Adiga youth is told in the backdrop of Thiruvananthapuram city. This paper studies how the city transforms the rural youth into a ruthless, power crazy individual and reveals the dark facets of urban life. The very power corridors in the city which raised the hero to glories, pulls him down and sends him back to his own land. The paper intends to point out how the city of Thiruvananthapuram is shrouded with a cultural aura of corruption, sycophancy, power politics, caste system and bureaucratic strategies. Thereby it alsopoints out how the film mirrors today's social and political happenings that the city plays host to. The paper intends to explore by what means the city acts as an epicentre of power, desire, glory and downfall, thus leaving a tumultuous impact upon the protagonist and transforming him in the process.

Creativity has often experimented with representation of cities as it offered a plethora of human experiences and opportunities for re-creation. Eventually cities evolved as important sites for the creation of literature and film. Malayalam cinema has often found cities to be a

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source of settings and subjects. Many films have come up with plots dealing with urban realities in its various forms. Both cinema and the city have a symbiotic relationship, shaping each other's growth. David Clarke opines, "...the city has undeniably been shaped by the cinematic form, just as cinema owes much of its nature to the historical development of the city" (2). While cities can trigger cinematic forms, various cinematic representations of the city have often been shaping factors of the ambience associated with these places in popular imagination. A meticulous inspection of the wide panorama of Malayalam cinema vividly depicts the changes that have engulfed the cities over the course of time. This is well evident in the cinematic representation ofcities like Madras, Mumbai and Thiruvananthapuram. Many critics also feel that it is easier to understand contemporary Malayalam cinema by looking at the city as a character. M. Padmakumar's Vaasthavam, the 2006 Malayalam political thriller, loosely based on Thakazhi's novel 'Enippadikal', is one such attempt.

The story of an Adiga youth from a rural area, played by Prithvi Raj is told in the backdrop of Thiruvananthapuram city. The Malayalam films of 1980s and 1990s which were shot at Thriruvananthapuram City often showed the museum and the nearby scenic places as the landmarks of the city. When the Malayalam film shifted its location to Kochi and changed its themes and subjects, the city of Thiruvananthapuram was almost forgotten. *Vaasthavam* tries to relocate the film to the capital city. Though there were films presenting Thiruvananthapuram as the centre of power, *Vaasthavam* realistically presents an individual's transition after being caught in the bureaucratic quagmire and power struggle in the capital city, and

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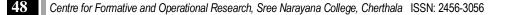
the resultant emotional struggles. It focuses on the bureaucratic facets of the city and the Secretariat is put in the limelight as a prominent representation of the city.

Vaasthavam starts with various images of rural culture as revealed by the portrayal of *Theyyam* and other temple rituals. During the first part of the movie, which includes the opening shots and song sequence, the camera focuses on giving a panoramic view of rural life. The protagonist is a Brahmin with a deep belief in conservative values and is portrayed as indulging in religious rituals. He values caste system and family honour. Faced with various family burdens, he totally rejects the communist ideals of his father. It is in this context that a man named Thripan Namboothiri comes up with an alliance for Balachandran Adiga. He promises the hand of his niece as well as a government job for Balachandran with this proposal. Balachandran's marriage is followed by the death of his mother and his translocation to Thiruvananthapuram. Thus, his mother's death coincides with the birth of his new life in a new city. Thripan Namboothiri acts as a bridge which takes Balachandran from a rural landscape and places him in an urban landscape. The camera then moves on to present Thirunananthapuram Central Railway Station which signals Balachandran's entry to Thiruvananthapuram. The camera as well as the protagonist then travels through the busy streets of Thiruvananthapuram showing the city landscape and its hustle and bustle.

He reaches the Premier Lodge where he meets Unnithan, who is known as the encyclopaedia of Kerala politics. Along with the protagonist, the audience is also introduced to the so-called Thiruvananthapuram dialect

in Malayalam language. The film even gives examples of the local flavour in the language which is also coloured by the erswhile royal rule as in the case of the phrase 'aduthoon pattuka' meaning 'to retire'. Another interesting factor to be noted is that the very first question that the protagonist faces in Thiruvananthapuram is about his caste, thus hinting that caste is a matter of concern in the power politics of Thiruvananthapuram city which still has the cultural and feudal remnants of the erstwhile Travancore state.

The audience is now introduced to the character Unnithan, brilliantly played by Jagathy Sreekumar, who acts as a spokesperson for the city. According to him, a person who has seen Kochi does not want his wife, who has seen Kollam does not want his home and a person who has seen Huzur Kachery does not even want his native place, thus hinting at the alluring magic of the city. He then says that Huzur Kachery means The Secretariat. The Kerala Government Secretariat in Thiruvananthapuram is the seat of administration of the Government of Kerala, housing important ministries and bureaucratic offices. It is the highest echelon of state administrative structure and is the administrative and political power centre. It was known during the princely era as the Huzur or Puthen Kacheri. Thus, the Secretariat is presented as an iconic landmark in Thiruvananthapuram and the city itself becomes the epicentre of power. He introduces Balachandran to the various nuances of life at Secretariat, which he describes as a vast ocean. Unnithan says: "Secretariat is a vast ocean. One who knows how to swim will reach heights ... The city is capable of transforming one. But he should have the desire. That's all" (00:31:30-00:32:30). Balachandran has desire in him. He is a



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frustrated youth who admits the setbacks he faced since he is a Brahmin. He says that many doors were closed since he is a Brahmin. His poverty at home, the act of giving up of his love for financial betterment, his sister's elopement with a low caste and his mother's death make him rebellious.

