POLICY IMPLICATIONS FOR USING ICTS FOR EMPOWERMENT OF RURAL WOMEN IN GHANA

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ABSTRACT
Using rural household survey data collected from 1000 female household heads selected from all the ten administrative regions in Ghana, this paper explored the policy implications for using ICTs for empowerment of rural women. A contingent valuation (CV) method was used to quantitatively estimate the influence of selected socio-economic factors on rural women's willingness to pay for alternative information delivery technologies. Even though the government sets the overall national ICT policy, the results from this study suggest some merit in allocating considerable authority to regional and local authorities in setting priorities and approaches to empowering rural women through the use of ICT. The study results also point to a need to cast rural empowerment policies and programs within the broader poverty reduction policies of the government and also within the attainment of the Millennium Development Goals (MDGs). The results again indicate the need to formulate policies and programs to prevent duplication of efforts and critical "Political Will".

I. INTRODUCTION

Empowerment of women is emphasized in the Millennium Development Goals (MDGs) and Ghana's own Poverty Reduction Strategy Program (GPRSP) as a measure to address the problem of poverty. The use of modern information and communication technology (ICT) is considered a critical element in the effort to empower rural women. Empowerment entails the ability and freedom to make choices in the social, political, and economic arenas. One of the challenges facing a developing country like Ghana is how effectively information could be made available to rural households to enhance choice-making. ICTs are very expensive, government has budget limitations. One wonders how the government of a developing nation like Ghana could harness the potential of modern technology to meet the information need of most people, especially the marginalized in society. Given the budget restrictions facing developing countries, the possibility of disaggregating implementation of ICT policies that will respond to the unique needs of rural women may have to be explored. This has several policy implications which are drawn from this paper.

II. SCOPE OF STUDY

This paper throws light on the essence of designing a disaggregated ICT policy to empower rural women. The study uses survey data from all the ten administrative regions in Ghana to determine the factors influencing rural women's' choice of information delivery technology. The information delivery technologies considered are private radio, community radio, and extension services.

The motivating hypothesis in this study is that the wide differences in the socio-economic status of rural women households' influences their choice of information delivery technology and also their willingness to pay for a selected technology. This basic hypothesis is addressed using data from a survey instrument administered to 1000 households from the ten administrative regions of the country. Beyond the issue of whether an aggregate rural empowerment ICT policy would be appropriate, the outcome of this exercise has important policy implications for program planning and implementation applications. For example, since Ghana receives considerable funding and technical support from development partners, the results from this study could be used to channel and target donor support to identifiable needs in rural areas so as to minimize waste and duplication of effort. For the government's own resource allocation, a disaggregated ICT policy could lead to significant policy efficiency gains.

III. THE ICT ENVIRONMENT IN GHANA AND THE RURAL SECTOR

Ghana has made a response to the ICT challenge. In 2003, the *Ghana Integrated ICT for Accelerated Development* (ICT4AD) *Policy*, which summarized the vision of Ghana in the information age was announced. While the policy outlines a broad array of objectives, it is clear that the core of the policy is to use ICT to achieve Ghana's vision of becoming a middle-income country by the year 2020. Ghana's ICT policy is supported by a slew of supporting laws, programs, and initiatives such as, the National Initiative Concerning the ICT and Education and Training (NISI), the African Information Society Initiative (AISI), and the Science and Technology Policy Research Institute.

Despite the wide recognition of the role of ICT in national development, a successful ICT program planning and implementation to accelerate empowerment of women in Ghana is beset by several institutional, technical, political, economic and social challenges. As an institutional matter, ICT policy planning and implementation is

spread among several ministries, institutes, research centers, and private agencies. This increases the potential for institutional dissonance and 'turf battles' that could lead to waste and duplication of effort. As a political and social matter, there are concerns that the uneven access to education would translate to a 'gender digital divide' in Ghana unless explicit and credible policies are put in place to address the situation.

Probably the most daunting task facing policy makers in Ghana is making ICT available to a large segment of the population, especially for educational purposes in the rural areas. Some point to the difficult choice between resource allocation to meet immediate needs such as food, shelter, and health versus investing these resources in computers and ICT infrastructure. This 'bread or computers' debate is misplaced because it fails to recognize the symbiotic relationship between ICT/information and rural households' empowerment to improve their welfare.

