

Promoting Demand and Supply for its Products and Services in Communities - A Strategic Model

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Abstract

The purpose of this paper is to analyze the emerging literature on community informatics with a view to developing a strategic framework, described as the Action, Reaction, Integration (ARI) model. We start by presenting the major themes in the research on community informatics. The review highlights issues that have attracted most research efforts on Community Informatics. We conclude this discussion by asserting that issues related to the strategy of community informatics have not received enough attention. Hence, the need for a theoretical model that focuses on this area. The ARI model, with examples from a real life case study which took place in regional Australia, is presented. We conclude the paper with an outline of the major directions for future research emanating from the ARI model.

Keywords

economic impacts, computers and society, management of information needs, models

INTRODUCTION

The term “community informatics” (CI) is defined in this paper as a technology strategy or an area that focuses on the use of Information Technology (IT) by territorial communities. As indicated by Gurstein (1999), CI links economic and social development at the community level with emerging opportunities in such areas as electronic commerce, community and civic networks and tele-centers, electronic democracy, self-help, advocacy, and cultural enhancement. As such, this term brings together the concepts of IT and information systems with the concept of community development.

As an area of research, CI can be regarded as the body of theory underlying one of the most exciting phenomena of the last decade, namely the diffusion and use of Internet technologies within communities. The Smart Communities movement, as it is often referred to in the popular press (Eger 1997a; Canadian Government, 1998; and Nordicity 1997), is a social reality not just in North America and Europe, but also in Asia, Australia, and the Middle East. There are also large-scale CI projects in South America and Africa.

The purpose of this paper is to analyze the emerging literature on CI with a view to developing a strategic framework, defined as the Action, Reaction, Integration (ARI) model. We start by presenting the major themes in the research on community informatics. The review is intended to highlight issues that have attracted most research efforts on community informatics to date. We conclude this discussion by asserting that issues related to the strategy of CI have not received enough attention. Hence, the need for a theoretical model that focuses

on this area. We proceed to present the ARI model, with examples from a real life case study that took place in Rockhampton, Australia. We conclude the paper with an outline of the major directions for future research emanating from the ARI model.

LITERATURE REVIEW

A review of the literature on CI reveals that it focuses on the following themes:

1. Why Is It Important For Communities To Learn To Use IT?

The answer that is provided by the literature to this question is that communities are now part of the global village and no longer exist in isolation within 'nation states'. The pressures of globalisation mean that communities need to learn to benefit from this new economic and social reality. Otherwise, they will be left behind. It is suggested in the literature that the only way that communities, particularly in regional and rural areas can survive in this new world order is for them to use IT for linking with the global village (Ohmae, 1995; Caves and Walshok 1997; Eger, 1997a and 1997 b; Canadian Government, 1998; Lankester, 1998; and Giddens, 1999).

Another reason that has been mentioned in the literature as a driver of CI is the need to combat community fragmentation. Thus, some authors suggest that information systems can counteract the increased sense of disconnectedness (UNDP, 1999; AFCN, 1999).

It is important to note that not all the literature in this area is in agreement that it is important or even beneficial for communities to learn to use IT for communication among their members. As indicated by Kling (1996), in a paper that focuses on the use of Internet technologies by communities in California, the ways that people work and communicate via computer networks could potentially "destablize conventional social categories".

2. How Can IT Support Community Development?

It is suggested in the literature that IT can support community development through helping communities identify and harness local commitment, resources and skills (Canadian Government, 1997; Eger, 1997b; Dohney-Farina, 1997; Pigg, 1998; AFCN, 1999). The assumption is that once community efforts are put together, the resulting joint effort would lead to stimulation of sustainable local economic activity and improvement of quality of life (Aspen Institute, 1996). This assertion is based on the premise that communities have considerable untapped capacity and that IT can help them become aware of this capacity and bring it to fruition.

3. What Makes CI Effective In Some Communities?

One of the most important themes in the literature on CI is the search for effective means for diffusing IT within communities. In this context several success stories are frequently quoted. The first of these, the Missouri Express Project, was established in Missouri in 1993. This project aimed to connect 80 communities in Community Information Networks (CIN's) over a three-year period (Pigg, 1998). The emergence of the Smart Communities concepts in San Deigo in 1994, led to the establishment of the World Foundation of Smart Communities in 1997 (Eger, 1997a). The approach underlying these projects was based on a wide variety of IT applications intended to create vibrant sustainable regional economies through targeting business and formal educational processes.

