

The EFITA* ICT** Adoption Questionnaire –
1999 – 2011 Priority Indicators for the Future

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The EFITA ICT Adoption Questionnaire program was initiated in 1999. The questionnaire itself was designed to provide a unique overtime set of reply convenience sets. These sets in turn were expected to provide an indicative tool to identify, relate and compare Adoption of ICT in Agriculture trends - in the EFITA member countries***. This Questionnaire initiative, by now reiterated in seven consecutive EFITA conferences since 1999, succeeded in providing a generalized review of ICT Adoption constraint trends over time. Questionnaire summaries enable comparison of indicated trend results with relevant non EFITA originating references as well. Those include the USDA Computer-use survey results since 1997 and Questionnaire replies from other ICT dedicated conferences.

The Questionnaire replies have identified and quantified a critical need to improve ICT Adoption proficiency. This over and above the prevalent need to minimize competence disparities in ICT utilization. Questionnaire replies stressed practical measures to alleviate this situation, indicated a need for enhanced agricultural extension and justified public funding of ICT services for agriculture. Additional competencies identified for future prioritizing included social networks, multi directional feedback between farmers, extension and research and enhanced integration within agricultural production chains. These were considered as relevant for non EFITA countries as well.

Continuation of this sequence of surveys can provide an ongoing, practical indication of ICT Adoption constraint trends and priorities to alleviate them. Such a baseline tool was considered as useful for ICT policy and development decision makers, services for the agricultural and rural sectors, farmers and their associated extension, research and services.

Keywords: ICT adoption, technological innovation, ICT training; public sector investment.

*European Federation for Information Technology in Agriculture

** Information and Communication Technologies

*** EFITA members – Appendix 1

Introduction

Effective adoption of ICT by farmers in Agricultural production and for the production chains till the end consumer remains a challenge since the initial use of Linear Programming for Agriculture in the late 1950s. The 1986 DLG sponsored congress in Hannover “Microelectronics (ICT at the time) in Agriculture” directly addressed this issue Gelb, 1986. A major focus related to the concern: “... how can farmers utilize ICT in Agricultural Production and what is the role of extension in attaining this goal?. By 1986 it was convincingly realized that although it might be feasible to adopt ICT and be cost effective ICT adoption is not necessarily straightforward, can initially even be counter-productive and inferior to established traditions and alternatives. Agricultural extension can, and is expected to go a long way to remedy such negative eventualities. To better understand the complexities of the issues involved INEA (the Italian National Institute of Agricultural Economics - www.inea.it) and the Toscana Extension service sponsored in 1999 an international workshop in Alberese, Italy. The specific focus was on the adoption of Internet by Extension and farmers. It was a comprehensive attempt to identify and evaluate the critical success factors of this appreciated potential innovation. There was general agreement on critical success factors such as:

