



# Agricultural information systems: a national case study

Agricultural  
information  
systems

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## Abstract

**Purpose** – The purpose of the paper is to investigate the agricultural information system in Turkey, with particular reference to the effectiveness of this system for farmers.

**Design/methodology/approach** – A case study based on a review of the literature, established knowledge and national experience to date.

**Findings** – That, in Turkey, there is insufficient connection between the publishing activities of research institutions and other institutions active in the field. This lack of coordination causes an incomplete distribution of agricultural information to farmers. In particular, this creates an information system in which there is no effective feedback in the “research–publishing–farmer” triangle. Yet distribution of agricultural information to users and reciprocal user feedback is vital, because it is the essential mechanism by which a consistently reliable and effective distribution of information can be maintained.

**Research limitations/implications** – Although the central thesis of the paper is not advanced by reference to original research on the part of the authors, it is based on pre-existing, well respected research which is intelligently interpreted and authoritatively synthesized by them.

**Practical implications** – To solve problems of agricultural information flow, the lack of coordination among the various organizations concerned has to be dealt with effectively, and a single organization has to be set up where information is collected in and distributed from the center. Non-public publishing and research services have to be supported and encouraged in parallel with this.

**Originality/value** – The paper advances a clear plan of action for improving the information system in an area of great relevance to all developing countries.

**Keywords** Agriculture, Information services, Turkey

**Paper type** Case study

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## Introduction

Despite increasing urbanization, the majority of people in developing countries still live in rural areas or depend on rural activities for large parts of their livelihoods (Ballantyne, 2005). Agriculture is their main source of economic support, especially in the case of the majority poor (Muyepa, 2002). Information for agricultural and rural communities is therefore a crucial tool in the fight against poverty and the battle to achieve food security. Information helps to open up and provide opportunities for poor people: it helps them to actually make use of opportunities and to shape their own lives, while also helping reduce their vulnerability to sickness and misfortune (Ballantyne, 2005).

Contemporary challenges facing agricultural information parallel those facing agricultural research and practice. Agriculture today must feed a growing population in a world of static or shrinking natural resources and increasing social and environmental constraints. Agricultural information professionals similarly must support agriculture by managing and improving access to a proliferating and increasingly complex array of information in a climate of shrinking resources and expanding constraints (Smith, 2003). Information is a powerful tool in addressing other agricultural needs and if it is used appropriately it can radically change a nation's economy (Tshabalala, 2001).



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*The economics of agricultural information*

Beginning with Adam Smith, economists have long recognized that information availability is a crucial component of efficient markets (Repo, 1989; Stigler, 1961). Governments consequently have assumed an important role in providing economic information to decision makers in agriculture (Just *et al.*, 2002).

More specifically, there is a widespread belief that information is vital for rural development (Wishart, 1995). For example, Munyua (2000) regards information as the least expensive input for rural development, and it can also be viewed as a basic, necessary ingredient for bringing about social and economic change in rural areas (Morris, 2000). Rural areas in developing countries are generally perceived to be an information desert that is becoming increasingly marginalized as the technology and information gap between rural and urban areas widens (Wakelin and Simelane, 1995). Rural communities, where agriculture is commonly the main activity, require information on *inter alia*, the supply of agricultural inputs (seed, fertilizer), new technologies and innovations, early warning mechanisms (for pests, drought, disease) and credit facilities, markets, and such-like (Munyua, 2000).

*A definition and model of agricultural information systems*

An agricultural information system can be defined as “a system in which agricultural information is generated, transformed, transferred, consolidated, received and fed back in such a manner that these processes function synergistically to underpin knowledge utilization by agricultural producers” (Röling, 1988).