The intricacies of Secretariat life and Balachandran's innocent responses to it are brilliantly portrayed. The corruption in Secretariat brilliantly comes to the forefront through the words of Unnithan as he says: "Even if Sreepadmanabha himself arrives, he cannot escape bribery" (00:31:10-00:31:20). Unnithan, who has been serving the Government right from the time of the Maharajah, also adds that selling covers is the most thriving business near Secretariat, thus hinting at the extent of corruption. He says that instead of the rule/Government of the people or democracy, it is the rule of the covers. Unnithan is a link between the era of rajabharanam (Royal regime) and the new system of government. He is a benevolent person who takes in all new recruits and gives them a living space in his own room. But the system corrupts him. His philosophy in making Balachandran receive bribe is that if you can do something for someone, then it is perfectly alright to get a bribe in return. According to him, even if the employee refuses to receive the bribe, his senior officer will make him accept it. He is a veteran in this kind of shady dealings and has a vision that everyone should get his due share. Therefore, the city is a place where the virtues and vices in a man are at war with each other.



The very first day at the Secretariat introduces Balachandran to its inherent corruption and in turn signals his transformation to the powerhungry young man. Thus, the film presents a different facet of Thiruvananthapuram, that of corruption and power politics with the Secretariat, the epicentre of those power games, transmitting the aura of power and corruption to the city itself. As Barbara Mennel points out, the city functions through "operation of power and the struggle for power" (15). The film lets the viewers know how his job in Thiruvananthapuram forces Balachandran to enter the corrupt waters of politics and bureaucracy. In spite of his conflicting emotions and concerns, he decides to continue with his treachery and his job at Thiruvananthapuram. His village appears to him as a symbol of his innumerable family problems and the resultant helplessness. On the other hand, Thiruvananthapuram city becomes his only hope of success and prosperity.

The conservative yet innocent rural youth completely transforms into a heartless go-getter in the urban landscape. This makes him all the more ruthless. It is Thiruvananthapuram city and the power it exudes, which sows in his mind the desire to own his lady love, even though she is married. He forgets everyone who acted as his stepping stones towards success. He even forgets his sister, his wife, his in-laws, everything that connects him to his village, thus signaling the complete abandonment of his native place and entry into the rat race that is presented as a characteristic feature of the city. As Arto Haapala writes in his paper, "THE URBAN IDENTITY: The City as a Place to Dwell", "We make connections with our surroundings, thus creating normality and order. This also means that once we have

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familiarised ourselves with the place, it loses its surplus of meaning. Quite literally, the place has become a part of us; we have thrown our existence into the world, over things and matters that are meaningful in our lives" (20). Balachandran abandons all values that mattered to him, overcomes the unfamiliarity in a new place and becomes one with the place.

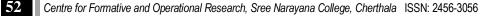
However, the very city which catalyses his success, witnesses his downfall and gifts him with utter loss and disappointments. But it is unable to change him back to his old self. In fact, he fully realizes his loss only after leaving the urban landscape and reaching his native place. Incidentally, during his last night at Thiruvananthapuram, the protagonist suffers his final set back, in the backdrop of yet another familiar landmark of Thiruvananthapuram city—the under passage—once again symbolizing the political undercurrents in the capital city. Thus, the city ceases to be a home to Balachandran. "Home is something we know thoroughly; if a place is full of surprises, uncontrollability and threat, it cannot be our home" (Haapala 20). What gets initiated during this surprise confrontation with yet another facet of city is a process of othering. Balachandran no longer feels at home in Thiruvananthapuram, his bewitching companion for the past few years.

The under passage at Thiruvananthapuram which was constructed in a record time of seven-and-a-half months under a collective responsibility, was the centre of attraction and a topic of discussion in the news media. The attack on the protagonist within this subway shows that, even within the landmarks depicting the development and civilized nature of the city, the

dark underbelly of the city and the clamour for power can be seen. Thus, the very city which is seen as a centre of civilization and affluence becomes a site for greed, betrayal and alienation.

The city often pops up as a prominent backdrop throughout the movie, thus completing its role as a character as important as the human characters. The visuals as well as the background music, presents the grandeur as well as the rich cultural heritage of the capital city. Even as Unnithan talks to Balachandran Adiga, sitting at the roof top of his lodge, the Secretatriat can be seen as a backdrop. The Secretariat or the Huzur Kachery thus acts as the symbol of Thiruvananthapuram. The Sree Padmanabha Swamy Temple also comes up as a prominent image, thus hinting at the city's association with its erstwhile royal administrators. As Unnithan puts it, Thiruvananthapuram is "SreePadmanabhan's land, the land possessing truth" (00:45:22-00:45:28).