Also, ICT policies and programs are expensive to design and implement. Resources are needed for infrastructure and operational purposes. Given the pressure on the government's budget, it may be necessary to solicit contributions from rural households, a rather difficult proposition given household income levels in rural areas. Also, it is well established that technology adoption and use depend on the socio-economic characteristics of rural households. Yet the ongoing policy debate concerning ICT in empowering rural households seems tilted to the belief that all Ghana needs is to make ICT available and rural households will jump at the opportunity. A credible and sustainable ICT policy to empower women in rural Ghana should consider the socio-economic characteristics of households, including a determination of their willingness to pay for alternative ICT technologies. This paper attempts to provide such information for ICT policy and program planning and implementation.

Rural Poverty, Status of Rural Women, and ICT in Ghana

The basic document summarizing the state of poverty in Ghana, strategies to defeat poverty, targets, constraints, and projections is the Ghana Poverty Reduction Strategy paper (GPRS, 2003). The GPRS defines poverty as "unacceptable physiological and social deprivation." (pg. 3) and lists participation in decision making, health, education, environmental sustainability, lack of political power as some of the critical considerations in defining poverty.

The high incidence of poverty among women presents a major barrier to ICT adoption. The Ghana Living Standards Survey (GLSS 4, 2000) concluded that women form over 70% of food crop farmers, and 90% of those in internal agricultural distribution, marketing and processing. About 80% of Ghanaian women in the labor force are employed in small, semi-formal and informal undertakings.

There are other constraints that could limit the employment of ICT in empowering rural women. Women constitute the higher percentage (42%) of adult illiteracy population (People who are 15 years and above, and can read and write at least a sentence) in Ghana. Studies have shown that women experience greater poverty, have heavier time burdens, lower rates of utilization of productive resources and lower literacy rates (GLSS 4, 2000). School participation rate for basic and second cycle schools is 77 % for men and 38% for women. Dropout rates remain high at about 20% for boys and 30% for girls at Primary School and 15% for boys and 30% for girls at Junior Secondary School. Programs targeting empowerment of rural women through ICT applications must take into account the targeted population to use the technology.

There are also major barriers to introducing ICT to rural women due to the political context within which rural women function in Ghana. In a true sense, the idea of empowerment' is captured by the participation of rural women in all phases – design, implementation, and evaluation - of policies and programs that affect them. The participation of women in decision-making is the weakest link in the fight against poverty. The GLSS concluded that women are poorly represented at all levels of decision-making. This low level of participation by women excludes their perspectives from policies and legislation; it prevents their input into national budgets and resource allocation, and it deprives society of women's skills, knowledge and their perspectives (Ofei-Aboagye, 2000). Considering these, policies and programs to promote ICT in empowering women in rural areas have to be undertaken with due consideration of the broader socio-economic environment within which women function in Ghana.

Another consideration is the availability of complementary inputs such as computers, voice and video systems, and in some cases, physical access to rural locations. The current infrastructure for telecommunication broadcast to regions in Ghana is limited to serving the major regional centers and capitals. Resources for expanding the reach of the telecommunication infrastructure may be quite limited in light of the findings of a recent survey of budget allocations to the ICT sector. According to the report, the majority of government

ministries and public sector organizations have less than 10% of their total budget on ICT (including acquisition of hardware, software, training, maintenance of ICT systems, etc.). Close to 60% indicated that their ICT expenditure as a percentage of their total expenditure is below 10%. Close to 34% of the organizations reported devoting about a quarter of their total expenditure on ICTs. On the whole, most of the organizations in all the sectors spend less than half of their annual budget on ICT (Ghana, 2004). These call for an innovative policy approaches for using ICTs for empowerment of rural women.

IV. STUDY AREAS AND RESEARCH PROCEDURES

The population of the study was 1000 female household heads randomly selected from the ten administrative regions of Ghana. Hundred female household heads were selected from each of the ten administrative regions. The data used in this study was based on a contingent valuation survey instrument administered in several villages in Ghana. The survey was divided into two main parts. The first part sought information on basic characteristics of households (age, education, dependents, occupation, expenditures, and membership in community organizations.) The second part consisted of a bidding game for alternative information delivery technologies. Three main information delivery technologies were considered – community radio, private radio, and extension agents (printed material). The main distinguishing feature of these technologies was price.

The use of radio in rural communication is very common in Sub-Sahara Africa (SSA). The proposed framework considers radio technology a key information delivery instrument given its popularity. Ghana has one of the highest radio ownership rates in SSA (710 per 1,000 people in 2002) compared to an ownership rate of 198 per 1,000 people in the rest of SSA, and 139 per 1,000 people for all low income countries. Ghana's ownership rate represents about a 207 percent increase over a 7-year period 1995-2002 (World Bank, 2003). Following the approach used in several studies, information dissemination through the radio is considered in two contexts - private radio and community radio. There are good reasons to consider radio use in these two contexts. Governments and donors who usually fund the rural education programs may want to reduce the cost of information dissemination by increasing the number of radio listeners usually in a group format. In this context, the amount of contribution to be made by information recipients is correspondingly reduced, making households more willing to pay for the information. An added benefit of a community radio format is the opportunities for listeners to interact and react to information received taking into account the views and opinions of other receivers of information. This interaction enriches the learning process and may be preferred by households.