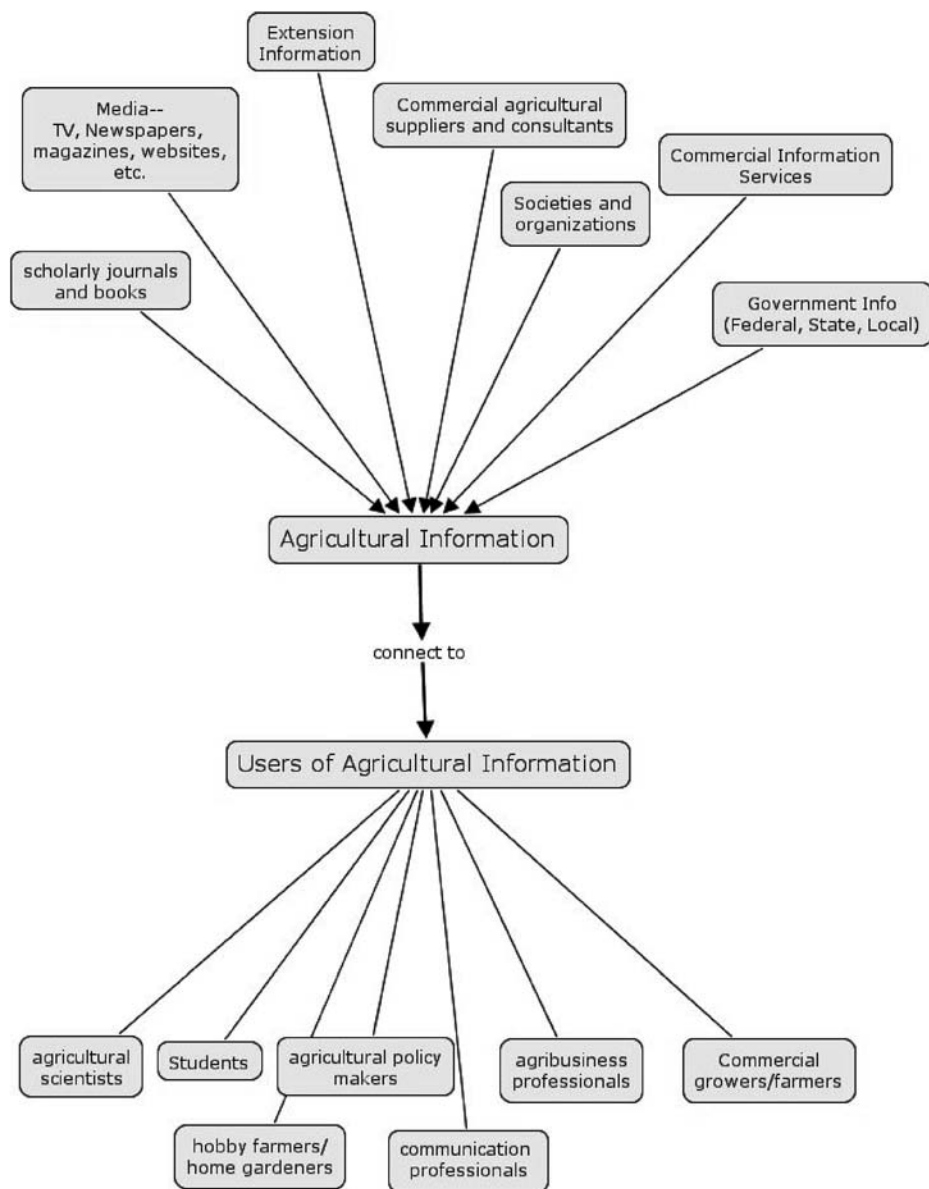
Agricultural information is considered as an essential input to agricultural education, research and development and extension[1] activities. Different kinds of information are required by different kinds of users for different purposes. The potential users of agricultural information include government decision-makers, policy-makers, planners, researchers, teachers and students, programme managers, field workers and farmers (Zaman, 2002).

Figure 1 gives an illustration of the flow of agricultural information.

Commodity associations, private consultants, informal contacts/neighbors and extension activities, all represent important additional sources of information. Thus, in addition to fee-based and publicly provided services, some information is obtained informally through social and professional interaction or is a by-product of economic transactions. In the context of structural and organizational change in agriculture, the explosion of information technology, the growing sophistication of decision-makers and their advisers, and shifts in conceptions of the appropriate role of the state in the economy, some have questioned the role of public and private sector actors in providing agricultural economic information services (Wolf *et al.*, 2001).

In order for public and private decision makers in the agricultural sector to use agricultural information for decision-making, problem-solving or to increase their knowledge, the necessary basic agricultural data must be available (Ehlers and Frick, 2000).

With these considerations in mind, this paper takes the agricultural information system in Turkey as its object of study. There have in fact been many improvements in agricultural productivity and production in Turkey, especially since it was proclaimed a Republic in 1923. But subsequently a more ambitious, coordinated strategy for informing the farmer about modern techniques has emerged as a necessary objective. A public extension unit was thus assigned the task of achieving this objective. And, in addition to this extension strategy, agricultural schools have



**Figure 1.**  
Concept map for  
agricultural information  
(Source: McCue *et al.*, 2005)

been founded to improve the communication of agricultural information to all possible users.

