

TOWARDS MEASURING QUALITY OF LIFE IN FARMING SYSTEMS A CASE FROM NORTHERN THAILAND

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Abstract

This study aims to contribute to the discussion on quality of life in rural areas. Living standard is understood as a part of quality of life. Definitions, criteria and a concept for analyses of the living standard are presented which includes eight criteria and the respective types of analyses. Thus, the paper presents a concept of measuring and assessing living standard and enters the area of livelihood assessment. It is applied under remote conditions in Northern Thailand in a comparative analysis between different ethnic groups. The results show, that there are methodological instruments available to not only analyse the physical, economic and administrative developments in farming and rural areas, but also to enter the more complex area of multiple objectives and diversified values of individuals and societies. The results indicate the need for further discussions and research towards improvement of systems-oriented approaches in measuring quality of life.

1. Introduction

The quality of life is an increasing concern in research resulting from the fact that single discipline based parameters of success fall short in covering the multiple structure of needs and problems/objectives of human beings. Systems research has contributed much to open the multi-disciplinary discussion on the complexity of the objectives of people (see Doppler, 2000a and 2000b). If “Quality of Life” is to be treated scientifically, it should be based on people’s view and should reflect their problems, objectives and priorities in decision-making in solving their problems (following their objectives). In the past, many studies using the term “Quality of life” have been carried out in the fields of health and social services, and increasingly in medicine and urban living. Less was done in the areas of rural life. Quality of life is neither clearly defined with generally accepted definition (Szalai A., 1980), nor are comprehensive concepts available which provide ways to measure an impact of development strategies on the way of life. What could be a starting point for this?

2. Definitions and concepts

The World Bank defines quality of life as “people’s overall well-being” and stresses the difficulty to measure quality of life. This is partly explained by the fact that it is related also to intangible components such as quality of the environment, national security, personal safety, and political and economic freedoms. Wingo (1973) defined the quality of life as the quality of the social and physical (both human-made and natural) environment in which people pursue the gratification of their wants and needs (Wingo, 1973 cited in Power, 1980). Power (1980) understands that “the quality of life encompasses the character of the external experiential environments in which people live their lives. It provides the backdrop against which all human activity takes place and provides a flow of valuable services to people which make their pursuit of happiness both possible and easier”.

We suggest to consider living standard (Doppler, 2000a and 2000b) as a part of way of life. The areas covered by living standard are represented by the criteria for measuring as described in Table 1. Most of these criteria can be quantified and related to specific analyses (Table 2). In addition, this offers the opportunity to measure future impacts of certain strategies on the living standard. Systems approaches are required to carry out analyses and future impact studies based on this complex set of evaluation criteria. In addition, this can be related to the multiple objective structure in many farming and rural families.

Table 1: Criteria for living standard

<p>1. Family income This is the total of farm, household and off-farm/off-household income. Cash family income is the cash part of family income (excluding subsistence and imputed values)</p> <p>2. Cash and liquidity Ensuring that cash is available at the point in time when essential duties require cash, such as ensuring existence minimum, ensuring payment for external resources (land, water, credit) if otherwise those resource needed would not be available in the future or own resources (e.g. land, livestock) would be lost</p> <p>3. Independency on resource owner Dependencies of families on other individual persons, families or organizations are often related to provision of resources (land, water credit), means of production (seed, fertilizers, pesticides) or to selling or processing of products.</p> <p>4. Food supply and food security This includes the amount and quality of supply of food from farm as well as from market over time. This will be influenced by size of family, the family cycle, resources for subsistence production, storage and preparation as well as the degree of market orientation and access.</p> <p>5. Supply of water, housing, sanitary equipment, energy and clothes Amount and quality of water as well as the resource required to ensure availability is central to the level of living standard. While housing and clothes are often of less importance, the sanitary conditions require high attention.</p> <p>6. Health conditions of the family Ensuring minimal health problems. Amount and quality of food and water supply as well as the sanitary behaviour are the main prophylactic sectors which will have to be related to curative measures using the own or local knowledge and natural potential as well as modern medicine</p> <p>7. Education and qualification Education and qualification to add new dimensions and possibilities to experiences and knowledge from the family and own society. It is a long-term issue and is relevant for decision-making for all remaining in the farming business as well as for those seeking employment outside their farms.</p> <p>8. Social security To ensure the survival or well-being of older people, widows, orphans and handicapped many family decisions are made to provide the economic base for this insurance, such as accumulating capital in different forms, higher education for children and social norms.</p>