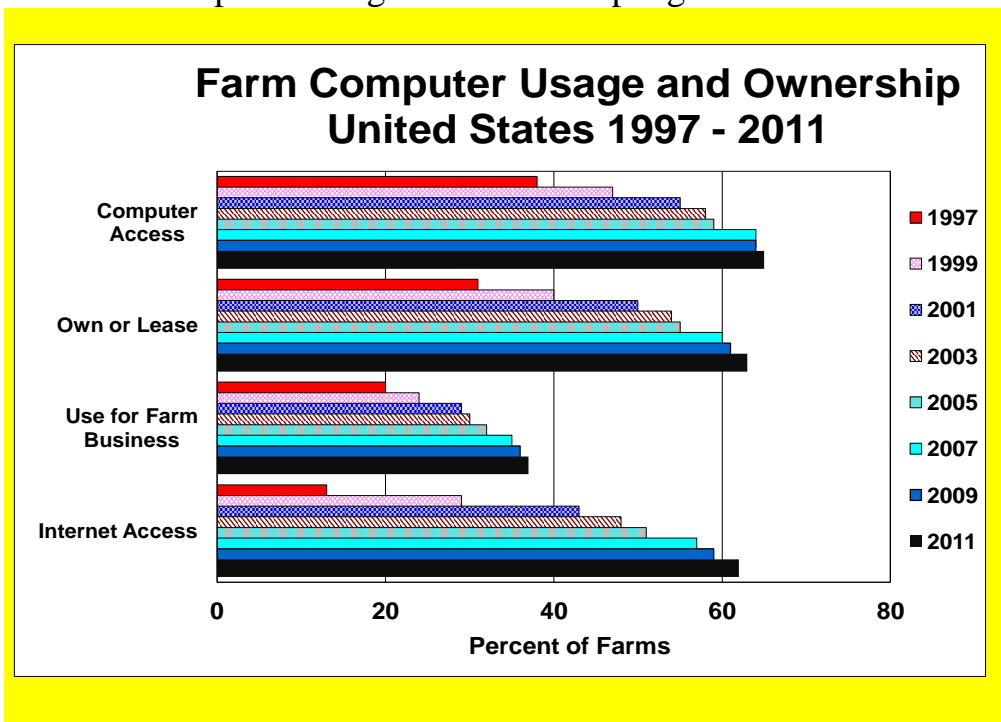
Internet accessibility on individual farms or at farmer-gathering locations; inputting of information that farmers/extension want and/or need; identifying a tangible benefit to information users; defining and serving target audiences; packaging information in a way that it can be understood and applied; a simple, user-friendly search engine and interface design; responsibility for the information quality and reliability; revealed preference as a guiding factor for Internet development.

Going deeper into the summary of detailed participant’s opinions provided a practical, baseline, reference for Internet adoption planning, program implementation and goal achievement evaluation detailed in Gelb, Bonati 1999.

The Alberese workshop was soon followed by an intensive multi-national effort to further identify and quantify more generalized ICT adoption constraints – over and beyond the explicit Internet expressed insights. The effort was initiated and coordinated in the EFITA conference in Bonn in 1999. It was reiterated in the following EFITA Conference in Montpellier, France in 2001, in Debrecen, Hungary in 2003 and thereafter bi-annually during the EFITA conferences till and including the 8th EFITA conference in 2011 in Wageningn, Holland. The convenience-set tool to quantify this evaluation was initially designed in Alberese and refined for the Bonn Conference in the form of a Questionnaire: “*The EFITA ICT Adoption Questionnaire*” – Appendix 2. Each conference participant in turn was requested to elaborate their ICT Adoption experience as a specific assessment of constraints and their source. The responses were collated bi-annually and reviewed over time. Eventually the accumulated sets enabled indicative comparisons from 1998 till the recent EFITA Conference in 2011 - Gelb, et.al. 2004, Gelb, Voet 2009. Comparisons between the initial

Bonn, Montpellier and subsequent Debrecen replies could be associated with “short term” ICT Adoption constraint references. The Bonn baseline replies related to the 2011 Wageningen replies, more than a decade later can indicate longer term trends. This longer scope can expand the inclusion not only of additional ICT adoption constraints but responses to ICT innovations beyond initial familiarization difficulties. These include ever-changing quality integration of ICT infrastructure systems and technological innovations, direct and indirect ICT end-user benefit awareness, over time end-user proficiency, incorporation of advanced human engineering, enlightened farmer sophistication, and many more. The questionnaires do not provide a rigorous random sample analysis. However by maintaining their format over time the replies can be viewed as complementary convenience sets with the replies uniformly shared by similarly involved “ICT in agriculture” professionals. These provide a rough indication of generalized trends and their relative revealed importance. Furthermore the consistency of the replies enables relating them to perceived trends elsewhere. These for example could be indicators derived from results from the USDA computer-use surveys USDA, 2011 – Fig. 1, questionnaires reiterated with “ICT interested” farmers in Germany Rosskoff 2003, specific symposium presentations Taragula, 2005 and replies from respondents from non-EFITA member countries and related conferences. A long list of references and evaluation of ICT Adoption trends, Questionnaire replies and references can be accessed at Gelb, Offer 2006,. Gelb 2006, 2007 and Gelb et.al. 2008. The references are not limited to EFITA countries and reflect current increased growing international interest and concerns as well e.g. Pehu et.al. 2011.