On the other hand, there may be some rural households that prefer their own private radio to receive information. It is plausible that younger and educated females may want to have the freedom to listen to other radio programs (for example, broadcasts in English), and therefore will be more willing to pay for their own radio instead of paying for a community radio. It is also very likely that educated rural dwellers have higher incomes since they may draw income from both farm and non-farm sources. In this context, they are in a position to pay for their own radio sets to receive information.

In terms of print media, the focus is on extension bulletins and adult education publications. The extension and adult education publications are assumed to be part of a person-to-person information delivery protocol. Information through the print media is assumed to be delivered by extension agents. There is no consideration of newspaper given the currently low level of circulation (about 14 per 1000 population in 2001) compared to about 40 per thousand population for low-income countries for the same period (World Bank, 2003).
The preceding suggests that the study considers information delivery by community radio to be the cheapest since several households contribute to the purchase and maintenance of the system. Extension agents are considered the next cheapest of the three technologies considered because the government pays these agents. The idea is to explore the extent to which a part of the cost of extension information delivery could be shifted to households and lessen the burden on government. The most expensive delivery technology as assumed in the study is the private radio since a household owns it individually and pays full amount for it.

Bidding took the form of a series of specific questions. For example, a respondent was asked whether she would be willing to pay ¢1,000 per year to use a community radio. If 'yes' the question was posed again with an increase in the amount to ¢2,000. The process continued until 'No' answered. The final amount to which the respondent answered 'yes' was recorded as the maximum willingness to pay to have the community radio installed in the village. For extension agents, the beginning bid was at ¢5,000, while for private radios, the beginning point was ¢10,000. Respondents were also asked to state an amount they will be willing to pay for each of the information delivery technologies.

Field data was collected with the assistance of staff of the Institute of Adult Education. These are people located in the Regional Centers of the Institute, which is established in all the ten Regions of Ghana and are constantly engaged in community programs with the local people. Their residence in the regions, accumulated community research and training experience helped to do rapid field data collection. Data was collected in a face-to-face interview where the interviewer had the opportunity to explain the purpose of the survey and the need to obtain truthful responses from the respondent. The interviewers were quite familiar with the villages and based on their experiences understood the need to interview in a manner that did not impair the integrity of the effort. For example, respondents were cautioned not to discuss their responses with other households. There was broad agreement among field staff that respondents took the process seriously and were willing to offer truthful information to assist in achieving the objectives of the survey.

V. MODEL AND STATISTICAL ESTIMATION

A multiple linear regression relationship was assumed between the dependent variable and the independent variables. The following factors were hypothesized to influence a household's willingness to pay for a selected technology:

Age: It was hypothesized that older households will be more willing to pay for community radio systems and extension visits. There were good reasons for this expectation. First, older households are likely to belong to community organizations and hence more comfortable with sharing the media. On the other hand, a young household is also likely to be less involved in community organizations, and would be willing to pay for their own private radio system.

Marital Status: The combined income effect and support of married couples is likely to encourage their willingness to pay for private radio information delivery technology. Oftentimes community organization activities are organized along gender lines and there are not much joint community activities between men and women. Thus, information delivery via community radio or extension services would be less attractive to married households. A plausible hypothesis is that married households will be more likely to pay for private radio, and are unlikely to pay for extension information or community radio.

Household Size: The household is defined to include all persons who are under the direct responsibility of the female respondent. At a given income level, large households are less likely to pay for private radios given the cost of these radios. Thus, large households will be more willing to pay for community radios and extension services, while small households are more likely to be willing to pay for private radios.

Education: Rural females have lower school attendance rates across all regions with the lowest rates recorded in the three northern regions (Northern, Upper West and Upper East). Generally, it is hypothesized that educated households will be willing to pay for any ICT media given the premium on information in decision making. While an illiterate household naturally would depend on the radio and extension visits for information, a literate household has the additional source of information delivered through extension bulletins, and other printed sources.

