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A systemic perspective in understanding the successful emergence of non-traditional exports: two cases from Africa and Latin America

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Abstract

Due to recent revival of interest on industrial policy, there have been many attempts to design policy tools to facilitate the successful emergence of new industry, which in turn may help developing countries to transform structurally to a developmental path. Often, however, the existing policy framework lacks the systemic and dynamic perspective of industry. In this context we consider the 'function of innovation system' to be a useful policy tool and have therefore adapted the framework to analyse two cases from developing countries. We investigate the Ethiopian flower industry and the Chilean salmon industry, both of which are successful cases of non-traditional agricultural exports. This comparison enables us to identify the emerging sequence and content of functions at the 'formative' and 'growth' phases of industry for developing countries. These are significantly different from those of developed countries. The identification of such characteristics, based on the 'functions of innovation system' framework, should support effective policy interventions in other developing countries.

JEL CODE: O13, O25

KEY WORDS: NON TRADITIONAL EXPORT, FUNCTION OF INNOVATION SYSTEM, DEVELOPING COUNTRIES, AGRICULTURE, SELF-DISCOVERY

1. Introduction

There has been a recent revival of interest about industrial policy in the development policy debate (e.g. Rodrik, 2004; Hausmann and Rodrik, 2003, 2006; Hausman and Kilinger, 2006; Hausmann Kilinger and Wagner, 2008, Hausman, Rodrik, and Hwang, 2005; Cimoli et al., 2010; Lin and Chang, 2009, Lin and Monga, 2011, Lin, 2010; Lin, 2011). This is due to a growing acceptance that 'market forces' alone cannot bring the much needed structural change for developing countries and follows the disappointing results of structural adjustment programmes over the last three decades. Industrial policy was previously understood as the protection of domestic industries via direct or indirect subsidy of the domestic manufacturing sector. Today, the concept has been broadened to accommodate policy interventions across a wider range of tradable activities that offer better prospects for economic growth, including non-traditional agriculture as well as services (Rodrik, 2007; Pack and Saggi, 2006).

Despite general agreement on the need for policy intervention for sound structural transformation, differences remain on the extent and mechanisms of policy intervention in support of new activities. The key question for developing countries is: 'how to select the industries or activities with developmental potential?' Hausmann and Rodrik (2006) advise against focusing on comparative advantages to select industries to promote and diversify the economic structure. This is because the endowment model only identifies products/activities in broad groups[1]. Hence, they suggest identifying a specific sector and a list of 'guiding principles' for industrial policy (Rodrik, 2007). In one attempt to assist policy makers, Hausmann, Rodrik and Velasco, (2005) provide a growth diagnostic decision tree. This aims to assess the 'binding constraints' in facilitating the emerging process of new activities. Similarly, Lin and Monga (2011) propose a six-step procedure for policy makers in developing countries: to identify industries that may hold 'latent comparative advantages', and to remove the barriers that may hinder entrepreneurs from entering the identified industry. Overall this is known as 'growth identification and facilitation'. The above strongly indicate that some kind of policy framework is urgently needed to understand the existing opportunities and constraints for emerging activities-in-making. The framework should, as all others have similarly attempted, identify 'binding constraints' *in dynamic motion* in order to formulate effective policy intervention.

Beyond the focus on 'binding constraints', policy makers should pay attention to more *holistic and overall systemic aspects* in order to solve problems. It is not only market 'failure' that changes the outcome of policy intervention but the way in which agents are linked. The institutional and network systems also matter as these can 'fail' to function. Cimoli, et al. (2010) argue that institutions and policies always matter because they can simultaneously influence: (i) the technological capabilities of individual and corporate organizations and the rate of learning; (ii) the economic signals and expectations (including on profits and opportunity costs) and (iii) the way agents interact with each other and with non-market institutions to bring about technological learning and economic change, which in turn may lead to structural transformation. From this perspective, the above attempts sought to identify 'binding constraints' (Rodrik 2007. Hausmann, Rodrik and Velasco, 2005, Lin and Monga, 2010); yet they lack *systemic* and *evolutionary* considerations.

The innovation system approach attempts to understand the process of industrial development from the 'systemic view' and accepts that policy intervention needs to respond to specific 'industrial dynamics' (Freeman 1987, Nelson, 1987, Lundvall, 1992, Carlson and Jacobsson, 1999). A 'function of innovation systems' (Bergek et al, 2008, Hekkert, et al., 2007, Gaili and Teubal, 1997,

[1] Here, the famous example is how to explain Bangladesh's export of bed sheets while Pakistan exports hats.