One of the early attempts to identify issues that can help remote communities benefit from CI was initiated by Gurstein (1999). In his discussion of the CI Project at Cape Britton, Nova Scotia, which he initiated and led, Gurstein mentioned the following as potential advantages of CI for remote communities: (1) overcoming distance insensitivity; (2) achieving local ownership and management of local information (3) making tele-work possible; (4) enabling local nuance in the processing of information; (5) promotion of flexibility for small scale distributed production; and (6) obtaining economies of dis-aggregation.

In the same study, Gurstein identified three strategies for CI as an enabler of community economic development: (1) using it as a 'marketing tool' for small business, (2) using it as an 'enabler' for the mobilization of a wider range of resources for community economic development; and (3) and using it as a 'distributed networker' for the emergence of new networks and economies of 'dis-aggregation'.

In a recent review of the Access Indiana project which funded the establishment of twenty eight community networks, Rosenbaum and Gregson (1998), listed the following as factors that contribute to the success of CI projects:

- integration into the routine life of the community;
- local content for local needs;
- linkage to local government, schools, and social services; and
- processes that ascertain long term sustainability.

4. What Factors Can Interfere In The Successful Diffusion Of IT Within Communities?

Gurstein's work (1996,1999) also heralded the beginning of the search for factors that may hinder the successful diffusion of IT within communities. Based on his findings, Gurstein indicated that less than successful CI projects were associated with the failure to link the projects with local economic activity and to unite community efforts behind strong leadership. In this context, Gurstein (1999) saw the use of CI as a double edged sword. Whilst it could facilitate community development, it could also be associated with discord within the community resulting from the differential effect on various community stakeholders.

Another study that attempted to identify factors that hinder successful diffusion of IT within communities was undertaken by Scott, Diamond and Smith (1997). This study was based on the first and largest CI project in Australia. It involved the establishment of 450 public access points across three Australian States. The most important shortcoming of this project was that its facilities were under-utilized. The authors saw the fact that the project was based on public rather than private access points as the major reason for its limited success. They recommended that in future, public funded CI projects should strive to encourage private access points (through local ISP's) and invest in raising community awareness of Internet technologies through promotion and training activities.

A recent paper by Kling (1999) alerted researchers to the need to develop theoretical tools that would assist in understanding and eventually overcoming obstacles to diffusion of IT within communities. Perhaps in response to this call, another recent paper (Romm and Taylor, 2000) outlined a model of diffusion of IT within a CI context. The model builds on the literature on diffusion of IT in organizations, highlighting the unique issues that need to be addressed when diffusing IT in communities as opposed to work organizations.

Building on previous work by Markus 1994 and Romm, Pliskin, and Clarke, 1997, the authors mention the following variables as critical to successful diffusion of IT within a CI context:

- **Technology** - Given that CI focuses on the whole community, including its less computer literate members, it is, important that technological constraints, namely, the degree to which technologies are seen as “user friendly” are taken into account when CI projects are undertaken.
- **Motivation** – The degree to which individuals within the community are motivated to participate in CI projects is crucial to the success or failure prospects of these project. Consequently, from a practitioner perspective, a lot of attention should be given to understanding the unique motivation of subgroups within the community (different age groups, socioeconomic groups etc.).
- **Task** – If members of the community cannot see how the technologies can be of use to them, they are not likely to adopt them. From a practitioner perspective, a lot of attention should be given to understanding the tasks that members of the community wish to undertake and how these can be facilitated by IT
- **Environment** – This variable would translate as changes to the social and economic environment in which the community as a whole is operating. For example, living in a remote area such as Cape Breton, Nova Scotia (as reported by Gurstein, 1999) would work as an incentive for community members to embrace Internet technologies as a means for marketing their unique products. From a practitioner perspective, a lot of attention should be given to understanding the external environment in which the community is operating and using IT to increase the comparative advantage of the community within its environment.
- **Politics** – This variable refers to the degree to which the community as a whole is characterized by harmonious relationships between its members. It would also translate into the degree to which the members of the community support their leaders in their effort to diffuse the new technologies. From a practitioner’s perspective, this variable would suggest that practitioners should be sensitive to conflicts within the community and endeavor to resolve them as a means for facilitating the diffusion of IT.
- **Culture** – This variable would suggest that the culture of the community to which the new IT's are being introduced has to be compatible with the goals of the project in order for the project to succeed. From a practitioner’s perspective, this would suggest a “culture analysis” of both the community values and the values embedded in the IT to be diffused.