Income: It is difficult to predict the effect of income on the willingness to pay for ICT in rural households. Generally, a positive relationship between income and the willingness to pay for ICT was expected. Households with high incomes tend to spend a smaller proportion of income on food while poorer households spend a higher proportion of income on food. Thus, one would expect the effect of income on ICT to be positive in the relatively richer regions. Furthermore, one would expect households with high incomes to use private radios instead of community radios in receiving information. One could argue that even though poorer households spend a higher proportion of income on food, their interest in obtaining information to 'kick' out of poverty may encourage them to be willing to pay for ICT information. In essence, there are no statistically significant differences in households' willingness to pay across regions. In this sense, it is difficult to predict the exact sign (positive or negative) on the income variable, and the issue is left to empirical determination. An indirect approach was used to obtain measures of income from rural households. Households were asked to list the major sources of income, and then inquired about their expenditure patterns. This was done due to the difficulty in obtaining direct income figures from households and also to capture the effect of transfers. These expenditure amounts were used as proxies for income. Indeed studies of willingness to pay for amenities in rural households have found direct rural income measures to be unreliable and have resorted to proxies to estimate income (Boadu, 1993).

Membership in Community Organizations: It was hypothesized that households who belong to a community organization will be willing to pay for information delivered via community radio. Community radio is cheaper

than a private radio and more importantly, these households have cultivated the spirit of sharing through their membership in an organization. Table 1 show that rural households make more contribution to community initiatives than do urban households.

Table 1. Miscellaneous Expenditures by Urban and Rural Households

Purpose of expenditure	Mean household expenditure (cedis)			Estimated total miscellaneous expenditure (billion cedis)
	Urban	Rural	All	
Taxes (TV License, property tax etc.)	3,700	1,300	2,200	8.8
Contributions to self-help projects	9,500	10,200	9,900	40.4
Weddings, dowry, funeral, etc.	91,900	62,900	73,500	298.9
Gifts and presents (excluding remittances)	36,700	28,900	31,800	129.3
Other miscellaneous expenditures	21,500	12,500	15,800	64.3
Total	**163,300**	**115,800**	**133,200**	**541.7**

Source: GLSS 4 (Table 9. 27)

The estimated multiple linear regression equation of the relationship between a household's willingness to pay for a selected information delivery technology and the socio-economic characteristics of the households is as follows:

1. $(WTP)_{ijt} = a_0 + a_1 (AGE) + a_2 (EDUC) + a_3 (MARS) + a_4 (DEPEND) + a_5 (EXPEND) + a_6 (MEMBR) + U_{i,}$

where $(WTP)_{ijt}$ is the willingness to pay by a household (i) in region (j) for information delivery technology (t), AGE is age of respondent measured in years, EDUC is the educational level of respondent. The educational level was broken down into two main levels of up to primary and above primary to reflect the low educational levels of women in rural households. MARS is the marital status of respondent, and was measured using a *dummy* variable equal to 1 if respondent is married, and zero otherwise. DEPEND is the number of dependents of respondent, EXPEND is the aggregate of all expenditures reported by the respondent measured in Ghana Cedis, and MEMBR is the membership of respondent in a community organization. Membership was measured as a *dummy* variable, equal to 1 if the respondent belonged to a community organization and zero, otherwise. The term U is a random error term assumed $N(0, \sigma^2)$.

VI. RESULTS

Table 2 below lists the means of selected independent variables for the ten regions in the study, and the mean bids for extension services, community radio, and private radio. Mean household size and expenditures are also provided. Consistent with expectation, mean bids for private radio is highest, followed by mean bids for extension information, followed by community radio.

Table 2. Means of Independent Variables Compared to Means from GLSS 4

	Household Bids in Ghana Cedis					
Region	*Community Radio*	*Private Radio*	*Extension Agent*	*No. of Dependents*	*Expenditure Survey*	*Expenditure GLSS 4*
Western	3535.5	10404	6182	2.79	5,052,525	4,677,000
Ashanti	3360	22300	8480	3.61	11,054,650	5,008,000
B. Ahafo	3730	24305	10030	1.77	4,180,710	3,544,000
Central	3886	22450	10180	3.74	5,153,510	2,977,000
Eastern	4868	22696	8909	3.33	8,549,222	3,736,000
Gt. Accra	3656	21162	10202	2.83	11,495,487	6,777,000
Northern	3400	21069	9520	4.43	3,335,400	2,837,000
Upper East	3141	21262	8595	3.04	4,059,460	1,793,000
Upper Eest	3830	26200	9980	5.67	2,070,160	2,462,000
Volta	5200	11190	7320	2.39	6,134,540	4,000,000

Source: Survey and GLSS 4, Table 9.2

Mean expenditure pattern for households also tracks the numbers from GLSS 4. However, in Greater Accra, Eastern, and Central regions, means from the survey are significantly different from the means based on GLSS 4. Since the GLSS 4 is based on 1999 information, it could be that expenditures have changed significantly over the last five years. The means are sufficiently credible to provide a reasonable basis for the survey data analysis.