**The policy and practice of extension**

In agriculture, the common pattern is that modern technologies are either developed by universities and research institutions, or alternatively they are transferred from abroad. The application of modern technologies to the countryside and to the target

groups for whom they are intended is furthered by systems of agricultural extension (Talug and Tatlidil, 1986). In the Turkish agricultural information system, a range of entities are intermingled with its three core system components of research institutions, extension systems, and farmers: this extra layer includes a variety of private institutions, consultancy agencies and various other organizations and institutions linked to agriculture. In Turkey, agricultural extension is mainly carried out by public institutions such as the Ministry of Agriculture and Rural Affairs (MARA)[2] and its branches for Farmer Training and Extension. The agricultural research institutions and Faculties of Agriculture in various universities focus mainly on developing new agricultural technologies for Turkey.

#### *History and present structure*

The first Extension Service was established as a central organization in the MARA, but was then put onto a national basis by being rolled out to all cities and counties in Turkey. This structure was steadily improved year by year until 1983 (Kumuk, 1993).

The idea of reorganizing the MARA was then proposed in 1984 due to difficulties in coordination and administration with respect to modern management techniques, something caused by the increased number of units in the center which had built up between 1937 and 1984. To realize this change, in 1984 both the central and provincial structure of the Ministry was rearranged. This centralized the management of some central units of agricultural services in order to provide unity of control and better horizontal coordination (Taysi, 1998).

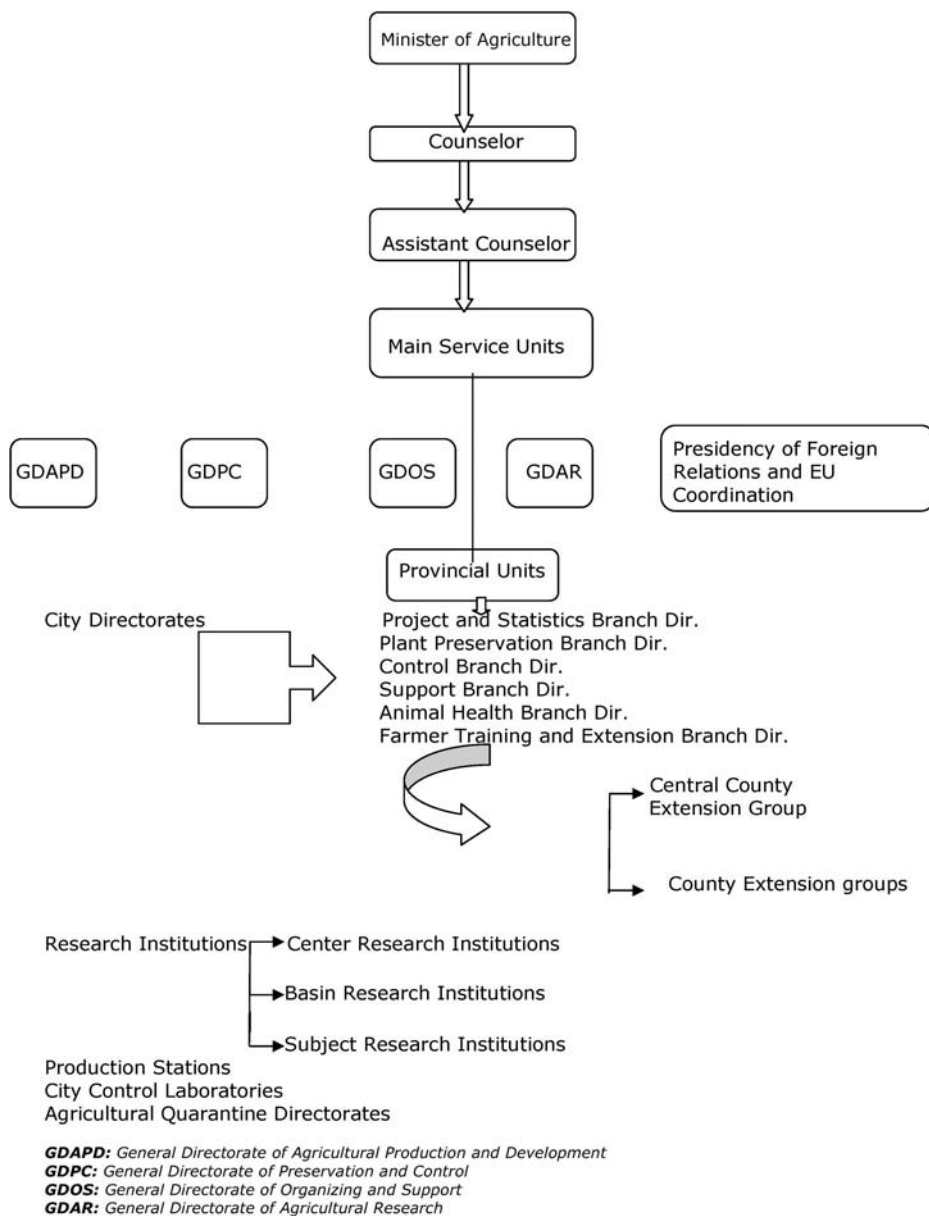
In parallel with this, the general extension approach which was hitherto applied in Turkey was amended in 1984. After that, the Agricultural Extension and Applied Research Project (AEARP) and Training and Visit (T&V) approach was applied across the whole country.