Carlsson e al, 2005, Edquist, 2004) emerges from this 'systemic perspective' with the aim of identifying the blocking/inducing mechanisms of emerging technologies/activities-in-making to facilitate effective policy intervention. This approach will be of interest to developing countries to guide their successful emergence of new industries. Despite its original aim to analyse the emergence of new technologies (such as solar and wind energy) in developed countries, many initial conditions for new emerging technologies are similar to those of emerging activities in developing countries. In both cases, early entrepreneurs face a high degree of uncertainty due to the lack of physical infrastructure, market demand, complementary goods and services, large-scale capital investments and knowledge related to the new activity or technology. The framework provided by the 'functions of innovation system' can be modified to explain the emergence of new industries in the catching-up country. In fact, Jacobson and Bergek (2006) applied this framework to examine several cases in developing countries (the Chilean salmon industry, Korean machinery industry and Brazilian aerospace and steel industry). However, their analysis was based on secondary sources and only briefly covers the emerging (formative) phases of these industries. Gebreeyesus and Iizuka (2011) also applied the functions of innovation approach to a developing country context in the case of the Ethiopian flower industry without differentiating the 'formative' and 'growth' phases. These efforts still need to be consolidated to establish a framework for guiding industrial policy in developing countries.

In this paper, we use an adapted version of the functions of innovation framework to examine the development of new export activities in developing countries. We looked at two successful cases of non-traditional exports — the Ethiopian flower industry and the Chilean salmon farming industry — to provide a more systematic understanding of 'binding constraints' and policy needs in the course of developing new industry. We differentiated the early stage of emerging activities into 'formative' and 'growth' phases following the industrial life cycle literature (Klepper, 1997, Winter et al, 2003 Malerba 2006). We also paid attention to how functional requirements evolve in each phase, so that the relevant 'binding constraints' can be identified for appropriate policy interventions. We analysed cases through detailed information from the historical perspective, with micro level data obtained from our field surveys[2]. Both cases are non-traditional agricultural products but are different in various aspects: geographical location, historical period of development, type of products, structure of industry, and stage of industrial development. Hence, we expect the common patterns emerging from this comparative analysis will clarify the discovery process of new industry in a more systemic manner.

The rest of the paper is organized as follows. The next section discusses the analytical framework. Section three and four provide analyses of the case studies of the Ethiopian flower and Chilean salmon industries respectively using the 'functional' framework. Section five compares the two cases, and the last chapter summarizes the findings.

2. Identification of blocking/inducing mechanisms in emerging activity: a systemic perspective

The function of innovation system is a systemic perspective introduced by critics of the innovation system approach (Lundvall, 1990, Freeman, 1987, Nelson, 1992). To evaluate policy effectiveness, the innovation system approach focused on how differences in the structure of systems (e.g. cross-national variations across different institutional and organizational set-ups) influence the

[2] The analysis of the Ethiopian flower industry is based on a formal survey conducted on all operating flower farms in 2008; additional interviews with government, industry association officials and the pioneers; and other official documents. The analysis on Chilean salmon similarly relies on fieldwork survey in 2003 conducted by the author and secondary data from government, industry association and other stakeholders collected subsequently in separate occasions in 2009 and 2011.

innovation process. In contrast with conventional thinking, the functions of innovation analysis focuses on understanding what the system actually *does — i.e. its functions* – in the *on-going* process of creating a system for the new activities (technology/sector) (Jacobsson and Bergek, 2006, Bergek et al, 2010, Bergek et al 2008, Hekkert, et al, 2007). This approach, instead of looking at the function of an individual structural element (agent) or a combination of elements (agents), pays attention to the dynamic outcome of interactions among elements within and beyond the system (agents and context). Thus we evaluate the performance of a system surrounding an emerging technology, product or industry.