Quality of life goes beyond living standard. We suggest, that the following areas are added to living standard to cover what can be understood as way of life:

- Degree of happiness,
- Humanistic standards such as personal safety, socio-cultural freedom, spiritual needs,

- Social satisfaction and ethnic freedom,
- Overall well-being.

This will have to be differentiated according to individuals, families and societies' views and needs. These areas are still under discussion (see for example Flora, C.B., 1999; Park, S., 2000; Garrison, B.M.E., 1998; UNDP, 1999; Ellis, F., 2000) and need more specification, especially a clear definition. This paper will not go into these areas, but restrict to the part of the living standard as part of the way of life or more precise: as a contribution to the discussion and definition of way of life.

Table 2: Criteria of living standard and corresponding analyses in farming systems

Family systems level	Evaluation criteria	Type of analysis
1. Subsystem "Farm"		
a. Economic success	farm income	farm income analysis
b. Economic security	liquidity, cash balance assets and capital stock external capital, credit	cash and liquidity analyses assets analysis analysis of capital accumulation and capital service
2. Subsystem "Household"		
a. Basic needs supply	food, drinking water, housing, clothing	goods supply analyses, gender analyses
b. Health situation	family and external health care and efforts	services supply analyses
c. Security of supply	steadiness, continuity and fluctuations of supply	dynamic and dependency analy- ses in supply of goods and services
d. Economic efficiency	household cash balance work load and hardship	cash and liquidity analyses, gender analyses
3. Subsystem "Off-farm activities"		
a. Economic success	income surplus	income analyses
b. Economic security	security of job, employ- ment or own off-farm enterprise	employment and activity analysis
c. Higher qualification	education, training	mobility, education and training analyses
4. Overall System: the family		
a. Economic success	family income	family income analysis liquidity and cash analyses
b. Supply success	family supply	supply analysis, food security
c. Health situation	sickness rates, expenses	health, services and medical analyses
d. Social security	social capital and norms	
e. Risk	capital resources availability	capital resource analyses (assets, accumulation, savings, credit) analyses
	dependency on resource owner	legal relations to landlords, water lords, money lenders, etc.
	dependency on institutions	dependency analysis
f. Education, knowledge	knowledge, flexibility innovative power	education analysis

Source: Doppler, W. (2001)

3. Application of the Living Standard concept in Northern Thailand

The above-presented concept was applied in the Western part of Phayao Province in Northern Thailand with a special focus on an inter-ethnic comparison in a mountain area. There are two different ethnic groups, Thai and Yao, living in different altitudes. The primary information for the analyses were collected in 1999/2000 in a socio-economic family survey in 22 Thai families, 22 Yao families at the middle altitude (Yao-mid) and 20 Yao families at the higher altitude (Yao-high). Cash crop production is dominated by rice in the Thai families, Lychee (fruit tree) and garlic is the main cash crop in Yao mid-altitude families and the Yao tribe at high altitude grow mainly coffee and ginger as cash crops.

Family and farm income

Family income is composed of farm and off-farm income and includes cash and kind as well. It represents the income generating power of the family owned resources and reflects the decision-making abilities of the family. Farm income refers to the income contribution of the farm and the family resources used in the farm and comprises the income generation in one year. A comparative analyses in the three groups in the study area in Northern Thailand (Table 3) results in the fact that there are clear differences between the ethnic groups and their location. Farm income is highest in Yao farms at medium altitude due to high value lychee production with an environment favourable for lychee. Off-farm income plays an important role and is highest in Thai societies reaching 33 % in the study area. Family income per family labour unit used in off-farm and farming activities is also highest in Yao medium altitude. Family income per unit of family labour of all three groups were sufficient to fulfil the minimum basic requirements (poverty line) which was estimated by the National Economic and Social Development Board (NESDB) and the Asian Development Bank (ADB) in September 1998 at an average income of 10,872 Baht (US\$264) per person per year. Among three groups, the Yao medium-altitude families were economically more successful than the other groups.