As it follows the power corridors more closely, the film also explores the shady nooks of the city which shelter the hired thugs acting as the henchmen of power politics. The character Pambu Vasu who resides in Chenkal Choola, often hailed in popular imagination as a place notorious for its inhabitants, is an example of this. However, an objective and critical viewer gets some food for thought regarding this stereotypical representation of city slums as he/she ponders over the media representation of the dominant perspective as the natural perspective. Media establishments are often "locked into the power structure, and consequently as acting largely in tandem with the dominant institutions in the society. The media thus reproduced the viewpoints of dominant institutions not as



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one among a number of alternative perspectives, but as the central and 'obvious' or 'natural' perspective" (Curran, James, et al. 69). Chenkal Choola is often portrayed as a place associated with crimes and criminals even as it shelters hard-working citizens as well. It is to be noted that many places with even more crime ratios do not receive the negative coverage given to Chenkal Choola. This shows how power and powerlessness can influence spatial representations.

The film also zooms in on the protest meetings in front of the Secretariat which again is a regular sight in Thiruvananthapuram. The various problems in different parts of the state are meant to get a solution at Thiruvananthapuram. The plight of commoners, the confrontation between the protesters and the police, and the resultant chaos are faithfully represented in the movie. These once again project the tug of war between the powerful and the powerless that often colour urban existence.

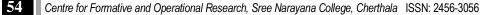
As the film comes to an end, Unnithan's voice can be overheard in the background saying that "Huzur Kachery, Chenkal Choola, Padmatheertham... will all be there all the time. But the people will leave in different pathways" (02:21:25-00:31:35). This statement is true indeed. The city remains a silent and indifferent witness to the changes it created in the lives of its inhabitants. It can also be a hint to the cultural amalgam in Thiruvananthapuram city which houses employees hailing from different parts of Kerala. The film ends with Balachandran's final resolution to leave the urban landscape for a rural one. The final scene signals Balachandran leaving Thiruvananthapuram city, through yet another image of a moving train. Thus, the film begins and ends with a visual of Thiruvananthapuram

Central Railway Station. Along with Balachandran Adiga, the city also dons the role of a prominent character in the movie.

The film often leans on the time-tested village/city binary concept through the characters, lifestyle and landscape. The images of honesty, innocence, dependence and tradition found in the village setting are often contrasted with the images of crookedness, sensuousness, independence and modernity found in the urban landscape. This is very much evident in the representation of female characters in the movie. While the women from the village, namely his childhood companion Sumitra, his wife Surabhi are all epitomes of innocent feminine grace, the women in the city are more independent and powerful. The seductive presence of Vimala Thankachi can be interpreted as one among the many acts of seduction by the city itself. Just as Balachandran falls head over heels in love with Vimala, he also symbolically falls into the snare cast by the city.

The city here becomes an agent of transformation. The power corridors in the city transform the rural youth into a powerful political kingpin, and instill desire in him. Thus, the city itself transforms into a symbol of change, power and desire. As Arto Haapala writes, "the identity of the city bears on the identity of those living in it, and vice versa: the urban environment reflects human needs and values" (13). This is evident in the change brought about in Balachandran's character.

Through the movie, the camera flits through the many familiar landmarks in Thiruvananthapuram including the Secretariat, Legislative Complex, Padmanabha Swami Temple, thereby creating an ambience of power, politics, bureaucracy and hegemony around the city. The film also



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unabashedly reveals the conveniently veiled caste system thriving in the ruins of the feudal lifestyle still seen in various parts of Kerala. Charactersin the movie blatantly sport their caste leanings in their names and are unconsciously conscious of their castes. The central character is never at ease with his sister and her low-caste husband. He points out the hardships that he had to face because of his upper caste lineage and unwittingly reveals the dark shades of caste prejudices still lurking in administrative corridors and the silent but seething sentiments against the reservation given to lower castes. The film thus presents Thiruvananthapuram city's one facet-thatof power, politics and bureaucracy, and how it all affects people's lives. As Fox says, "...city is often used as a metaphor for our dystopian excesses: corruption, sin, betrayal, segregation, alienation and entropy" (qtd. in P., Indu 78). Thiruvananthapuram city comes across in the movie as a site of all these elements. It stays as a constant presence throughout the narrative through the dialogues, characters and visual elements. Cinema thus constructs an urban space which is simultaneously a site of celebration, dejection and estrangement. It not only portrays the human experiences in the city but also reveals the spirit of the city.

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On Some Graph Labeling Techniques

ON SOME GRAPH LABELING TECHNIQUES

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Abstract

A labeling (or valuation) of a graph is a map that carries graph elements to numbers (usually to the positive or non-negative integers). Some labeling use the vertex-set alone, or the edge-set alone, and we shall call them vertex-labeling and edge-labeling respectively. Other domains are also possible. Numerous labeling techniques have been defined and a lot of surveys of labeling techniques have been carried out so far. The present study is an attempt to depict a journey through some of the graph labeling techniques which may be mentioned as milestones in the history of labeling and have become inspiration for many other labeling techniques.