Fig. 1: Farm Computer usage and ownership Agriculture in the USA



Source:USDA, 2011

A useful example of such a trend comparison exercise and the ability to define issues relevant for EFITA countries would be to review the Alberese Internet adoption evaluation Gelb, Bonati 1999 as compared to the Questionnaires and USDA survey results. We can ponder - for example: “why is the Internet penetration in the USA since initiation in 1997 till 2011 less than 70%; is this quantified adoption pattern a relevant prognosis for Internet Adopting EFITA countries; a problem of current and future public interest, of agricultural consequence and an issue of national concern....”? A more detailed description follows.

Evaluation of ICT Adoption questionnaire revealed trends

While being useful in an attempt to understand and explain past ICT Adoption issues the questionnaire revealed trends might possibly suggest constraints to be expected. Being forewarned, and more important, enabling identification of specific problems in advance can carry significant benefits. The usefulness of predicting an eventuality (e.g. a decade long Internet Adoption delay since its introduction - relevant to >30% of the farmers) cannot be overemphasized. Relevant target groups within their concerns would include policy and decision makers facing regional and national ICT investment and priority choices, all those involved in services to agriculture including the production chains and last but not least the farmers with extension and research serving them. Combining these target group efficiencies and the significance of food production and rural viability as current National priorities suggests an urgency to view the ICT Adoption trends and constraints from a public interest point of view.

The first two issues that come to mind are:

- a. Is ICT adoption after all these years and accumulated experience still an issue of unique importance?
- b. Is public funding of ICT services for agriculture justified?

Gelb and Parker 2007 evaluated in detail the replies to this first question namely: “Is ICT Adoption for Agriculture Still an Important Issue”? Table 1 adds an additional 5 years to the Gelb, Parker observations. It summarizes the replies collated over the whole 1999-2011 period.

Table 1: Is ICT Adoption still an issue and is public funding for Agricultural ICT Services justifies? (% of ”Yes” replies)

	Montpellier 2001	Villa Real 2005	Glasgow 2007	Wageningen 2009	EFITA 2011
Are there problems with ICT uptake in Agriculture?	72.0	96.7	94.4	90.3	90.0
Is public funding for ICT services for Agriculture justified?	67.8	88.1	88.2	77.4	>90.0

The trends indicated in both questions are clear – even though quantitatively they are imprecise. Since 2001, over six consecutive EFITA conferences, ICT Adoption is recognized by a constant majority of conference participants as an ongoing and recognized problem. Gelb, Parker and Gelb, Voet confirm and detail this observation. The questionnaire continues to ask in Table 2 re this acceptably “recognized problem”: *what are the main factors limiting the use of ICT by farmers over time?*

Table 2: What are the factors limiting the use of ICT by Farmers (% of “Yes” replies)

	Bonn 1999	Villa Real 2005	Glasgow 2007	Wageningen 2009	EFITA 2011
Inability to use ICT	29.3	45.0	12.5	45.2	<45.0
Infrastructure issues	18.9	35.0	28.6	25.8	0.0
Cost	17.6	25.0	24.2	29.0	<25.0
Lack of training	8.6	16.7	17.9	58.0	>65.0