Table 3: Farm, off-farm, family income and cumulative cash balance in different ethnic groups, Mae Chai district, Phayao Province, Northern Thailand, 1999/2000

Item (Bath/family/year)	Thai (1) N=22	Yao-mid (2) N=22	Yao-high (3) N=20	α^{12} (%)	α^{13} (%)	α^{23} (%)
Farm income	48,530 (±32,542)	107,110 (±43,299)	41,607 (±14,817)	98	91	96
As % of family income	67	83	83			
Off-farm income	24,035 (±10,629)	22,457 (±13,180)	8,775 (±8,739)	42	100	100
As % of family income	33	17	17			
Family income	72,565 (±37,557)	129,567 (±41,701)	50,382 (±18,390)	98	33	100
Per labor unit	23,484	35,595	13,617			
Cumulative cash balance	41,287 (±47,994)	87,733 (±44,629)	10,850 (±15,351)	95	4	99
Median	8,689	70,548	3,655			
As % of family income	57	68	22			

Note: 1/ α = the probability on the assumption that differences is significant in percentage with a confidence level of 95% according to the KRUSKAL-WALLIS test. α^{12} = difference between the Thai and Yao-mid groups. α^{13} = difference between the Thai and Yao-high groups. α^{23} = difference between two Yao groups.
2/ Numbers in parenthesis are confidence limits of mean estimation at a confidence level of 95%.

Cash balance and liquidity

Cumulative cash balance explains the liquidity of family, which is a criterion of economic security of family. Cumulative cash balance of the Yao-mid families is two times higher than the Thai families and eight times higher than the Yao-high families (Table 3). In addition, shortage of cash happened in the Yao-high families during May until December before selling the coffee and ginger. Whereas, the Thai and the Yao-mid families are ensured throughout the year. This shows that the economic situation of the Yao-mid group was more secure than the other groups and the Yao-high group had the lowest security in the economic situation. Compared with the average family income, the cumulative cash of the Yao-high families is more or less one fourth of their average family income.

Independency on resource owners

Family decisions are made on allocation of family resources as well as on getting resources from outside the family. Buying, renting, hiring and similar actions will have to be taken in relation to resource market conditions and economic profitability. One of the crucial point in family based smallholdings is the dependency on resource owner, such as landlords, water-lords, money-lenders etc. who provide resources to families, but may fix unfavourable conditions. If families may not fulfil these conditions they may face the danger of losing their own resources and hence their basis for living. It is for that reason, which any analysis of living standard has to include the issue of dependency. In the study area, land, farm size, land scarcity and land renting practises as well as using own land as security for credits plays an important role. There is no significant difference among the three groups in the land size. Land ownership and title are the important factors to evaluate the security and stability of the farming systems. Most of the Yao families own lands but most of the land are without land title deed and rights because the land belongs to the national park, which is under control of The Royal Forestry Department (Figure 1). However, families are allowed to use the lands for agriculture and living but the areas are limited. Thus, the lands cannot be extended. The Thai families own only 52% of total land but most of the lands have a land title deed or rights for using the lands. This indicates a wide range of dependencies on land rights and ownership between the three groups in the study area.