The notion that 'research creates knowledge, and extension transfers it to the farmers who utilize it', underpins the "Training and Visit" (T&V) extension system employed by most countries (Röling, 1988). To this end, in Turkey, a new agricultural extension system was adopted with the support of World Bank from 1984 onwards. This agricultural extension system was placed under the control of both the MARA and its provincial and county offices, with finance from the government. But it has not worked to full effect (Olgun, 1997).

The Turkish MARA is responsible for implementing the system of agricultural extension, which is organized into 81 provinces, 802 counties, 894 Village Group Agricultural Centres (VGAC) and 56 Agricultural Research Directorates (MARA,2005). The MARA works with seven main service units in its center, and one of these units, the General Directorate of Organization and Support, is responsible for agricultural extension. In the provincial network, the Farmer Training and Extension Branches offer extension service to farmers. See the Organizational chart of the MARA as given in Figure 2.

#### *New approaches*

To render these extension services more effective, in 2004, 1,000 volunteer agriculturists were assigned to 1,000 villages by the MARA on a project called, the "Support project of village-centered agricultural production". Because of the perception that centralized solutions are not useful for farmers, this decentralized initiative intended to give on-site information to villagers and to solve problems via dialogue with them. The project has not yet been concluded and so its exact outcomes



**Figure 2.** Organizational chart of MAR A (Research and Extension Organization)

are not as yet ascertained, but the preliminary feedback is that, in many villages, the desired objectives were indeed successfully attained.

There is an obvious connection here between effectiveness and success, and the number and qualifications of the employees working in this initiative. This connection is of the highest level of significance, since extension is fundamentally an educational process, one based on human factors and personal mediation. Thus, no doubt, the

most important resources in such extension organizations are the people themselves who carry out the extension activities (Talug, 1982). An increase in the qualifications of the extension workers would remove some of the obstacles to a smooth flow of information (e.g. communication with the farmer, or coordination with research institutions).

There are still problems in the system itself, in terms of planning extension activities, and the agricultural research–extension linkages are very weak. One way to overcome this problem may be to stop the over-differentiation between research and extension institutions (Ozkaya and Olgun, 1993). Extension activities themselves are still planned centrally and the information flow model is, more or less, from top to bottom. Thus, farmer participation in planning extension activities is very weak (Olgun, 1997).

Studies of farmers' adoption of new technologies in industrial agriculture have often been framed within the traditional adoption-diffusion model of innovation (Jones, 1963) in which a few "innovators" initially adopt a conservation technology, then the majority of farmers do so, and finally the remaining "laggards" join in (Rogers, 1962). Farmer participation is especially valuable, since better communication between scientists and farmers would increase the utility and reliability of information reaching farmers. Research projects must intentionally incorporate farmers as sources of knowledge from the outset, rather than seeing them as passive receivers of information (McCorkle, 1989; Saver, 1990; Kloppenburg, 1991).

### Research systems

Information systems are expected to provide an organizational backbone to support information flow among national agricultural research institutions (Maru, 2002).