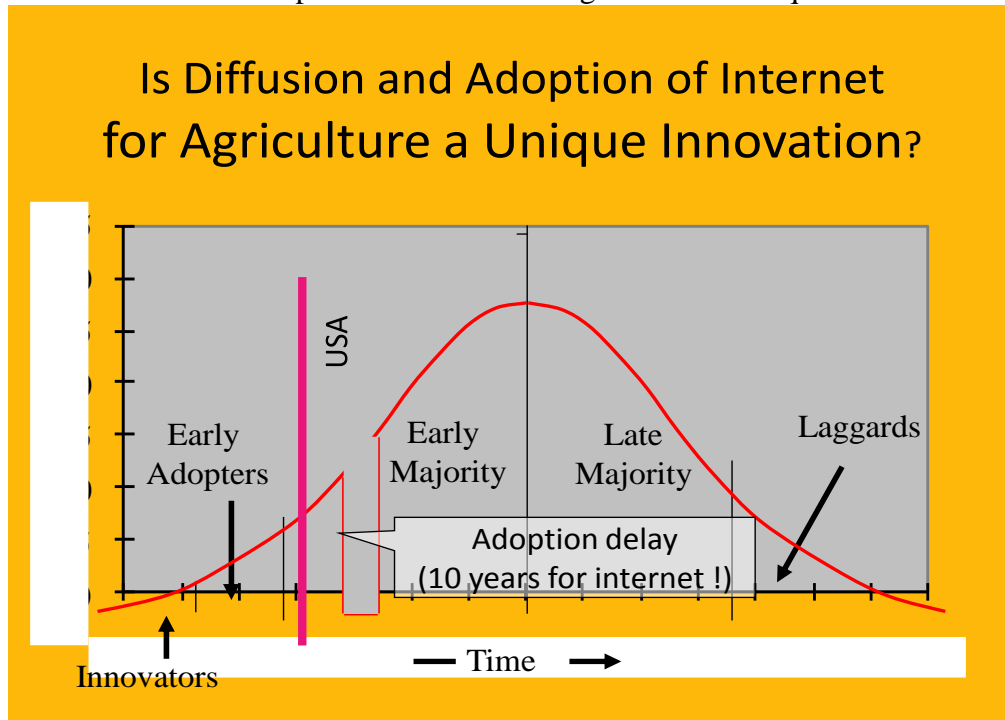
The replies quite reasonably offer the following trend interpretation: Cost and infrastructure, since 1999 were not observed to be an increasingly dominant constraint. Infrastructure issues appear to have been resolved to a large degree - to the extent of being a non issue or as being ultimately solved in the broader context of regional and national communication services. Costs seem to be contained at a relatively low level – *but more important not as a significantly increasing issue*. As a trend for the future it can perhaps be assumed that the cost of the future ICT innovations will be offset by lower production costs and greater efficiency of equipment, systems, communications and human capital involved (e.g. automation).

A consistent trend of a constant lack of substantial improvement in farmer ability to use ICT is clearly pronounced in the Questionnaire replies. Complementarily they point out that lack of training is a significantly growing and influential constraint. Within the confines of accuracy this comment could actually be phrased such that “the need for training has not diminished over time”. Blame can be allotted to the increased complexities of ICT since 1999. A counter claim however would point to enhanced real life ICT competence visible in agricultural production. This competence would be due to achieved ICT utilization experience, updated education of the “new” agricultural graduates, “industrialized farmers” and innovative human engineering. All these should have more than compensated for the Questionnaire “lack of training” replies. In reality - they do not. In this case interpretation of this trend result by the mentioned target groups justifies, and even dictates, serious consideration of what to do, costs and “what if” impacts.

At this point it seems reasonable to test the validity of “Trend seeking and their evaluation”. Specifically if ICT Adoption trends are not unique case study of technological innovation adoption much can be learned from comparison to “others”. Namely is the ICT (and creation of the “Knowledge Based” society)

adoption pattern comparable to the history of other such major category innovations – e.g. electricity. Standage, 1998 focuses this question on the history of Internet. Following this evaluation by looking back at the Alberese Workshop summary, Rogers’ 1962 Innovation pattern Fig 2 as applied to the Internet Adoption results of the USDA survey (Fig. 1 above) combined with and the Questionnaire replies Gelb, Voet 2009 suggests that there are ICT Adoption similarities with other Innovations. And yes there is if not much to learn an outline for evaluating future trend priorities.

Fig. 2: Is Diffusion and Adoption of Internet for Agriculture a Unique Innovation?



Source: USDA and Rogers 1962

In terms of future constraint trends such a formulation confirms the trend indicated by Questionnaire responses - namely that: “ ICT adoption after all these years and accumulated experience is still an issue”. Specifically in Table 1. it is recognized in the replies over time.

In terms of practicality consideration of priorities a significant dilemma emerges for the target groups mentioned above. For example from Policy and Decision maker’s point of view. By accepting indication of trends for the future as a basis for priorities allocation it remains to be decided: should priorities and efforts focus on rescuing the “Late Majority” by bringing it up to par?