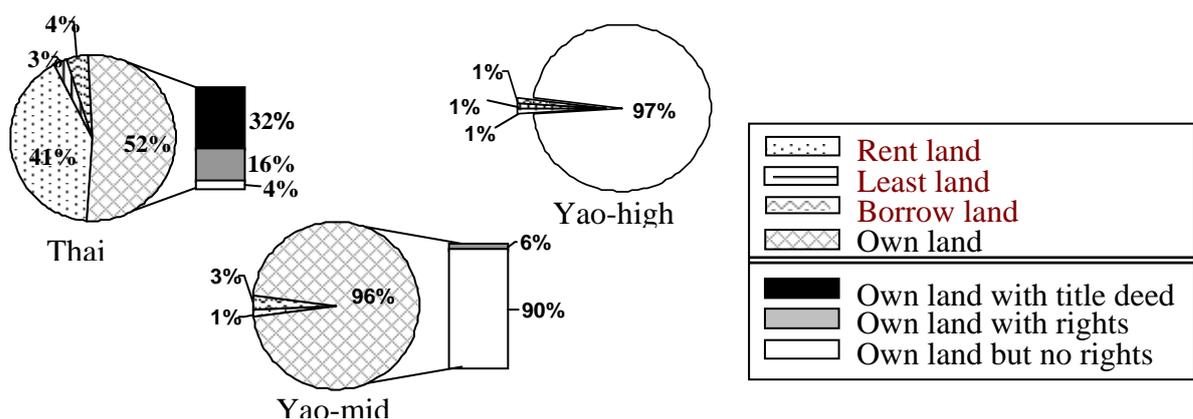


Figure 1: Land ownership and title, Mae Chai District, Phayao Province, Northern Thailand 1999/2000

Food supply and food security

Rice is the main staple food in Thailand. All three groups have consumed rice more than average rice requirement (Table 4). The total amount of consumed rice of the Thai and the Yao-high families mainly come from own production. Whereas, consumed rice of the Yao-mid families mainly come from local market, because most of their lands are engaged in lychee production, which is economically more attractive than rice production. Meat and fish as main protein sources of the villagers are consumed above the minimum requirement in all groups. Since livestock production plays less important role than crop production, the meat and fish supplies mostly came from local market. The Yao-mid families consumed significantly higher amount of meat and fish than the other groups. Two children in two families of the Yao-mid families were found to be undernourished. No malnutrition was found in the other two groups.

Table 4: Food requirement and consumption of the families, Mae Chai District, Phayao Province, Northern Thailand 1999/2000

Food supply (Per family/year)	Thai N=22	Yao-mid N=22	Yao-high N=20
Rice consumptions			
Mean (Kilogram)	1,705	1,235	1,039
CL 95%	±446	±283	±361
Median	1,285	1,177	968
- From own production (% of total)	98	21	78
- From market (% of total)	2	79	22
Rice requirement (Kilogram)	426	573	529
Meat and Fish consumptions			
Mean (Baht)	5,880	11,864	5,667
CL 95%	±1,203	±3,279	±1,604
Median	4,980	10,420	4,890
- From own production (% of total)	16	27	41
- From market (% of total)	84	73	59
Meat& Fish requirement (Baht)^{1/}	3,320	4,483	4,114

Note: 1/ Food requirements are taken from FAO statistical databases.

2/ Meat, pig and poultry meat, and fish requirements in kilogram are calculated in Baht to aggregate them together by using average price.

Supply of water, housing, sanitary equipment, energy and clothes

Ground water is the most important household water source of Thai families. Rainwater is mainly utilised for drinking purposes, whereas ground water is used for other household activities such as washing. Most of the Thai families have enough water throughout the year. The Yao-mid families get water supply from the stream, which was connected by plastic pipes to their house. Twenty-seven percent of the Yao-mid families do not have enough water during dry season. However, some of them collect rainwater for use during water shortage. The Yao-high families use spring water, which is collected in cement tanks and distributed to every house by plastic pipeline. Only 10% of the Yao-high families reported that there was not enough water for household during dry season.

Quality of drinking water in household was examined and it was found that more than half of the Yao-mid families are unsatisfied. Because during the rain season the water becomes dirty due to heavy rain and the pipe could be blocked up by leaves and soil. 95 and 85 percent of the Thai and the Yao-high families, respectively, are satisfied with the quality of drinking water.

The housing situation is, in general, satisfactory since almost all families owned a house. Most of the Thai families have stable houses, which are made from wood and concrete. Most of the Yao families also have stable house. Nevertheless, 28% of the Yao-mid families have unstable house, which is made from bamboo (Figure 2).