Romm and Taylor (2000) make an important distinction between the **quantitative** aspects of diffusion or its **rate** and the qualitative aspects of diffusion or its **depth**. They note that when it comes to diffusion of Internet technologies within communities, qualitative measures, which reflect depth of diffusion, should be considered in addition to “increase in the number of users” (the usual measure for rate of diffusion). Thus, issues such as who is using the Internet, as well as, for how long and for what purposes are of utmost importance.

It is in this context that Romm and Taylor (2000) also urge researchers to undertake longitudinal research, looking at issues such as:

- how do CI projects change over time;
- do the attitudes within the community change over time;
- does the behavior of community members change over time; and
- are the changes in both attitudes and behavior gradual (evolutionary) or abrupt (revolutionary).

TOWARD A STRATEGIC MODEL OF CI

From the review in the previous sections, it is obvious that issues of CI strategy have not attracted significant research. The discussion of diffusion hurdles and, particularly the recent emphasis (Romm and Taylor, 2000) on the need for longitudinal research in CI, indicates that researchers are starting to be aware of the need to consider long-term issues in CI, including issues that relate to strategy. However, the model that we present in the following sections is, to the best of our knowledge, the first explicit attempt to think about CI from a strategic perspective.

Constraints

The ARI model was developed in the context of the following **seven** constraints:

- (i) The model takes as a given that CI projects may start from a very low base-line, namely, a community whose diffusion of IT is minimal.
- (ii) The model assumes that there are exogenous and endogenous variables that motivate the community to embark on a CI project.
- (iii) The model assumes that certain steps have to be undertaken to close the gap between the relatively low base-line at the beginning of the project and the desired high level of IT diffusion at its end.
- (iv) The model does not make any assumptions about the resources (financial or otherwise) that are available to the community to support the CI project.
- (v) The model does not make any assumptions about the source of the resources that support the CI project (whether they originate outside the community, inside of it, or both).
- (vi) The model does not focus on the actual diffusion process, or on variables that could assist or hinder such a process. Instead, it focuses on the strategic decision making of the project leaders.
- (vii) Finally, the model is prescriptive rather than descriptive. It does not explain a set of data that has been empirically collected. Instead, its emphasis is on recommending a course of action that is **analytically** sound.

The assumptions underlying the ARI model

The ARI model is based on two sets of assumptions. The first five assumptions relate to the **nature** of its components. The second set of five assumptions relates to the **relationships** between its components.

The nature of the ARI model's components

- (i) The ARI model is based on three building blocks, Action, Reaction, Integration.
- (ii) The Action (A) component is defined as activities (or projects) intended to increase **demand** for IT products and services. The Reaction (R) component is defined as activities intended to increase **supply** of IT products and services. The Integration (I) component is defined as activities intended to integrate the demand for and supply of IT products and services through **aggregation** of either demand or supply or both.
- (iii) The goal of a CI project is to establish higher levels of demand and supply for IT products and services within communities.

- (iv) In order to reach higher levels of demand and supply for IT products and services, projects that are intended to increase both demand and supply should be undertaken.
- (v) Ultimately, the goal of CI projects should be to aggregate demand and supply for IT goods and services, as their aggregation will result in an upward spiral of increase in both demand and supply, establishing a self sustaining “market” for IT products and services.