(Provide elementary extension and production subsidies for underperforming farmers). Alternatively should straightforward subsidies subsidize and support the “Early Majority” and/or encourage the “Early Adopters and Innovators”. They in their achievements would demonstrate as act as “locomotives” to haul specific innovations into the mainstream agricultural practices?

The Questionnaire identified trends do not attempt to assume specific probabilities, suggest a comparison of estimated results or case by case

recommendation. Suffice it to note that the trends, as a reference tool, could be identified, considered and shared quantifiably with relevant stakeholders.

Discussion

ICT and ever present ICT innovations are now undisputedly a dominant feature of numerous known and yet to be discovered components of our Agricultural production routine and Knowledge Society. Undertaking major decisions to adopt and promote these innovations in Agricultural production and Rural development - based on sketchy projections of future problems is risky at best. The benefit of early identification of adoption constraint trends cannot be overemphasized. Currently Agricultural Production and Rural Viability in all countries are of critical importance. The missed opportunity costs caused by non optimal ICT development and inferior adoption priorities can be prohibitive. These sub optimal priorities can result in inefficient allocation of production inputs, misdirected development funds, loss of comparative advantages, competitiveness, squandered rural futures and in worst cases social disruption. The modest contribution of the EFITA ICT Adoption Questionnaire to avoiding such outcomes is useful.

EFITA, among other vehicles is at the forefront of following ICT innovations and their adoption in agriculture, food production and rural development. A unique ICT adoption feature is the exponential increase of “Sources of Innovation” characterized and enabled by the almost universal adoption of ICT by stakeholders. Multi-directional interactions between stakeholders is currently intensifying and accelerating these processes. The EFITA questionnaires, in lieu of their consistency and focus, over time can assist in identifying past ICT Adoption constraint trends in the widest Agricultural production and Rural viability contexts. More important they can roughly indicate future constraint tenacity. This alone justifies the effort involved in continuation of reiterating the questionnaires beyond maintaining a valuable planning reference baseline. Beneficiaries of these indications range wide and far: Policy and decision makers, Extension, Research and service providers, additional sectors and the public at large – nationally and across national borders. As baselines they can also assist in monitoring and better understanding of current ICT oriented initiatives such as agriXchange, “ICT-AGRI ERA-NET” (ict-agri.eu), FutureFarm, Social Networks, and more.

At this point it seems to be too early to uniformly superimpose the identified adoption trends on e.g. activities to increase the impact of social networks on agricultural productivity, the future of an Open Farm Map, structured centralized information sharing, facilities for tracking and tracing agricultural products, real time production models, innovative automation and other ubiquitous ICT innovations. The generalities of the trends identified however do indicate the need to focus on elaborate training to minimize the time lag in adoption of an ICT innovation which in turn also justifies public funding of involvement in this effort.

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Appendix 1: Membership of EFITA BOARD and NMO Representatives

Name	Position	Country	E-mail
Nicolai Fog Hansen	President	Denmark	nfh@lr.dk
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Appendix 2:

2011 EFITA ICT ADOPTION QUESTIONNAIRE

Name Country.....

Occupation..... Contact.....

Do you think that there are problems with the uptake of Information and Communication Technologies (ICT) in agriculture? (yes) (no)

Do you think there are unique uptake problems with any of the following ICT (*please tick all that apply*):

**DSS(), MIS(), Internet(), Precision Farming(), Process Control(),
Production Models(), E-commerce(), Social networking(),
Other(s).....**

1. **What are the factors limiting the use of ICT by farmers.....**
.....
.....
2. **What are the factors limiting the use of ICT by Extension working with farmers?.....**
.....
3. **What are the factors limiting the use of ICT by research working with farmers?.....**
.....
4. **What are the consequences for farmers not using ICT: Today and the near Future?.....**
.....
5. **What are the consequences for Extension not using ICT: Today and in the near future?.....**
.....
6. **Should public funds help to finance Information Technology Services for farmers**
7. **Comments –**

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