Introduction

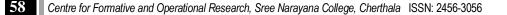
Graph theory is a very popular area of discrete mathematics having numerous theoretical developments and countless applications to engineering and other branches of sciences. Graph theory is considered to have begun in 1736 with the publication of Euler's solution of Konigsberg Bridge Problem. Any mathematical object involving points and connections between them may be called a Graph. Labeling is a term used in technical sense for naming objects using symbolic format drawn from any universe of discourse such as the set of numbers, algebraic groups or the power set 2^X of a 'ground set' X. The objects requiring

labeling could come from a variety of fields of human interest such as chemical elements, radio antennae, spectral bands and plant/animal species. Further, categorization of objects based on certain clustering rules might lead to derived labels from the labels of objects in each cluster; for instance labels a and b of two individual elements in a set {A, B} could be used to derive a labeling for the set in a way that could reflect a relational combination of the labels a and b. To be specific, A and B are assigned labels a, b from an algebraic group, whence the set {A, B} is assigned the label a*b where * is the group operation. Such assignments are generally motivated by a need of optimization on the number of symbols used to label the entire discrete structure so that the structure could be effectively encoded for handling its computerized analysis.

Some basic definitions

The basic definitions of graph theory can be found in [3] and [8]. A graph Gis an ordered pair (V, E) where V is a set of elements called vertices and E is a set of unordered pairs of distinct vertices from V called edges. We say two vertices u and v are adjacent if they are connected by an edge. The set of adjacent vertices of a vertex u is denoted as N (u), and it is also called the set of neighbors of u. The degree of a vertex u is d (u) =|N(u)|, the number of neighbors of u. For a given graph G, when the vertex set and the edge set are not given explicitly, we refer to them as V (G) and E (G) respectively.

A subgraph H of G is a graph such that V (H) \subseteq V (G) and E (H) \subseteq E (G). For a graph G =(V, E) and a subset W \subseteq V, the subgraph of G induced by W, denoted as G[W], is the graph H=(W, F) such that, for all u, v \in W,



if $(u, v) \in E$, then $(u, v) \in F$. We say H is an induced subgraph of G. Equivalently, we can define subgraphs and induced sub graphs in terms of deletion of vertices and edges: H is an induced subgraph of G if it is obtained by deletion of vertices, and H is a subgraph of G if it is obtained by deletion of vertices and edges.

A graph G is said to be connected, if every pair of vertices is connected by a path. If there is exactly one path connecting each pair of vertices, we say G is a tree. Equivalently, a tree is a connected graph with (n-1) edges. A path graph P_n is a connected graph on n vertices such that degree of each vertex is less than or equal to two. A cycle graph C_n is a connected graph on n vertices such that every vertex has degree exactly two.

A complete graph K_n is a graph with n vertices such that every vertex is adjacent to all the others. A bipartite graph G=(V, E) is a graph such that there exists a partition P=(A, B) of V such that every edge of G connects a vertex in A to one in B. Equivalently, G is said to be bipartite if A and B are independent sets. The bipartite graph is also denoted as G=(A, B, E) where E is the edge set. The join of two graphs $G_1=(V_1, E_1)$ and $G_2=(V_2, E_2)$ with disjoint vertex sets V_1 and V_2 is the graph G=(V, E)such that $V=V_1\cup V_2$ and $E=E_1\cup E_2\cup\{(u, v): u\in V_1, v\in V_2\}$, that is, G is obtained by connecting every vertex of G_1 to every vertex of G_2 .

Labeling of a graph

A Graph labelingis an assignment of finite subset of set of integers to the vertices or edges or both subject to certain conditions. 'Graph labeling' as an independent notion using numbers was first introduced by Alexander Rosa [10] in 1967.B. D. Acharya [1]associated an arbitrary

non-empty set to the graphs and laid foundations for the set-valuations of graphs. Later, numerous graph and digraph labeling techniques were introduced and have been remarkably surveyed by Joseph A. Gallian [4]. We shall define two labeling of the same graph to be equivalent if one can be transformed into the other by an automorphism of the graph. In general, graph labeling, where the basic elements (i.e., vertices and/or edges) of a graph are assigned elements of a given set or subsets of a nonempty 'ground set' subject to certain given conditions, has often been motivated by a lot of practical situations.

The beginning of the story

Even though the study of graceful graphs and graceful labeling methods was introduced by Rosa the term graceful graph was used first by Golomb [5] in 1972. Rosa defined a β -valuation of a (p, q)-graph G as an injection f from the vertices of G to the set $\{0, 1..., q-1\}$ such that, when each edge (x, y) is assigned the label |f(x)-f(y)|, the resulting edge labels are all distinct. The β -valuations of a graph originated as a means of attacking the conjecture of Ringel. A few years later, Golombrenamed β -labeling as graceful labeling as it is known today. Many problems of graph theory consist in finding a vertex or an edge labeling for a graph satisfying certain properties. In a graceful labeling of a graph G the resulting edge labels must be distinct and take values 1, 2... q. That is, the vertices are labeled with distinct numbers chosen from 0 to m, where m is the number of edges, such that each edge is labeled with the absolute difference of the labels of its end vertices and it is unique in the graph. Rosa showed that if every tree is graceful, then Ringel's conjecture holds. Since then, researchers have been trying to prove Ringel's conjecture

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through the Graceful Tree Conjecture, which claims that every tree is graceful. However, graceful graphs gained their own merit of study over the years of research.