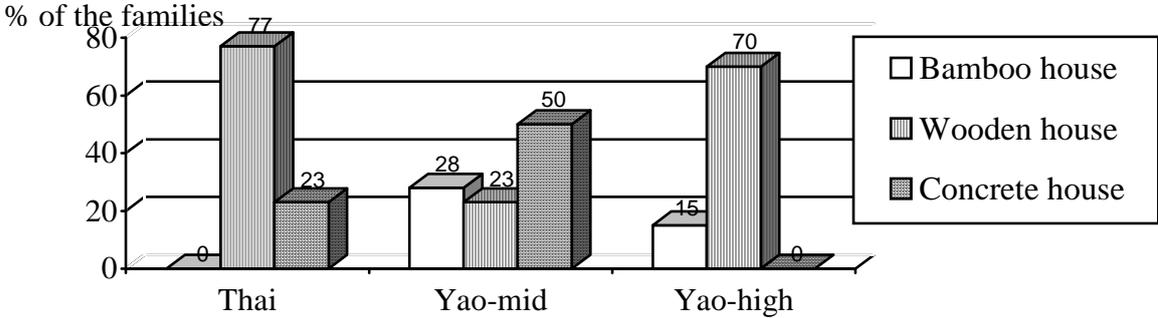


Figure 2: Type of house in the study area, Mae Chai District, Phayao Province, Northern Thailand 1999/2000

Health conditions of the families

The health situation of the Thai families seems to be better than both Yao groups in a way, that less percent of families having sick members (Table 5).

Table 5: Health situation of families, Mae Chai district, Phayao Province, Northern Thailand 1999/2000

Health situation (% of families)	Thai N=22	Yao-mid N=22	Yao-high N=20
<i>Sick persons per year</i>	9	27	15
<i>Medical treatments per year</i> ^{1/}			
1.Hospital	14	23	0
2.Health centre	72	59	75
3.Taking medicine by himself	19	9	30
4.Traditional method/ medicine man	0	5	0
5. Private clinics	0	14	0
<i>Having addicted members (opium)</i>	0	14	10
<i>Cases of children malnutrition/year</i>	0	9	0
<i>Health care expenses (bath/family/year)</i>			
Mean ^{2/}	875	1,836	490
CL95%	±595	±1,043	±367
Median	500	1,250	50
As % of family income	3.73%	5.16%	3.6%

Note: 1/ More than one answer is possible.

2/ The means of the health expense among three groups are significant differences in 96%.

There are both government health stations and a hospital in the lowland where the Thai families live. In the Yao village at the middle altitude, there is a small health station where a Yao health officer is on service. There is no health station in the Yao village at the higher altitude. When members of the Thai families were sick, most of them went to visit a doctor at a health station or hospital in the district (Table 5). Whereas, 27% of the Yao-mid families complained about the poor quality of services in the health station in their village. Thus, when they were sick, they preferred to go down to a health station in Thai villages or to the hospital, some even visited a doctor at private clinic, which is relatively costly. Only a few were still using the traditional method by medicine man. The Yao-high villager went to the health

volunteers in the village when they were sick or would go to the health station of the next village. Anyway, some of them took medicine by themselves.

A specific problem in both Yao groups is the use of opium. All the families having addicted member are relatively poor since they spend a lot of money for buying opium. However, the all of the addicted people are the elderly. The young generation is not addicted. The expenses for health care can reach a high share of the family's budget. It can even involve high level of risk, since extremely high expenses may occur unexpectedly. Capital assets flexible to be transferred into cash (e.g. animals) are essential in avoiding risk of illiquidity. There are significant differences in the average of health expenses among three groups. The Yao-mid families have highest health expenses compared with the other groups. However, the health expenses in all groups are just 3 to 5% of the family income (Table 5).

Education and qualification

Approximately 75% of Thai villages have a primary school in their village. The analysis shows, that 39% of the family members who are older than 14 years in both Yao families groups are uneducated or have not completed the primary school at fourth level and as the result they cannot write and read Thai language. Most of the Thai villagers, 78%, are educated. It is observed that the higher the altitude the lower the educational level of the inhabitants. In contrast to this, the education level of the literate people was investigated and it is revealed that the highest percentage of the people who completed high school is in the Yao-mid group (38%) and followed by the Yao-high group (30%) and the Thai group (28%). There are significant differences in the education level of household heads among three groups. Most of household heads (59%) of the Thai families have completed primary school whereas in both Yao groups most of household heads are uneducated, 59% in the Yao-mid and 75% in the Yao-high families.