Equation 1 was estimated for all the regions using the Newey-West estimator. The Newey-West estimation procedure takes into account the problems in using cross-section data to give consistent and efficient estimates. The results of the estimation procedures are presented and discussed below.

Tables 3a, 3b, and 3c present the results of regression analysis using the combined data set from all the ten regions in Ghana, 100 observations for each of the ten regions. Four observations were rejected so the total number of observations is 996 instead of 1000. The overall explanatory power of the model is poor with an R^2 (Coefficient of determination) of 7.5% for the community radio regression, 6.9% for private radio and 8.4% for extension services. The low explanatory power of the models is not fatal, especially given the consistency and statistical significance of several of the critical socio-economic factors that were hypothesized to influence rural women's' willingness to pay for selected information delivery technologies.

Table 3a shows that older women, educated above the primary school level, with high expenditure levels, and are members of a community organization are more willing to pay for information delivered via a community radio. With the exception of the income factor that is statistically significant at the 10% level, all the other factors are significant at the 1% and 5% levels. The table also shows that younger women (below age 20) are not willing to pay for information delivered via a community radio. Results for information delivered via private radio (Table 3b) follow the pattern obtained for community radio but it could also be found that married women are willing to pay for information delivered via private radio. This may be due to the fact that married households have higher income (combined income) and could afford the more expensive media for information delivery. This observation is supported by the fact that the estimated coefficient for expenditures (.00011) in Table 3b is bigger than the estimated coefficient for expenditures (5.09E-06) in Table 2a. Also the expenditure factor in table 3b is highly significant (1% level) compared to the significance level (5%) for the same factor in Table 3a. Table 3c reports the results of estimation for information delivered via extension agents. The pattern observed under the two previous results is observed for information delivery via extension agents. Here again, the principal factors are high education, high expenditures, membership in community organizations, age and marital status. Again, the results show that younger women are not willing to pay for information delivered via extension agents. The only factor that was not found significant in explaining variation in the choice of information media is the number of dependents.

Table 3a Regression Results for Households Willingness to Pay for Community Radio

Variable	Coefficient	t-Statistic
Constant	3017.98	23.08
Age [Up to 20]	-704.62	-5.07
Age [Above 20]	180.84	2.69
Married	38.70	0.43
Dependents	-1.60	-0.10
Educ. [Primary]	-110.71	-0.84
Educ. [Above Primary]	187.74	2.05
Expenditure	5.09E-06	1.62
Membership	316.90	3.54
R-squared	0.075	N = 996

Table 2b Regression Results for Households Willingness to Pay for Private Radio

Variable	Coefficient	t-Statistic
Constant	12333.05	8.14
Age [Up to 20]	-5469.63	-2.54
Age [Above 20]	1041.34	0.81
Married	3433.88	2.47
Dependents	348.89	1.40
Educ. [Primary]	1204.46	0.73
Educ. [Above Primary]	5663.57	3.17
Expenditure	0.00011	2.82
Membership	4867.08	3.69
R-squared	0.069	N = 996

Table 2c Regression Results for Households Willingness to Pay for Extension Service

Variable	Coefficient	t-Statistic
Constant	6707.23	17.23
Age [Up to 20]	-1855.98	-4.57
Age [Above 20]	395.12	1.95
Married	463.64	1.71
Dependents	48.58	1.059
Educ. [Primary]	-27.67	-0.089
Educ. [Above Primary]	473.32	1.82
Expenditure	1.43E-05	2.22
Membership	1298.57	5.20
R-squared	0.084	N = 996

The results based on regional data followed the pattern observed under the pooled results as presented above. With the notable exception for the Volta and Upper West regions, the income variable was found to be statistically significant in explaining the variation in the willingness to pay for information delivered under the selected media for all the other regions. The education variable was found to be statistically significant for all regions except the Northern, Greater Accra, and Upper East regions, while the community membership variable was found to be statistically significant in all regions for at least one of the media except in the Ashanti, Brong Ahafo, and Eastern regions. The only regions where the age variable was not found to be significant in explaining the variation in willingness to pay for any media were Western, Ashanti, and the Upper East. Likewise, the number of dependents variable yielded inconclusive results. Unlike the outcome using the pooled data, the marital status of women did not play a significant role in explaining the willingness to pay for any of the regions.