Graceful graphs

A graph is said to be graceful if the numbers used to label its vertices are distinct values of the set $\{0,1,2,3...m\}$ and the edge labels are distinct values of the set $\{1,2,3...m\}$ where the edge labels are absolute values of the difference of vertex labels. Rosa defined the α -labeling of a graph as a graceful labeling with the additional property that there exists an integer k so that for every edge (x, y) either $f(x) \le k < f(y)$ or $f(y) \le k < f(x)$. The graphs with α -labeling have proved to be useful in the development of the theory of graph decompositions. Acharya proved that every graph can be embedded as an induced subgraph of a graceful graph [2] and a connected graph. Acharya, Raoand Arumugham proved that every triangle-free graph can be embedded as an induced subgraph of a triangle-free graceful graph. They also proved that every planar graph can be embedded as an induced subgraph and every tree can be embedded as an induced subgraph of a graceful graph and every

It is proved that the complete graph K_n is set-graceful if and only if $n \in \{2, 3, 6\}$. Also the complete graph K_n is topologically set-graceful if and only if $n \le 3$. A graph G is said to be bi-set-graceful if both G and its line-graph are set-graceful. It is proved that a graph G is set-sequential if and only if $G+K_1$ is set-graceful. It is interesting to note that the concept of being set-graceful and set-sequential are equivalent for a tree.

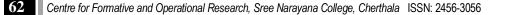
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A condition for a graceful graph labeling

If a (p, q)-graph G has a set-graceful labeling with respect to a set X of cardinality $m \ge 2$, then there exists a partition of the vertex set V(G) into two nonempty sets A and B such that the number of edges joining the vertices of A with those of B is exactly 2^{m-1} . It is also known that a graph G with q edges is k-graceful if there exists a labeling f from the vertices of G to the set $\{0,1,2, q+k-1\}$ such that the set of edge labels induced by the absolute value of the difference of the labels of adjacent vertices is the set $\{k, k+1, \dots, q+k-1\}$. Thus a graceful labeling of a graph G is a vertex labeling f: V \rightarrow [0, m] such that the function f is injective and the induced edge labeling $f_{Y}:E \rightarrow [1, m]$ defined by $f_{Y}(u, v) = |f(u) - f(v)|$ is also injective. If a graph G admits a graceful labeling, then we say G is a graceful graph. Although the theory of graceful graphs has been studied for a very long time-span, not many general results are known about graceful labeling. Most of the results are about asserting the gracefulness of a graph-class since it suffices to show a graceful labeling for each graph in the class. The characterization of graceful graphs has always remained as an active area for the researchers.

An example of a graceful graph labeling

In order to gain some intuition on how to label a graph gracefully, let us show how to label a path graph. So, take a path graph P_n and let V $(P_n) = \{u_0, u_1...u_{(n-1)}\}$ be the set of vertices such that $(u_{(k-1)}, u_k) \in E(P_n)$ for 0 < k < n. Since P_n has m = (n-1) edges, we must label the vertices with numbers from 0 to (n-1) so that every number between 1 and (n-1) appears as an edge label. We start with edge label (n-1) since there is only one



way to get an absolute difference equal to (n-1), which is having a vertex with label 0 adjacent to a vertex with label (n-1). Thus, let us try labeling u_0 with 0 and u_1 with (n-1). Next, let us try to get an edge label with value (n-2). There are only two possible ways to get (n-2) as an absolute difference: (n-2) = |(n-2)-0| = |(n-1)-1|. Since u_0 has no more unlabeled adjacent vertices, we can only get the edge label (n-2) by labeling u_2 with 1. Going on with this strategy, our resulting labeling will be graceful graph labeling.

The graceful labeling problem

The study of graceful labeling of a graph has always been a very prolific area of research in graph theory. The graceful labeling problem is to determine which graphs are graceful. Proving a graph G is or is not graceful involves either producing a graceful labeling of G or showing that G does not admit a graceful labeling. The graceful labeling of graphs is perceived to be a primarily theoretical topic in the field of graph theory. The gracefully labelled graphs often serve as models in a wide range of applications. These applications include coding theory and communication network addressing. Bloom and Golomb give a detailed account of some of the important applications of gracefully labelled graphs. That 'all trees are graceful' is a long-standing conjecture known as the "Ringel-Kotzig Conjecture". A characteristic change from assigning numbers to the basic elements of a given graph G was made by suggesting to consider setvalued functions, and these changes were motivated by certain considerations in social psychology. Interpersonal relationships depend on personal attitudes of the individuals in any social group. When opinions are expressed by the individuals to others in the group, the types

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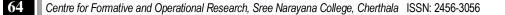
of interpersonal interactions get affirmed and/or modified. On the other hand, such affirmations and/or modifications in various types of interpersonal interaction in the group could induce change in the attitudes of the persons in the group. Actually, this phenomenon has motivated a study of total set-valuations or assignment of subsets of a given set to the basic elements of a given graph with a variety of constraints motivated either by theoretical or by practical considerations. Thus a set-valuation of a graph G=(V, E) is simply an assignment of elements of the power set 2^X of a given nonempty 'ground set' X to the basic elements of G; having a variety of origins.