We understand that before entrepreneurs risk investing in a new activity (technology), they normally evaluate their surrounding conditions. What we call a 'system of innovation' would include these surrounding conditions, which can influence the trajectory of how a new activity emerges. The way in which a new activity interacts with surrounding conditions is very difficult to predict and cannot be replicated because the system intrinsically follows a path which is: (1) local specific (Katz, 2006, Rodrik, 2004) and path dependent (experience specific) (Bergek et al 2010); (2) a dynamic learning process (absorptive capacity specific) (Bergek et al 2010, Lundvall, 1992, Cohen and Levinthal, 2001, Teece, Pisano and Shuen, 2000) and (3) varied depending upon the phases of development of its activities (time specific) (Bergek et al, 2010) as well as type of activities involved (activity specific) (Jacobsson and Bergek, 2006). The above signifies that the discovery process of new industry varies significantly and there is no single 'path'. Hence, looking at the presence of necessary 'functions' required for a new activity to perform well (Bergek et al, 2008, Hekkert et al. 2007) can be useful to facilitate a system building process. These system functions are identified from cases of technology in developed countries [3] : (1) Entrepreneurial experimentation, (2) Market formation, (3) Resource mobilization, (4) Guiding direction of search and identification of opportunities, (5) Knowledge development and diffusion, (6) Legitimation, and (7) Development of positive externalities. This framework enables us to demonstrate complexity of interconnected factors behind the 'blocking/inducing mechanisms'. Through deeper understanding of interaction, the policy issues can be correctly identified with specific action plans[4] (Bergek et al., 2010).

Bergek et al (2008) grouped these seven functions into two categories. The first relates to functions with market interactions: (1) Market formation, (2) Entrepreneurial experimentation, and (3) Knowledge development and diffusion with an understanding that firms learn through market interaction, or the 'learning network'. The second group of functions is called the 'political network', comprising (1) Resource mobilization, (2) Guiding the direction of search, and (3) Legitimation. As the name suggests, these functions are mobilized more by political forces. The function 'Development of Positive Externality' was excluded from these groups as it can be created both by market forces as well as political forces and emerges only in the presence of other functions.

Jacobsson and Bergek (2006) show how this framework can describe the emergence of new activities in developing countries. They applied the framework in examining cases from a range of activities including the German solar cell industry, Korean machineries industry, Brazilian aerospace and steel industry and Chilean salmon farming industry. They identified that at an initial stage of emergence of new activities, the functions appear in different sequence in the agricultural based activity (Chilean salmon) from the complex products (the rest). For agricultural based

[3] The unit of analysis for function of innovation system studies (Bergek et al, 2008, Hekkert et al, 2008) is technological innovation system (TIS), the system that surrounds technology. Jaccobson and Bergek (2006) broaden this approach and include sector with the sector or sectoral innovation system (SIS) as the unit of analysis. Here we adapt Jaccobsson and Bergek (2006)'s interpretation and generally refer to 'activities' instead of 'technology' or sector'.

[4] Figure 2 of Bergek et al (2010) titled Inducement and blocking mechanisms, functions, and policy issues in the case of "IT in home care" illustrates the complexity of this interaction.

activity, 'entrepreneurial experimentation' was the most important function followed by 'market formation', 'knowledge formation', 'legitimation' and 'resource mobilization'; while 'complex' industries, 'knowledge formation' and 'resource mobilization' preceded other functions in the emergence of new industry.

Based on a detailed case study of the Ethiopian flower industry, Gebreeyesus and Iizuka (2011) identified that not only the sequence of appearance of functions but also the contents of the functional requirements are different for emerging activities in catching up countries. As described in appendix 1, the contents of functions from the case differed from the one identified by Bergek et al (2008) based on energy technology cases in developed countries. Such a difference clearly reflects the existing literature on the catching up process. For instance, the function 'knowledge development and diffusion' means scientific knowledge from R&D in developed countries, while it refers more to imitation and adaptation of existing knowledge in the Ethiopian case. Such a contrast is well in line with the literature on technological capabilities (Kim and Dahlman, 1992, Kim, 1998, Bell and Pavitt, 1995, Lall, 1992, Bell and Albu, 1999). The function, 'market formation' in developed countries concerns how to nurture and create the new market through the process of 'nursing', 'bridging' and scaling up to 'mass' market, while in the Ethiopian case, it was how to overcome the market barriers. Similarly, 'entrepreneurial experimentation' in developed countries means probing new activities in various ways to select the best technology, product or industry. In the case of Ethiopia, it meant experimenting with different combinations of factors of production (labour, natural resource endowment) and market niche; in short the 'cost discovery' (Rodrik and Hausmann, 2003). The contents of two functions, 'Market formation' and 'Entrepreneurial experimentation', in the Ethiopian case were well in line with discussions made on the 'self-discovery' process (Hausmann and Rodrik, 2003) as well as the 'latent comparative advantage' (Lin 2010, Lin and Monga, 2011). This demonstrates how developing countries can use natural endowments to jump start their structural transformation process. 'Legitimation' in developed countries places more emphasis on policy and legislative alignment (due to their already well-equipped public institutions) and firms play a lesser role. In this case, however, 'Legitimation' signified the process of firms building their 'countervailing powers' (Myint, 1954) by establishing a dialogue with the government (private-public partnership) on a level playing field. In the case of Ethiopia, the main focus for 'resource mobilization' was to *seek* the gap in resources (human capital, physical infrastructure, finances etc.).