VII. POLICY IMPLICATIONS

The overall results from this study point to household expenditures (used as proxy for income), household education, and membership in community organizations as the principal factors influencing rural women's willingness to pay for the various technologies used in information delivery to women in rural areas. The income variable was found to be statistically significant in explaining the variation in the willingness to pay for information delivered under the selected media for all the regions. The education variable was found to be statistically only in the Ashanti while the community membership variable was found to be statistically significant in the Upper East and Greater Accra regions. Age was found to be significant in explaining the variation in willingness to pay for any media in the Ashanti, and the Upper East regions. Likewise, the number of dependents variable yielded inconclusive results. Also, the marital status of women did not play a significant role in explaining the willingness to pay for any of the regions. Despite the lack of consistency in the regression results several important policy and planning options are suggested by the results from this study.

a. Need to disaggregate Policy planning and Implementation process

Even though the government sets the overall national ICT policy, the results from this study suggest some merit in allocating considerable authority to regional and local authorities in setting priorities and approaches to empowering rural women through the use of ICT. This is due to the different impacts the socio-economic factors had on different regions. It is in this context that the government has to put 'teeth' into the Local government Act (1988) PNDC Law 207 and the instructions under Article 35 Ghana's 1992 constitution which indicate that the state shall make democracy a reality by decentralizing the administration and financial machinery of government to regions and districts and by providing all possible opportunities to the people to participate in decision making at every level of national life and in government.

There have been some efforts by government to broaden the participation of strategic groups in the public policy and planning decision-making process. This was evident in the preparation of Ghana's poverty Reduction Program (GPRP). For example, the GPRP planning group consulted about 36 community groups during the preparation of the document. These groups included women, the youth, and community leaders (GPRP 2003, P.6). Also, the planning group held seminars with women leaders/coalitions of women's groups to obtain their input in preparing the strategy paper. The coalition of women's groups prepared a statement listing areas, which they felt, could be more engendered and which had not been treated as part of the first draft document (GPRP 2003, P. 7). While these initiatives are laudable, the study results point to need to deepen this consultation process with even greater emphasis on local control and input from women.

b. Need to Implement ICT policy within a Broader Poverty Reduction Program

i. Improving Rural Incomes

The study results also point to a need to cast rural empowerment policies and programs within the broader poverty reduction policies of the government and also within the attainment of the Millennium Development Goals (MDGs). Ghana's primary poverty reduction objective is defined under its *Vision 2020* goal to become a middle-income country by the year 2020. The results show how that the attainment of this vision would boost ICT use in delivering information to rural households since income was found to be consistently statistically significant in explaining rural women's willingness to pay for information. There are two important issues to address in the context of the relationship between incomes and ICT use to empower rural women.

First, the relationship between ICT use and income must be seen as bi-directional. While high incomes make it possible for rural women to pay for the information delivery technology of choice, the delivered information, in turn, is intended to empower women to be able to make those decisions that would improve their welfare and incomes. These observations lead to the conclusion that knowledge of the importance of incomes in ICT use in information delivery is not enough. There is also a need to emphasize the learning component that allows rural women to better utilize received information in decision making to further improve their incomes.

A second implication of the statistical significance of the income factor is the need to broaden policies to enhance the many possible sources of income available to rural women. Even though the popular view has been to focus on agriculture as the primary source of raising incomes of rural women, the survey results point to a need to broaden the scope of an incomes policy in rural areas. The field survey results show that the majority of women (45.8%) reported "trading" as the primary source of income while 23.9% reported "farming" as their primary source of income. About 7.7% reported "dressmaking" as their primary source of income while 4.1%, 2.7%, 2.6% reported "hairdressing," "teaching," and "office work" respectively as the primary source of income. A sizable percentage (11.2%) reported no income source.

The distribution of women's sources of income is beginning to put flesh on some of the results obtained in the study. For example, the distribution may help explain why several households were not willing to pay for information delivered by extension agents since the historical mission of these agents are the delivery of "agriculture-related" information. The results may also explain the popularity of private radio because radios may complement such activities as 'hairdressing', 'dressmaking,' 'office work,' and 'trading.' The key is for policy and program planners to better understand the dynamics in the rural sector and to recognize shifts in economic activity that may be counter to the historical pattern of economic activity.

ii. Education

Another factor that emerged as important in explaining households' willingness to pay for information is education. The significance of the education factor supports the need to plan and implement ICT policies for rural empowerment in a holistic context. Education is one of the major components of Ghana's poverty reduction program and the MDG. The survey results show that the government has a major hurdle to clear in its effort to empower rural women using ICT to deliver information. Formal educational attainment appears to be very low among the female rural household heads. The survey showed that about 45% of the household heads had no formal education. Only 1.1% had attained tertiary education. Thus, even though rural women who had some education had expressed a strong willingness to pay for information, policy and program planners have to undertake *specially designed* adult education programs to benefit rural women. The results also imply that information would have to be delivered to rural households in a language they understand and a medium that they would be comfortable with. The significance of the education variable also points to a need to emphasize 'local' content in designing rural information programs.