Magic labeling of a Graph

Edge magic total labeling of G is assigning the labels to the vertices and edges, such that the sum of the labels of edge and its end vertices are constant k for each edge in G. If there exists two constants k1 and k2 such that the above sum is either k1 or k2, it is said to be edge bimagic total labeling. If there exist distinct constants for all edges, it is said to be edge antimagic total labeling.

Mean Labeling of a graph

A graph G=(V, E) with p vertices and q edges is said to be a mean graph[7], if it is possible to label the vertices x in V with distinct elements from 0,1,2,3,...q in such a way that when each edge e=(u, v) is labelled with (f(u)+f(v))/2 if f(u)+f(v) is even, with (f(u)+f(v)+1)/2 if f(u)+f(v) is odd and the resulting edge labels are distinct. In this case, *f* is called a mean labeling of G.



A Set-indexer of a graph

A Set-indexer of G is an injective 'vertex set-valuation' $f: V(G) \rightarrow 2^X$ such that the induced edge set-valuation on the edges (u, v) of G defined by $f(u) \bigoplus f(v)$, $\forall (u,v) \in E(G)$ is also injective, where ' \bigoplus ' denotes the operation of taking the symmetric difference of the subsets of X. It is proved that every graph has a set-indexer. A graph G is said to be setgraceful if there exists a set X and a set-indexer $f:V(G) \rightarrow 2^X$ such that $f(E(G))=2^X-\{\varphi\}$. The characterization of set graceful graphs is still an open problem in this area.

There are results analogue of well-known properties of arbitrary networks like Kirchhoff's Voltage Law (KVL); the analogy could be seen by treating P(X) as an additive 'voltage group' where the 'addition' is the binary operation of taking symmetric difference between any two subsets of X.

Topological set-indexers

It is proved that for every graph G there exists a topological setindexer (or, a T-set-indexer), which is a set-indexer $f:V(G)\rightarrow 2^X$ such that the family $f(V(G))=\{f(u):u\in V(G)\}$ is a topology on X, thereby establishing a link between graph theory and point-set topology. A topological set-indexer of a graph G is a set-indexer $f:V(G)\rightarrow 2^X$ for which f(V(G)) is a topology on X. A set-graceful graph G= (V, E) is said to be topologically set-graceful if the set-indexer on G is a topological setindexer. A topology τ on a non-empty set X is said to be graceful if there exists a graph G=(V, E) and a set-graceful labeling $f:V(G)\rightarrow 2^X$ of G such that $f(V)=\tau$, G is then a realization of τ denoted by $G(\tau)$ as and when

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found convenient .In particular τ is said to be graceful if f is a graceful set-indexer of some realization of τ . A set indexing number $\sigma(G)$ of a graph G is defined to be the least positive integer n such that G has a set-indexer with respect to X_n. Further if f is a set-indexer of G with n= $\sigma(G)$ then f is termed as optimal set-indexer of G.

We can relate a graph G to different topological structures. In 1967, J. W. Evans proved that there is a one to one correspondence between the set of all topologies with n points and the set of all transitive digraphs with n points. The labeling of vertices and edges of a graph G subject to certain conditions have been often motivated by their utility in various applied fields and their intrinsic mathematical interest. The wellknown Four Colour theorem was originated in 1853 and remained as Four Colour Conjecture for more than 150 years till it was solved in 1977. Later following many illustrious works on β -valuations, there followed a lot of other ways of labeling such as arithmetic labeling, felicitous labeling, elegant labeling, sequential labeling etc. The field of setvaluations and set-graceful labeling is an active area of research providing splendid open problems and new directions in the theory of set-valuations of graphs.

Topogenic set-indexers of a graph

A set-indexer *f* of a graph G=(V,E) is topogenic [6], if the family $f(V(G))\cup f_L(E(G))$ is a topology on X, where $f(V(G))=\{f(u):u\in V(G)\}$ and $f_L(E(G))=\{f_L(e):e\in E(G)\}$. In particular, if $f(V(G))\cup f_L(E(G))=P(X)$, then *f* is called a graceful topogenic set-indexer.



Topoline set-indexers of a graph

The concept of topoline set-indexers of a graph was introduced by Ullas Thomas and Sunil. C. Mathew[9]. It is proved that for every graph G there exists a topological set-indexer (or, a T-set-indexer), but every graph do not admit a topoline set indexer. This fact caused the origin of Topoline graphs. A topoline graph is a graph which admits a topoline set-indexer. A Topoline set-indexer is a set-indexer $f: V \cup E \rightarrow 2^X of$ a non-empty graph G, such that the family $f(E(G)) \cup \{\varphi\}$ is a topology on X. It is proved that any set-graceful labeling is a topoline set-indexer but the converse is not true. A lot of results are being derived about interrelationships between topological, topogenic and topoline set-indexers of graphs.

Conclusion

The field of labeling of graphs have been an active area of research ever since its introduction. Based on the labeling techniques discussed here, numerous labeling techniques have been defined and a lot of surveys of labeling techniques have been carried out so far. Still, a lot of research scholars are working in the area. The concept of labeling has been adopted and visualized by many other related branches of mathematics. Deriving new labeling techniques and finding applications of the labeling techniques in real life situations are active open research problems for researchers.