Social security and safety of the families

The interviews in the survey revealed that most of the families have never experienced dangerous life such as murder, rape, and/or robbery. The secondary data from basic needs survey in 2000 presented the percentage of families having an accident. It was found that 12.5% of the Yao-mid and 3% of the Yao-high families had encountered in an accident but no any Thai families in the study areas have had an accident. With respect to participation in social development activities, 90% of the Thai, 84% of the Yao-mid and 100% of the Yao-high families have always used their right in political election. In addition, almost all of the families, more than 97%, participated in other social development activities. People's view on environmental issues and their specific environment indicate that 68% of the Thai families are satisfied with the overall change as compared to the situation in the past. 86 percent of the Yao-mid and 70% of the Yao-high families, too, are satisfied with the overall change. They reported that the population of trees in the forest area is increasing as compared to the past when they were burned for agricultural areas. Change of farming system of the Yao-mid group from rice-based farming system to fruit tree farming system is also a reason for having more trees in the study area.

4. Overall assessment of living standard and livelihood

In the previous chapter the individual criteria for living standard of families have been presented and discussed in a case in Northern Thailand. The overall assessment of living standard needs to consider all criteria at the same time (Table 6). It includes all criteria of a family and allows to compare between families of different classes (or different farming systems, social groups, farming and non-farming families, rural and urban families) as well as

the development over time (not included in Table 6). Thus, the overall assessment allows to consider several dimensions of development.

The multi-objective situation in families calls for a multiple assessment procedure. Since families may give individual problems different relevance and may give different weight to the individual objectives in an overall assessment, the goal achievement will have to be valued and weighted according to families' preferences. The *utility assessment* (Zangenmeister, 1970) offers an opportunity to consider the different values of individual objectives and goal achievements.

Table 6: Comparative analysis of living standard and livelihood indicators in different ethnic groups in Northern Thailand, 1999/2000

Indicators	Thai in valley area					Yao at higher altitude				
	Performance	Goal ¹	Value ²	Weight ³	Livelihood ⁴	Performance	Goal ¹	Value ²	Weight ³	Livelihood ⁴
1. Family income										
- per labour	23,484 baht	70	4	6	24	13,617 baht	50	3.3	6	19.8
(higher than poverty line)	(116%)		4			(25%)		3		
- per unit of land (Rai)	4818 baht	70	4			4147 baht	60	3.6		
2. Cash balance (liquidity)	Insured all time,	100	6	5	30	Shortage before selling cash crops,	75	4.5	5	22.5
- As % of family income	57%					22%				
3. Independence on resourceowner										
-Land ownership	Owner 52%	50	3	4	12	Owner 97%	50	3	4	12
-Land title	Full title and rights					No land rights				
4. Food supply and security	More than enough	100	6	6	36	More than enough	100	6	6	36
5. Supply of water, housing, sanitary equipment, energy and cloth			5.9	6	35.4			5	6	30
-Drinking water	5% unsatisfied	95	5.7			15% unsatisfied	85	5		
-Own house	100%	100	6			85%	85	5		
-Type of house	Stable houses	100	6			15% unstable houses	85	5		
6. Health conditions of the family			5.7	5	28.5			5	5	25
-Having sick members	9%	90	5.5			15%	85	5		
-Health treatment	86% with doctor or health officer	86	5.2			75% with doctor of health officer	75	4.5		
-Having opium addicted members	No	100	6			10%	75	4.5		
-Having malnourished child.	No	100	6			No	100	6		
7. Education and qualification										
-Educational attainment	78% of members educated	78	4.7	4	18.8	61% of members educated	61	3.7	4	14.8
8. Social security			5.4	4	21.6			5.5	4	22.0
- Having a warm family	98%	98	5.9			100%	100	6		
- Safe life	100%	100	6			97%	97	5.8		
- Environment	68%	68	4.1			70%	70	4		
- Social participation	90%	90	5.4			100%	100	6		
Livelihood indicators					206.3					182.1

Note: 1/ Goal achievement in % of families' objective, 2/ Value of goal achievement (1-6), 3/ Weight of goal (1-6), 4/ Livelihood indicator