iii. Community Organizations

The statistical analysis also point to an important role that community organizations could play in the delivery of information to empower rural women. Women who belong to some form of community organization were more willing to pay for information delivered via the three ICT media examined in the study. The survey showed that slightly more than half (50.3%) of rural women belonged to a community organization and cooperatives. This strong sense of communalism has important policy and program planning implications. For example, the government may want to take advantage of the spirit of communalism and focus on programs that could be delivered to a group as a way to reduce costs and hence be able to extend programs to cover a larger population group. It also means that there is a need to design effective feedback mechanisms since in a group context, it may not be possible to easily address individual concerns. Information program content may emphasize discussion as a way to sustain group interest. It is important for the government to allow rural organizations to

define their own rules to check practices such as 'free riding' and 'shirking.' Attempts by government agents to interfere in group organization may be counterproductive.

c. Need to develop a disaggregated funding strategy

In addition to disaggregating the policy and planning process in using ICT to provide information to rural women, the results also point to a need to formulate policies and programs to prevent duplication of efforts. This study has helped to identify factors that influence rural women's willingness to pay for different information delivery technologies. The many factors have different effects in different regions. This opens the door for policy and program planners to allocate efforts among different agencies and development partners.

The survey showed that rural women were very interested in receiving information. About 49.7% responded in the affirmative when asked whether they received information on agriculture, trading, health, education, and government. A higher percentage of 72.5% indicated their desire to acquire information and skills which is a good indicator for the need for a *specially designed* rural adult program for the women. From the survey only about 7.6% responded that they pay for information delivery. On the other hand, about 77.6% indicated their willingness to pay for the learning media if the government was to offer such a specially designed program whiles 4.8% were not sure of their decision. In a similar vein 79.3% indicated their willingness to pay for such a facility if it is offered by a private organization. While a large majority of the respondents indicated that it is the responsibility of the individuals using the facility to pay for information, a few indicated that it should be the Government, or District Assemblies, or Non-governmental organizations [NGOs] who should pay for the information. Policy and program planners have to take into account both the needs in different regions, and also the alternative funding sources available to be able to target information delivery programs that reach the appropriate rural population.

d. Need for Holistic Planning

There were several factors that were not statistically significant in explaining the willingness to pay for information by rural women but are very important in planning an effective program to deliver information to rural households using ICT. Even though these factors were not statistically significant, they had the right signs consistent with the hypothesis. One such factor is age. A very high percentage, about 94% of the respondents fell within the active adult stage of 21 – 50 years. These are people who could be described to be in their peak stage of development and production. Their responses could well inform policy on the use of ICT for rural adult education and willingness to pay for such facility and services. Furthermore, the distribution points to a need to examine education program content and the relevance of the information delivered.

Another factor that is important to consider is the number of dependents in a household. It was hypothesized that women with many dependents would be less willing to pay for information given the cost in maintaining a large household. Note that dependents meant not only the biological daughters and sons of respondents but all their wards or other people that they were responsible for. While it is typical of a rural Ghanaian household to report as many as 17 dependents within a household, the survey found the majority of the respondents, 88.3% to have dependents ranging from 0 – 6. A further break-down showed that over 55% had the total number of their dependents ranging from 0 – 3. What this suggests is that a good number of households may not have the huge financial burden associated with maintaining a large number of dependents. Holistic planning dictates that the government takes a long term view of the empowerment process to include issues related to population planning that on the surface seems like a remote factor in planning information delivery to rural women using ICT.

Another seemingly remote factor is the marital status of rural women. The survey indicated that a majority, almost 70% of the household heads were married. This point to an important socio-cultural factor that must be taken into account in planning information delivery to rural women via ICT. Men occupy a dominant role in Ghanaian society, and this dominance is even more pronounced in rural communities. The roles and status of women/wives and the nature of male - female relationship that exist in these communities put considerable burden on women's time allocation. A more comprehensive rural education program must therefore take into account this dominant position of men. Thus their views, consent and support would be crucial for effective program planning and implementation.

e. Need for the critical "Political Will"

The Government of Ghana has expressed its commitment to provide information through the use of ICT to empower rural women through various policy pronouncements and position papers. Government's commitment however must be examined within the broader context of the allocation of budgetary resources to rural education programs and ICT development. As pointed out in Chapter Two of this study, over 70% of

government ministries spend less than 10% of their budgets on ICT related activities. With the global trend towards e–government, government may want to signal its commitment by increasing its own use of ICT. Furthermore several indicators point to the possibility of significantly expanding ICT use in information delivery to empower rural women. A few of these indicators are examined below.