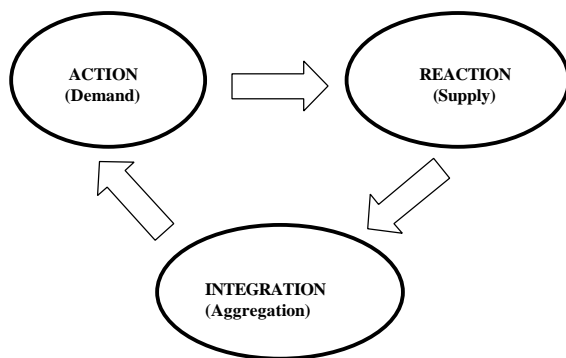


Figure 1: The Components of the ARI Model

The relationships between the ARI model’s components

- (vi) Of the two variables (supply and demand), demand is easier to manipulate by external agents. Therefore, for the purpose of the ARI model, it is defined as the “Action” phase and describes the set of intervention activities that should take place **first**.
- (vii) The ARI model refers to the manipulation of supply for IT products and services as the “Reaction” phase based on the assumption that it would be more difficult to manipulate it in a community context unless a demand for IT products and services **already exists**. In other words, it would be difficult to convince industry to provide a community with Internet based products and services (particularly a remote community or one placed in a developing country), unless there is already a body of customers willing to buy the products and services.
- (viii) The ARI model refers to the aggregation of demand and/or supply of IT products and services as “Integration” phase because this set of activities represents a level of integration involving the first two. The model also assumes that aggregation will not be possible to achieve unless a minimum level of both demand and supply for IT goods and services have been established.
- (ix) The ARI model assumes that the three components, “Action”, “Reaction”, “Integration” (or demand, supply, aggregation) will drive each other, ultimately producing a mutually dependent upward spiral effect where all three continue to increase over time.
- (x) Finally, the ARI model assumes that in order to sustain a CI project over a long period of time, the leaders of the project will have to maintain a “balanced portfolio” of “Action”, “Reaction” and “Integration” activities, intended to reinforce each other.

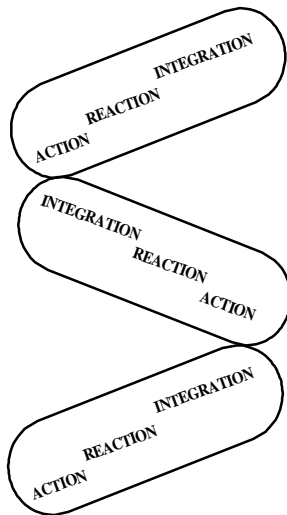


Figure 2: The Relationship Between the Components of the ARI Model

The Rockhampton case study

In the following sections, a short version of the Rockhampton case study is presented, with the discussion highlighting issues relevant to the ARI model. For a full version of the case study, please contact the authors.

Rockhampton is the capital of Central Queensland, a region that is five times the size of the UK. The city, which has a population of about 60,000 people is the commercial centre for a rural population of about 250,000. The city experienced a period of prosperity during the “gold rush” (at the end of the previous century), but has been in decline ever since. The city is still a service centre to the region, boasting, three theatres, three hospitals, and many other businesses that serve the region. The region’s economy is based on mining, services, tourism, and agriculture. However, the one of the largest employers in the city is Central Queensland University (CQU) which has over 15,000 students, distributed between 12 campuses (four of which are located overseas). Other than being the fastest growing university in Australia, CQU is considered a leader in Australian distant education, with a strong emphasis on Internet based teaching.

The CI project at Rockhampton was initiated by the University when it’s President. appointed one of his deputies (in early 1998) as Head of Smart City. Over the next two years, the Provost was successful in leasing, purchasing and receiving as donations a number of heritage buildings in the town’s CBD which were to be used as the basis for the Smart City project. He was also successful in attracting a group of energetic professors from within the university to assist him in developing over a dozen of Smart City projects. By the end of 1998, the University has recruited its first female IT Chair. She joined the Provost by leading the CI projects within Smart City. By mid 1999, the first departments from the university moved into several buildings in the town’s CBD. The “pioneers” included the School of Journalism and several administrative units, with relatively few students. The President made it clear in a series of lectures to the university community that the Smart City project was not about moving the university into a city campus. Instead, it was going to be a total change in the role of the university in the community, being based on outreach activities with the community, with a strong emphasis on community informatics. Other than the university, the Smart City Board, established by the Provost, included representatives from the City Council, the City Chamber of Commerce, and various community activist groups.

Phase 1 of Community Informatics projects

Projects intended to promote demand for IT products and services

During 1998 and early 1999, two projects that were intended to promote awareness of Internet technologies have been initiated by members of the Provost team. These included: “The Rural Youth project”, which provided public access points for youth in a dozen of Central Queensland’s small rural communities, and the “Indigenous Networks project”, a project intended to promote awareness and provide public access to the Internet to 15 aboriginal communities in Central Queensland. Both projects were supported by the Federal Government through a national funding agency committed to diffusing Internet technologies in rural Australia.

Projects intended to promote supply of IT products and services

During 1988 and early 1999, several developments that signalled an increase in the supply of Internet based products and services in the city took place. These included a marked increase in the number of ISP’s in the city (from two to seven), and a significant increase in the number of Web design companies. Another important development was the establishment of an Internet Café by one of the largest ISP’s in the city and an aggressive campaign by the local banks for residents of Central Queensland to take advantage of the banks’ newly developed Internet Banking packages.