Research is needed in order to advance the availability of present levels of information, and, beyond this, to generate new information. Research takes place in academic as well as research institutions. Researchers require a variety of information types from numerous national, regional and international sources to enhance support for their research. Without a strong and responsive information base, quality research cannot be attained and the advances needed in the field of agriculture are inhibited. If research and development documentation remains unknown to users, effective, well-informed studies can not be carried out as needed, resulting in a loss of time and wastage of resources (Miah, 1997).

Successful studies show how the processes of extension and research are inextricably interlinked. Extension workers from across the world attending a conference in Rome in 1989 engaged in a fruitful dialogue about the three most successful courses of agricultural extension known to them, and pointed out how there was no chance of success for any extension activity, organization or programme unless it was supported and fed by research, (Talug, 1992).

#### *Structure of agricultural research system in Turkey*

In Turkey, the research and development institutions of Agriculture, Forestry and Fishing work under the responsibility of the MARA (48), Ministry of Forestry (11) and General Directorate of Village Services (11).

The General Directorate of Agricultural Research is also under the MARA and has both central and provincial structures.

The Central Research Structure consists of the Council of Agricultural Research, Research Consultation Committees and the Program Coordinators, coordinated by the General Directorate of Researches.

The Provincial Research Structure consists of a network of Research Institutions. These comprise seven Central Research Institutions, 19 Basin Research Institutions, and 34 Subject and Discipline Research Institutions (MARA, 2005). The Organizational chart of the agricultural research was given in Figure 2. Also there are several institutions such as The Scientific and Technological Research Organization of Turkey (TUBITAK), TR Prime Ministry State Planning Organization (SPO) and the National Productivity Centre (NPC) supporting agricultural research projects. Additionally, varying faculties (of Agriculture, Forestry, Veterinary), farmer organizations, (cooperated unions, farmer unions, chambers of agriculture), voluntary institutions, and private agricultural institutions are available to both carry out research and promote the 'extension' of its findings.

#### *Research areas*

In Turkish agricultural research, different areas of interest have predominated at different times. For example:

- agricultural mechanization in the 1950s;
- irrigation, agricultural control, and fertilization in 1960s and 1970s;
- seed-raising and the development of new species (biotechnology advances) in 1980s.

Today, agricultural research activity concentrates mainly on the alternation of current production qualities, such as producing new species of animals and vegetation.

Unfortunately, the potential for the transfer of agricultural technologies from developed countries is very limited in Turkey. The availability of foreign capital for the advancement of agriculture technologies, for export possibilities and for common investments is simply inadequate. Moreover, a network of international relations among research institutions is not as yet properly established.

#### *Research and information flow*

Agricultural information is generated from a variety of sources, such as universities, Research Institutions, the FAO, TUBITAK, or SPO, and is then disseminated to farmers and those in agricultural areas by the extension attendants of provincial organizations run by the MARA, by state and private media, by private consultants, and by voluntary institutions and farmer organizations.

An important issue for Turkish farmers is their need for increased availability of sources of information, which would be particularly welcome and highly effective with regard to helping them make decisions and choices about agricultural production. There are two potential, untapped drivers which could increase the availability of sources of information in this area:

- The potential for increased involvement of non-public organizations in agricultural extension services (due to the reasons such as the increasing levels of investment made in the food industry, and increased levels of vertical integration, compared with the financial problems in the public extension sector);
- Advances in the production and distribution technologies of information (Tatlidil and Ceylan, 2000).

**Conclusions**

In the flow of agricultural extension and information, despite the application of technological transfer approaches, many problems remain unsolved while indeed new ones have appeared, not just in Turkey but in the world as a whole.

Technological advances and software packages developed with the hope of promoting efficiency in the information dissemination practices of research institutions and universities, or even in the companies of the developed countries, have not in reality brought benefit to farmers. The effectiveness of the public extension program has in fact diminished, due to the reasons such as limits in budgets, lack of motivation and morale among staff, a decreasing and inappropriately distributed number of extension attendants, the non-dynamic structure of the extension organizations, and disconnections in communication among research institutions, both internally and in their relations with other extension institutions.

Moreover, the small size of farms, illiteracy among farmers, the lack of organizational unity among farmers, and the instability of national agricultural policies have all played a part in undermining the effectiveness of the agricultural extension system. This demonstrates how vital aspects of the agricultural information system have not worked properly, with information failing to reach users in timely or effective fashion.