These contents of functions will not stay the same for the whole evolutional process of industry. In the dynamic process of industrial development, the contents and priority of functions will shift in various ways depending on the type of industry and the stages of industrial life-cycle. This means that different types of 'binding constraints' emerge at different stages and as a result, policy needs would change accordingly. Hence, in our analysis, we will examine the evolution of functions in 'phases', adapting 'industrial phases' from industry life-cycle literature. These phases are: (1) initial (formative or exploratory), (2) intermediate (growth), and (3) mature (Klepper, 1997, Williamson, 1975, Drew, 1987, Clark, 1985).

The function of innovation approach adapted 'formative' and 'growth' phases to identify differences in functions when analysing emerging technologies in developed countries (Bergek, et al, 2008, Alkemande and Hekkert, 2008). Bergek et al(2008) described the 'formative' phase as usually shorter than a decade, with great uncertainties about technological trajectory, markets and application, price/performance of the product, under-development of diffusion and activities compared to its potential, and absence of powerful self-reinforcing features and weak positive

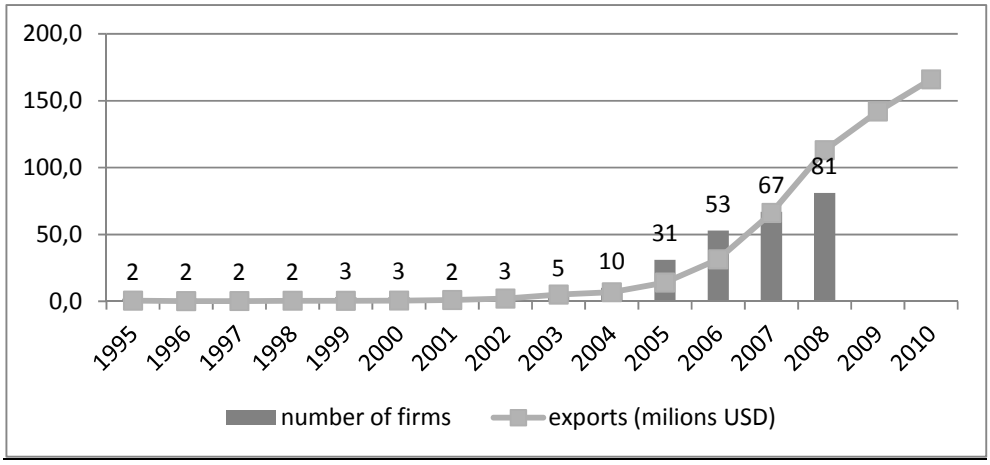
externalities. The growth phase (particularly early stage), on the other hand, is characterized by a sharp increase in market volume, a shake-out of a variety of technologies among producers which may result in achieving economies of scale for producing the dominant design. In this phase the government or political sub-system becomes more involved in its capacity as regulator (e.g. standard setting). That is to say, innovation system specific institutions are formed. The system will grow in terms of actors and linkages, other type of actors such as intermediaries, and specialized suppliers enter the system. In turn the number of interactions (both formal and informal) increases and more formal networks emerge. This demonstrates the transition from 'formative' to 'growth' as 'changing the gear' because in their examples, the growth phase is considered as a self-sustaining phase while the formative phase is more experimental.

The following two sections respectively analyse the Ethiopian flower and Chilean salmon industries, focusing on two stages of the industrial life-cycle — the 'formative' and 'growth' phases. Our aim is to capture common patterns from these very different cases to shed a light on possible policy tools for guiding the 'self-discovery' process.

3. Case 1: The Ethiopian flower industry[5]

Ethiopia is endowed with the major ingredients for a successful flower industry and regarded especially suitable for the production of high quality roses (Reinders, 2008). Export-oriented and private sector based floriculture industry began to emerge in the mid-1990s, after extensive reform programmes to transform the command economy to a market-oriented economy. Over the last decade, flower exports from Ethiopia have grown rapidly and become the country's most successful case in recent history. By 2010, the export value of flowers rose above USD 166 million, making Ethiopia the 7th largest flower exporter in the world, and the 2nd largest in Africa after Kenya.