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PSYCHOLOGICAL ASPECTS OF CHATHURVARNYA: THE BHAGAVAD-GITA'S PERSPECTIVE

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Abstract

'Varna' means elightening, inspiring etc. In Indian Philosophy especially Bhagavad Gita, Chathurvarnya has no relation with the caste system. A human being acquires a varna according to his qualities (guna) and actions (karma). There is no birth or inheritance in the role of social philosophy of chathurvarnya. Chathurvarnya order was established based on the level of evolution of the Individual soul towards perfection.

Key words:

1.	Artha	:	Prosperity, economic values
2.	Ashrama	:	Four age—based life stages
3.	Dharma	:	Is an order that makes life and universe
			Possible
4.	Guna	:	attribute of nature
5.	Kama	:	Pleasure, psychological values
6.	Kshathriyas	:	Martial class forms defense and
			And administration of the society
7.	Lokasamgraha	:	Welfare of the world
8.	Moksha	:	Liberation from worldly attachments
9.	Purusharthas	:	Aims of life
10.	Rajas	:	Passion
11.	Shudras	:	Service / artisan class
12.	Svadharma	:	One's own duty
13.	Sattva	:	Goodness
14.	Tamas	:	Inertia
15.	Varna	:	Type, order
16.	Vaishyas	:	Productive class, (business & Trade)
17.	Vyavaharika level	:	Empirical level
18.	Yoga	:	Skill in action

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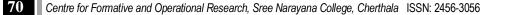
1. Introduction

The great rishies of India devised a profound system called *Varna-Ashrama Dharma* for the harmonious realisation of the *Purusharthas*– four values of life. *Dharma, Artha, Kama, Moksha* are the *Purusharthas*. The personal and social life of the individual has to be shaped by duties and obligations according to the person's *guna*'s (aptitudes) and abilities. According to Sri Krishna in the *Bhagavad-Gita*, "the four-fold grades were created by myself on the basis of innate disposition and vocation that accorded with each; know me to be the maker of such as also to be its undoer"¹ The four *varnas* are, the *Brahmanas*, the *Kshatriyas*, the *Vaishyas* and the *Shudras*. Psychologically one's personality is based on his innate qualities or *gunas*.

1.1 Svadharma

The intrinsic nature, or what basically constitutes is the uniqueness of personality, is called *svadharma* or one's own *dharma*. *Svadharma* is determined by an individual's inner tendencies and mental impressions. This has no reference to caste. For instance, Drona, though recognised as a Brahmin by birth, stands on the battle field as a warrior to fulfil his *svadharma*.

Performing the duties of the *varna-ashrama* is known as the *svadharma*. Each individual should carry out his duties strictly in accordance with what is laid down for his *varna & ashrama*. The true basis of this system is *guna* and *karma*, ie., the individual's virtue and action. The story of Satyakama, son of Jabala from the *Chandogya Upanishad*, speaks the real nature of *varna* system.² In this context, one



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should look into the mental aptitude and physical fitness of a person to carry out the assigned task satisfactorily so as to benefit him and also to benefit the society. So, better it is left to the individual to find out the duties that he would be able to accomplish on the basis of his *guna* and *karma*.

Suppose a *Brahmin* by birth is interested in doing trade and commerce by virtue of his qualities, then there should not be any objection to such an activity. In such a case he belongs virtually to a *Vaishya* by *varna* criterion, although he continues as a *Brahmin* in the society. That becomes his *svadharma*. *Varna* system gives freedom, it should be the endeavour of a 'lower' *varna* individual to make efforts to refine himself to achieve the *varna* quality and perfection. According to Dr. S. Radhakrishnan, "the emphasis is on *guna* (aptitude) and *karma* (function) and not*jati* (caste). The *varna* or order to which we belong is independent of sex, birth or breeding. A class determined by temperament and vocation is not caste determined by birth and heredity. The four-fold order is designed for human evolution...."³

1.2 Varna, Dharma and Society

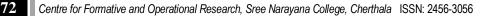
The vedic ethics is expressed in the form of *varna dharma*. The first reference to the four-fold division of society is found in a *Rig* Vedic hymn known as *Purusa-Sukta*. In the process of creation, it specifically mentions the four *varnas*: *Brahmin, Kshatriya, Vaishya* and *Shudra*. *Purusha-Sukta* establishes an organic theory of society. The *Brahmin* stands for religion, science and the higher morality, the *Kshatriya* for war, politics and administration; the *Vaishya* for the trades, professions and

industries; the *Shudra* for labour and service. It is only when these four departments of human activity are all in a flourishing condition that the society, nation is sound and great. When any of these disappear, it is bad for the body of the society. Famous management thinker Henry Fayol's first management principle is division of work. Division of work implies the principle of specialisation. Total activities must be assessed, enumerated and then grouped on the basis of specialisation. This would promote efficiency and facilitate fixing of the responsibility.