Our suggestions to help remove deficiencies in the agricultural information system would be as follows:

- To set up a unique institution specifically for the purpose of promoting extension, but also with the role of gathering centrally all the necessary information for this task into its sphere of activity;
- To establish coordination among research institutions;
- To strengthen the connection between extension institutions and research institutions;
- To establish coordination between the MARA and other extension institutions;
- To raise the budget allocated to extension and research;
- To introduce appropriate technologies to farmers which are tailored to their needs, instead of those technological packages which are generally available on world markets;
- To set out new arrangements for extension programs so that the farmer can actively participate in the creation of programs, above all at the planning and application stages of extension;
- To provide research and extension services that the farmers can shape, with regard to their needs;
- To grant opportunities to involve farmers' organizations in the information system so that the farmers can enhance their productivity and improve their knowledge and abilities by first-hand participation;
- To support and promote the potential for extension activities from the non-public sector;
- To simplify the bureaucracy surrounding the use of both agricultural information and also human resources in extension effectively and efficiently;



- To establish open communication forums with databanks, teletext, GSM systems, and all other relevant modern ICTs, to activate the information flow between the Ministry and Research Institutions and their information users;
- To improve the value of human resources engaged in agriculture by improving the educational attainment levels of farmers.

### Notes

1. "Extension" means "reaching out," and – along with teaching and research – educational institutions will "extend" their resources, solving public needs with resources made available through a variety of outreach programmes, adapted from: United States Department of Agriculture, Cooperative State Research, Education, and Extension Service, available at: <http://csrees.usda.gov/qlinks/extension.html> (accessed 30 May 2006).
2. MARA, Ministry of Agriculture and Rural Affairs, 2005, available at: <http://tarim.gov.tr> available at: <http://tagem.gov.tr> available at: <http://tedgem.gov.tr> (accessed 30 May 2006).

### References

- Ballantyne, P. (2005), "Accessing and managing agricultural information", International Network for The Availability of Scientific Publications (INASP) Newsletter, No. 28, March, available at: <http://inasp.info/newslet/mar05.shtml> (accessed 30 May 2006).
- Ehlers, A. and Frick, A. (2000), "An analysis of the agricultural information system in South Africa with specific reference to the Western Cape province", *Elsenburg Joernaal*, 2000, pp. 29–32.
- Jones, G.E. (1963), "The diffusion of agricultural innovations", *Journal of Agricultural Economics*, Vol. 15, pp. 59–69.
- Just, D.R., Wolf, S.A., Wu, S. and Zilberman, D. (2002), "Consumption of economic information in agriculture", *American Journal of Agricultural Economics*, Vol. 84 No. 1, pp. 39–52.
- Kloppenburg, J. Jr (1991), "Social theory and the de/reconstruction of agricultural science: local knowledge for an alternative agriculture", *Rural Sociology*, Vol. 56 No. 4, pp. 519–48.
- Kumuk, T. (1993), "A critical view to the implementation of training and visit extension in Turkey", *Ege Universitesi Ziraat Fakultesi Dergisi*, Cilt 30, Sayı 3, pp. 207–14.
- Maru, A. (2002), "A normative model for agricultural research information systems", International Service for National Agricultural Research, The Hague, The Netherlands.
- McCorkle, C.M. (1989), "Toward a knowledge of local knowledge and its importance for agricultural RD&E", *Agriculture and Human Values*, Vol. 6 No. 3, pp. 4–12.
- McCue, J., Craycraft, C., Dunham, T., Fretz, T., McGeachin, R., Wilson, P. and Young, E. (2005), Leadership Council for Agricultural Information and Outreach. Subcommittee on Content "Stocking the Shelves" Report, Lexington, KY, May.
- Miah, M.A. Hamid (1997), "Agricultural information needs, mode, mechanism and information flow in Bangladesh", *Proceedings of the Regional Workshop on Agricultural Information Needs, Mode, Mechanism and Information Flow in SAARC Countries*, SAARC Agricultural Information Centre (SAIC), 31 March-2 April, pp. 11–20.
- Ministry of Agriculture and Rural Affairs (2005), available at: <http://tarim.gov.tr> at: <http://tagem.gov.tr> and at: <http://tedgem.gov.tr> (accessed 30 May 2006).