In the case of comparative analyses of projects and project alternatives, this has been modified and applied by Doppler (1985, pp.366-374) where special reference was given to family level. The rationale and concept can be used to determine a *livelihood indicator* as shown in Table 6. The weight of an objective (criteria) may differ in relation in culture or to the level of needs and achievement of goals. It is for that reason, that empirical knowledge from the families' should be available. In Table 6 an example of this procedure is given. The goal achievement in % of families' objective is used to estimate the families' value for the individual goal (here: a value between 1 and 6). The relevance and weight of an individual goal in relation to the other goals is weighted between 1 and 6, where a weight of 6 means an very important goal as compared to a goal with a weight factor of only 1. The value of goal achievement of goal x is multiplied by the weighting factor y of the specific goal and this gives the contribution of an individual goal to livelihood. All livelihood values of the goals together give the livelihood indicator in the farming system. In Table 6 the livelihood indicator in Thai systems is 206 and in Yao-high altitude it is 182. The livelihood in Thai farming systems is higher than in Yao. The definition and measuring of the values of goal achievement and weighting factors may be difficult and needs further discussion and research. The important point is, that the justification of the determination of such parameters has to be given and basic assumption will have to be laid open and transparent. As soon as the process and the assumption era transparent, such aggregated indices may be used.

Conclusions

There is an urgent need for further discussion on terminologies and concepts when going beyond a disciplinary based approach. Farming and rural systems should not only include the systems view in physical, economic and administrative sectors, but also the human being' s needs, preferences and values. This is the area were farmers' local knowledge and values, participation of people has to come in and contribute to the better understanding of the overall complexity.

This paper selected a certain sector of individuals' and societies' objectives, needs and views. The selected criteria for living standard have been applied under practical conditions in a remote environment in a mountain zone. It has shown that it is possible to acquire information needed and to apply analyses to estimate living standard of people. Furthermore, the aggregation of criteria for living standard and the weighting according to families' preference may indicate future potential of research. It can be assumed that this will also contribute to future strategy testing with impact modelling. The concept presented and applied is not a final concept and we expect further improvement in the future. It should, however, contribute to the discussions in the fields of "living standard", "livelihood", "welfare" and "quality of life".

References

- DOPPLER, W. 1985: Planung, Evaluierung und Management von Entwicklungsprojekten. Verlag VAUK, Kiel
- DOPPLER, W. 2000A. Setting the frame: Environmental perspectives in Farming and rural systems analyses. In: Doppler W. and Koutsouris A. (Eds.): *Rural and Farming Systems Analyses: Environmental Perspectives*. Margraf Verlag, Weikersheim, pp.1-9
- DOPPLER, W. 2000B. Farming and Rural Systems –State of the Art in Research and Development- In: Doppler W. and Calatrava J. (Eds.): *Technical and Social Systems Approaches for Sustainable Rural Development*. Margraf Verlag, Weikersheim, pp. 3-21
- FAO. 1999. Online statistical databases on nutrition. <http://apps.fao.org/>

- ELLIS, F. 2000. *Rural Livelihoods and Diversity in Developing Countries*. Oxford University Press. New York
- FLORA, C.B. 1999. From the Director: Quality of Life Versus Standard of Living. *Rural Development News*. Winter 1998-99
- GARRISON, B.M.E. 1998. Determinants of the Quality of Life of Rural Families. *The Journal of Rural Health* 14 (2), pp. 146-153
- PARK, S. 2000. *Concept of the quality of life and its comparison*. Paper presented at the first Seoul Town Meeting (STM) in the Westin Chosun, October 24, 2000.
- POWER, T.M. 1980. *The Economic Value of the Quality of Life*. Westview Press, Colorado.
- SZALAI, A. 1980. The meaning of comparative research on the quality of life. *The quality of life comparative studies*. SAGE studies in International Sociology. Szalai, A. and Andrews, F.M. (eds.), California, USA, pp.7-21.
- ZANGENMEISTER, C. 1970: Nutzwertanalyse in der Systemtechnik. Eine Methode zur multidimensionalen Bewertung und Auswahl von Projektalternativen.