1.3 Qualities of Varnas

Sri Krishna gives his delineation of the four psychological types in verses 41 through 45, chapter 18. The qualities of *Brahmin* such as calmness, self-restraint and the like are evidently of a sattvic nature. In Brahmins life sattva *guna* dominates *rajas*. When a man enters into a bipolarity with the Absolute Reality and experience wisdom–dictates of the science of the Absolute Reality—he becomes a *Brahmana*. The Vedic Tradition also holds the *Brahmin varna* as the first by virtue of its spiritual wisdom. It represents the intellectual class that provides guidance in ethical and moral problems. According to *BrihadaranyakaUpanishad*, "who departs from this world without knowing this Imperishable (Brahman or Reality) is miserable, a kripanah. But one who departs from this world after knowing this Imperishable (Brahmana".⁴

Great Buddhist Book the *Dhammapada* says *Brahmana* is "not by matted hair, not by lineage, not by caste, does one become a *Brahmana*, he is a *Brahmana* in whom there are truth and righteousness."⁵



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When one comprehends with the Absolute in the *vyavaharika* level with a coloured mind, and is swayed by his passions to stand by those values, he becomes a *Kshatriya*. In verse 43, chapter 18, the *Kshatriya* is described as prowess, firmness and skill and as one who does not abscond from his duties, generosity and sovereignty. When a person confines himself to the actualities of the work, always getting and spending and having only a feeble undercurrent of the Absolute, he becomes a *Vaishya*. In verse 44, Chapter 18, the *Vaishya's* functions are described as agriculture, cattle rearing and trade. A person tied down to the harsh actualities of the mundane world and passing his days in a protracted agony for which he sees no alternative, becomes a *shudra*. According to *Gita*, the duty of *shudra*, is action consisting of service.⁶

The *Brahmin varna* represents the intellectual class that provides guidance in moral matters. *Kshatriyas*' main function is to protect the people from external and internal disorders. The function of *Vaishya* is generation of wealth and its distribution in the society. The *Shudravarna* finds it natural to engage in providing variety of services for the society.

1.4 Bhagavad-Gita & Plato

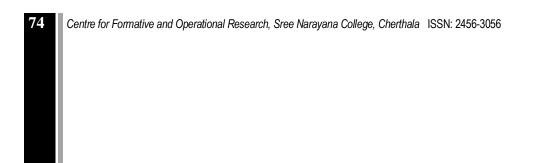
The four varnas spoken of in the *Gita* are recognised by Plato; the soldiers, the philosophers and servant. In a modern society people belong to holy orders, military service, business and wage-earning groups. The Philosophers are people whose particular virtue is wisdom. Only Philosphers with superior knowledge do not seek their own interest. Thus, to a certain extent we can find in Plato *'svadharma'* or duty according to one's station as found in the *Bhagavad Gita*. According to K. M. Munshi,

"The three classes of Plato's society and the four-fold order of the *Bhagavad Gita* imply a social pyramid at the top of which stands the man of purity or reason. The other can mount to the top of the social pyramid. There is no bar to this ascent, except lack of aspiration and of the will to become. Its path cuts across all the natural and artificial barriers created by heredity tradition and social environment.⁷

There are dissimilarities between Plato and *Gita* about the concept of class system. Plato says that the ruler is to rule and the soldier is to protect the society as well as state. On the other hand, the *Gita* advocates that it is the privilege of the ruling class itself to provide security to society and state. The *Gita* calls this class of rulers cum soldiers, the *Kshatriyas*. While Plato believes the ruler is a philosopher and not a soldier and so it is not functional as a ruler-soldier, for, he is a Philosopher-King only. *Gita* says, a soldier has all the rights not only to fight and protect but also to rule.

1.5 'Svadharma' and 'My Station' and Its Duties

The *Bhagavad-Gita* anticipates Bradley's conception of 'My Station and Its Duties'. Every person is born with particular attitudes in a particular social environment. His special duties are strictly determined by his particular station in life, and he should perform these duties faithfully to realise his highest personal good and the general goal. Every person ought to follow the best of his own genius and determine his duties accordingly in conformity with his station in life. The individual special duties are determined by his station in society or his place in the actual social relations. The *Gita* enjoins the performance of specific duties for



the good of the humanity (*lokasamgraha*) and attainment of God, while Bradley enjoins the performance of duties appropriate to one's station in the society for self-realization.

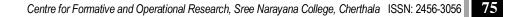
Conclusion

The *Gita* here is not concerned with social obligations, but only with that harmony between the inner and outer life of an individual which is the union (yoga) that should lead him to the Supreme Good. From this it is clear that it is not one's birth that decides one's work. It is one's temperament and attitude which open up a value vision.

The caste system is not *chathurvarnya*. In the purity of *chathurvarnya*, the status of a man is fixed by his capacities and his inner nature and not by birth in the caste system. This idea fixed the status of a man not by his birth but by his capacities and his inner nature. According to *Gita* "better is one's own duty though imperfect, than the duty of another well performed".⁸

References

- [1] Bhagavad-Gita, 4:13
- [2] Chandogya Upanishad, 4:41
- [3] Radhakrishnan S, The *Bhagavad-Gita with an Introductory Essay* (*London*: George and Unwin, 1948) p.160-161.





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