- Morris, C. (2000), "The role of computers and information technology in rural agricultural information systems", LIS 711: Information Management, Assignment 3, Topic 16, 20 October.
- Muyepa, F. (2002), "The role of agricultural information in poverty monitoring in Malawi", paper presented at the Poverty Monitoring Stakeholders Workshop, 24–26 July.
- Munyua, H. (2000), "Information and communication technologies (ICTS) for rural development and food security: lessons from field experiences in developing countries", paper presented at a workshop on The Role of Information and Communication Technologies in Rural Development and Food Security, Rome, 5–6 June, available at: <http://fao.org/coaim/ictus/munyua.htm> (accessed 30 May 2006).
- Olgun, A. (1997), "The needed change in agricultural extension with customs union agreement in Turkey", *Proceedings of the 13th European Seminar on Extension Education, August 31–September 6, 1997*, Ireland, p. 374.
- Ozkaya, T. and Olgun, A. (1993), "The research and extension relations in Turkey", *Proceedings of the 11th European Seminar on Extension Education, August 30–September 4, 1993*, Denmark, p. 155.
- Repo, A.J. (1989), "The value of information: approaches in economics, accounting, and management science", *Journal of the American Society for Information Science*, Vol. 40, pp. 68–85.
- Rogers, E. (1962), *Diffusion of Innovations*, The Free Press, New York, NY.
- Röling, N. (1988), *Extension Science: Information Systems In Agricultural Development*, Cambridge University Press, New York, NY.
- Saver, R. (1990), "Meeting the challenges to agricultural research and extension", *American Journal of Alternative Agriculture*, Vol. 5 No. 4, pp. 184–7.
- Smith, E.M. (2003), "Agricultural information for the new millennium", Vol. 24 No. 1, NC SU Libraries Focus Online, US Agricultural Information Network Conference Scholarship.
- Stigler, G.J. (1961), "The economics of information", *Journal of Political Economy*, Vol. 69, pp. 213–25.
- Talug, C. (1982), *Meyseb Tarimsal Yayim Calismalarinin Degerlendirilmesi Uzerine Bir Arastirma*, Yayinlanmamis Docentlik Tezi, Ankara.
- Talug, C. and Tatlidil, H. (1986), "Tarimsal Yayim Hizmetlerinin Duzenlenmesi", GAP Tarimsal Kalkinma Simpozyumu, 18–21 Kasim Ankara Universitesi Basimevi, Ankara, pp. 595–613.
- Talug, C. (1992), "Arastirma-Teknoloji Politikalari Paneli", Tarim Haftasi 92 Sempozyumu, TMMOB Ziraat Muhendisleri Odasi 2000'li Yillara Dogru Turkiye Tarimi, 7–10 Ocak 1992, Milli Kütüphane, Ankara, pp. 554–6.
- Tatlidil, H. and Ceylan, C. (2000), "Turkiye'de Tarimsal Yayim Hizmetlerinin Gelistirilmesi", V. Turkiye Ziraat Muhendisligi Teknik Kongresi, TMMOB Ziraat Muhendisleri Odasi, 17–21 Ocak 2000, Milli Kütüphane, Ankara, pp. 1105–15.
- Taysi, I. (1998), "Tarim ve Koyisleri Bakanliginin Merkezi Orgut Yapisinin Gecirdigi Evreler", Tarim ve Koyisleri Bakanligi, Arastirma Planlama ve Koordinasyon Kurulu Baskanligi, Ankara.
- Tshabalala, B.V.L. (2001), "Agricultural information needs and resources available to agriculturists and farmers in a developing country with special reference to Lesotho", dissertation submitted in partial fulfilment of the requirements for the degree, Magister Informations, Rand Afrikaans University.
- Wakelin, F. and Simelane, S. (1995), "The regional consultative forum on rural development and information provision to rural communities", *Innovation*, Vol. 11, pp. 40–3.

- Wishart, J. (1995), "Information services: an NGO response to their role in development", *Innovation*, Vol. 11, pp. 26–32.
- Wolf, S., Just, D.R. and Zilberman, D. (2001), "Between data and decisions: the organization of agriculture economic information systems", *Research Policy*, Vol. 30, pp. 121–41.
- Zaman, M.A. (2002), "Present status of agricultural information technology systems and services in Bangladesh", available at: <http://jsai.or.jp/afita/afita-conf/2002/part 1/p075.pdf> (accessed 30 May 2006).

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