■ Ghana already has an extensive telecommunications network that reaches every region in the country. Given the strong expression of willingness to pay for information delivered via community radio, private radio, and extension services, government may need to explore ways of strengthening the existing network to achieve the goal of empowering rural women through information delivery using information technology.
■ Ghana has considerable experience in rural education programs. This experience should reduce the learning curve to a significant degree. As reported by Abbey-Mensah, (2001), head of Rural Broadcasting in Ghana, Rural Broadcasting [RB] in Ghana began in October 1962. Programs were designed for both men and women to educate [to stress *Dignity in Labor*], inform and entertain the rural people in local languages. In the program segments that targeted farmers and fishermen consisted of agricultural news, interviews with successful farmers, talks by experts on new methods of farming, nutrition, child-care and market reports. Broadcasting staff followed-up with visits to determine the extent to which the listeners practiced their trade using the new knowledge and skills discussed in the radio program.

Another dimension of the RB programs explained by Abbey-Mensah [2001] is the Rural Radio Forums introduced in 1964 where a series of listening groups of farmers met at a point to listen to special radio programs on improved methods of farming and had discussions with agriculture extension officers. Recognizing the roles rural women play in housekeeping, farming, preservation and selling of agricultural products, special 30-minute daily program was broadcasted for the rural women. In addition to the FM radio stations which are currently operating in almost all the regions in Ghana, other private initiatives include the *Worsum* Clubs, radio forums organized by the School of Communication Studies of the University of Ghana which seem to make a lot of impact on the income-generating activities of the rural people. There is a need to build on these proven activities to achieve the goal of empowering rural women.

■ There are currently available on the market several technologies that avoid many of the technical constraints, especially electricity that prevent the introduction of popular technologies such as computers. For example, *Wind Up and Solar Powered Radio* is a self-powered radio which may be operated directly by spring generated power, or by using its solar panel. The Freeplay Global Shortwave Radio which weighs 5 lbs. 51 oz./ 2.5kg has no need for batteries or an external power source [electricity]. The Freeplay Radio plays all day in direct sunlight, and when low-light conditions prevail it automatically switches over to spring power. (if the radio has been previously wound.) For convenience, the Freeplay may also be powered using AC/DC 6 Volt wall adapters. The radio has been distributed to refugee camps in Burundi and in Tanzania's Great Lakes region.

An innovative facility that could help improve the community radio program is the *Suitcase Radio* product developed by the Wantok Enterprises, a Canadian company [www.wantokent.com]. Both its Radio [and TV] systems were designed for use in areas where infrastructure such as roads and power grids are either non existent or in very limited supply. Everything operates from 13.8 Volts (a fully charged car battery voltage). Solar panels, wind generators, or standard gasoline or diesel chargers can also charge the batteries. If AC power is available, the company supplies an AC to DC power supply that will convert 230 Volts to 13.8 Volts DC. The company has community radio stations in many African countries and in the Caribbean, Asia and to a lesser extent Eastern Europe. The largest quantity of their radio stations are in Niger (75 or 80 units) and Mali (45). Niger, one of the poorest countries in the world has 90% of their equipment running off Solar charged systems. The company also did their TV pilot project in Niger, which also runs off solar (Holmes, 2004; Wagner et al, 200Kwapong, 2005). This discussion of emerging technologies illustrates the importance of strategic planning as a process, with frequent updates based on new information.

f. Need for Inter-Agency Coordination
One of the most difficult hurdles in any massive government program is effective coordination to minimize 'turf battles' and waste. An ICT program to deliver information to rural women would involve technical experts, policy planners, and several public and private agencies. At a minimum, one could think of the involvement of the ministries of finance, education, agriculture, local government, and science and technology. At the agency level, one could think of the Ghana News Agency (GNA), the extension service, and the Institute of Adult Education. To these must be added the numerous NGO's and bilateral agencies that are pursuing their own development aid activities consistent with their national priorities. The challenge is for government to coordinate these many institutions to optimize resources devoted to using ICTs for rural adult education.

One option is to create a 'super agency' that draws personnel from the various agencies with the specific single objective to supervise ICT activities directed at rural communities. Such an agency could serve as a 'clearinghouse' and one-stop shop for all activities connected with rural information delivery.

VIII. CONCLUSION

The overriding conclusion that emerges from this study is the need to examine ICT use in empowering rural women within a 'holistic' policy context. No single socio-economic factor emerged as the dominant variable in planning policies and programs to introduce ICT use in information delivery to rural women. Likewise, no single information delivery technology emerged as ***the*** technology to use in delivering information to rural women.

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