Projects intended to promote aggregation of demand and supply

The most important project that can be categorised as representing aggregation of demand and supply at this period was launched in late 1999 by the largest ISP in the city. The project was a community portal, supported by an extensive database of many businesses in the city and accompanied by an on-line news bulletin with information about the city’s major attractions and upcoming events. The portal was developed on a very low budget and had a very low “hit rate” but was still an important attempt to create a platform where Internet based businesses and customers could interact as one market.

Phase 2 of community informatics projects

Projects intended to promote demand for IT products and services

By the end of 1999, the university decided to support a team of its members on the first Internet awareness project within the city. The project, entitled “COIN” (for community informatics), is designed to focus on the establishment an “evolving” web site for one of the suburbs of the city. The objective of the project is for the community to eventually use the web site as a basis for a number of project based lists and chat-groups. The project also intends to facilitate training activities for the members of the community on Internet related areas. Another project, also conceived in late 1999 was ‘SeniorConnect’. This project was supported by the City Council and intends to introduce senior citizens in the city to Internet technology. The project is related to COIN in that the trainers in it were to be high school students from the suburb included in the COIN project.

Projects intended to promote supply of IT products and services

During late 1999 and early 2000, several developments that signalled further increase in the supply of Internet based products and services in the city took place. The first of these developments was an announcement by the City Council that it would establish a number of “Kiosks” around the city shopping centers where a range of services (paying of fees,

obtaining licenses etc.) can be accessed on-line. At about the same time, several companies dedicated to Internet training moved into the city, establishing alliances with some of the major ISP's and computer retailers. These companies offered a range of training courses, particularly on how to use the new services (telebanking, the city council's kiosks) and how to engage in Electronic Commerce.

Projects intended to promote aggregation of demand and supply

By late 1999 the second major project that can be seen as representing aggregation of demand and supply, an application for an IT Incubator, was initiated by the city. The Incubator project was prompted by a Federal government announcement a special fund to support IT Incubators in each state across Australia. Given the location of Rockhampton, 600 km from Brisbane, the capital of Queensland, the major competing bid for the funds was expected to come from Brisbane. To maximise the city's chances to win the bid, the City Council established an Incubator Planning Board with representation from all major employers and citizen groups in the city. In the proposal, it was made clear that the Incubator would rely on software development projects provided by the major industry players (aggregation of demand for IT products and services) while at the same time, approach one of Australia's largest computer retailer and software development companies as a potential employer of IT teleworkers from the city (aggregation of supply of products and services). In this sense the project represented an attempt by the city to aggregate both demand and supply, thus benefiting from economies of scale in both areas. Table 1 below categorises the CI projects undertaken by the City of Rockhampton in terms of the major components of the ARI model.

DISCUSSION AND CONCLUSIONS

Perhaps one of the most important issues raised by the ARI model is the question of timing of intervention activities. The model suggests that even though activities that promote demand and supply for IT goods and services should be undertaken **simultaneously**, demand related activities should take precedence.

Does this mean that unless a minimum level of demand has been reached no activities that involve manipulation of supply or aggregation of both supply and demand should take place?

	Action	Reaction	Integration
Phase 1	Rural Youth Indigenous Communities	ISP's Web designers Internet Banking	Portal
Phase 2	COIN Senior Connect	Kiosks Internet Training Telecenter	Incubator

Table 1: Categorization of Case Data in Terms of the ARI Model

Obviously the answer to this question is no. The fact that a community is at a low level of diffusion and most efforts are focused on increasing demand for IT products and services, does not mean that activities that are intended to increase supply of these products and services **should not** be undertaken. Similarly, even though a minimum level of both demand and supply is probably necessary for aggregation to occur, it is possible, as the Rockhampton

case study demonstrates, to envisage low level (the community portal project), as well as, higher level (the Incubator) of aggregation of supply and demand.

Perhaps the best way to conceptualize the timing issue in the context of CI is along the lines suggested in Figure 3 below. As indicated in this figure, even though demand-driving activities should precede any other driving activities, an **overlap** between demand and supply driving activities is desirable. Similarly, even though a minimal level of both demand and supply for IT products and services is probably necessary for any useful aggregation to take place, an **overlap** between supply driving activities and aggregation driving activities is possible and perhaps desirable, as aggregation of demand or supply is likely to increase both.

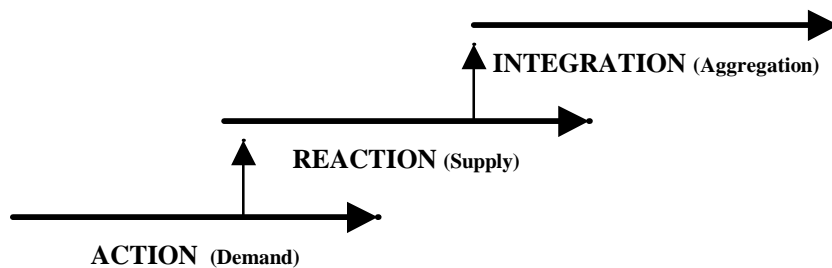


Figure 3: The Timing of Activities in the ARI Model -

Another interesting implication from the ARI model, relates to the relationship between the model and other exogenous and endogenous variables that may impact on its components. Obviously, in real life, there could be quite a few variables that may impact on the levels of demand and supply for IT products and services within communities, irrespective of the decision making processes undertaken by the project leaders. Figure 4 below outlines some of the variables that should be considered by future researchers exploring CI strategy in a broader context.

As indicated in Figure 4, the success prospects of a CI leader, implementing the strategies outlined in the ARI model is likely to be affected by two sets of variables: exogenous variables that relate to the environment external to the community in which the project is implemented (e.g., technology developments, support/control from government, competition with other communities and/or organizations, financial and/or other resources etc.), and variables that relate to the community itself (e.g., motivation of individual members, degree of harmony within the community, compatibility of the project with the community culture, etc). Both exogenous and endogenous variables will most probably affect not only the overall outcome of the project but the degree to which the leaders will enjoy the support and trust of the community while the project is in progress.

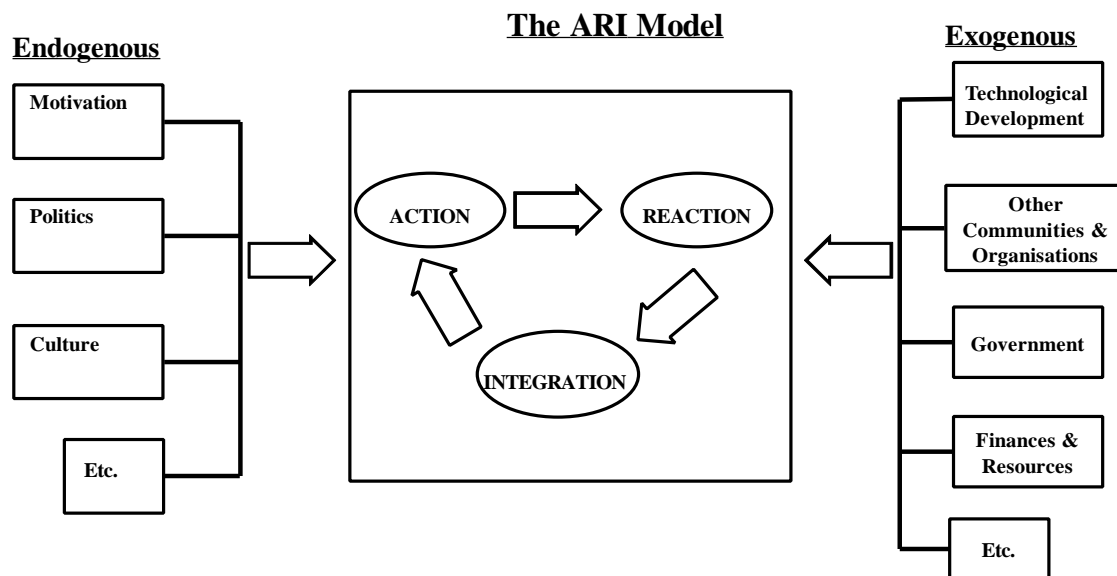


Figure 4: The relationship between the ARI model and exogenous and endogenous variables

It remains for future research, both theoretical and empirical to extend the scope of the ARI model. This could take be achieved in terms of **depth**, namely, identification of more relevant variables that can explain and predict CI strategy, or in terms of **generalization**, namely, the collection of additional empirical data that substantiates the major tents of the model In particular, an area that should be addressed by future research is the identification of **drivers** endogenous and exogenous, to CI projects.

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