Figure 1 Pattern of exports and number of in the Ethiopian flower industry



Source: for export value and volume UN-Comtrade and for the number of firms own survey

[5] The analysis on the Ethiopian flower industry is based survey done in 2008 and follow-up in interviews in 2010. In this section we tried to be brief with the aim of saving space. We suggest interested reader on details to refer a previous article (Gebreeyesus and Iizuka, 2012).

Figure 2 gives the cumulative number of flower producer/exporter firms and export value in the period from 1995-2010. In the early phase, the firm entry to this new business was slow. There were no new entries to the flower industry until 1999, when Golden Rose, a foreign owned firm, joined the sector. Until 2003, there were only five flower firms exporting with a total value of export no more than USD 4 million. However, since 2003, things have changed drastically in this sector. In just a period of one year (from 2003 to 2004), the number of firms doubled and have continued to grow rapidly since then. By 2008 the number of firms reached 81, increasing by a factor of around 16 compared to 2003. Meanwhile the value of flower exports grew by about 32 times between 2003 and 2010, rising above USD166 million. This amounts to an annual average growth of 70 per cent. The take-off of this industry took place after 2003, so we may consider 2004 as a year when the sector changed 'gear', i.e. transformed from the formative stage to a growth phase. Henceforth, the 'formative' phase refers from the start to 2003 and the 'growth' phase the period from 2004.[6]

3.1. The formative phase

a) Entrepreneurial experimentation

In the early 1980s, there was an unsuccessful attempt to produce and export summer flowers to Europe by state farms. Following the transition from a command to a market oriented economy, two domestic entrepreneurs took the initiative and started production of flowers with the aim of exporting them directly to Europe. In 1993, the forerunner flower exporting firm, Meskel Flowers Plc. emerged and was soon followed by another firm, Ethio-Flora. Both firms were located at lower altitude and producing mainly summer flowers. Meskel Flowers later started producing roses but used a wooden greenhouse. As early entrants, they faced various challenges but obtained almost no support from government. Despite 5-6 years of struggle, both firms were not able to continue in the flower business.

In 1999, Golden Rose Agrofarms Ltd (Golden Rose, hereafter), a UK based business, started rose production. Prior to its investment, Golden Rose thoroughly examined the performance of the early entrants as part of its feasibility study. Unlike the early entrants, it decided to locate its farm in a highland area[7] to enable the production of high value roses, and introduced modern steel structure greenhouse. This company had no prior experience in the flower business. It entered into a turnkey project arrangement with an Israeli company which constructed the whole farm facilities, planted the flower varieties and supplied a farm manager for a short period of time. Although Golden Rose faced similar challenges to the early entrants, it successfully overcame them and emerged as a pioneer in the sector. Four additional rose farms entered the industry between 2001 and 2003, following the success of Golden Rose.[8] Three out the four were established by Ethiopians and located their production sites in the highlands.

[6] Given the short time span since the start of growth phase, we should bear in mind that we are currently examining the early period of the growth phase.

[7] About 2060 meters above sea level.

[8] These are Summit Agro industry, Ethio Dreams, SIET Agro PLC, and Eniy Ethio Rose.

b) Knowledge transfer and diffusion

The technology for the production of flowers is, by and large, matured and easily available in the international market. During the formative phase, knowledge was mainly transferred from abroad through purchase of inputs, equipment and expert services. The firms imported most of the equipment needed for construction of physical infrastructure (greenhouses, irrigation systems) as well as plant varieties through licensing royalties from international breeders. The choice of cultivation site, type of product and choice of technology were not, however, straightforward. As indicated above, the first two firms were located in lowlands, used less sophisticated technology and started producing low value flowers, while the successful Golden Rose chose a highland location, used a steel structure greenhouse, and chose to produce high value highland roses.

At the early stage, there was an acute shortage of specialized labour. Existing expertise at the time was concentrated among workers who had some experience in the short history of the flower production under the state farms in the early 1980s. These were few in number and lacked the necessary skills particularly regarding rose production in modern greenhouses. Hence, almost all of the farms started before 2005 had to recruit expatriates particularly from Kenya or India. In addition to using these expatriates, firms provided in-house training to their workers.

c) Market formation

The market for flowers is already present; hence, the main task at this stage was to establish access. In the European market (EU), the major destination for Ethiopian flowers, cut flowers are sold via an auction system (mainly Dutch auctions) or directly to supermarkets and other retailers. Due to the easier access of Dutch auctions, most of the early entrants started exporting flowers through this route. To access the market, firms had to overcome various difficulties including: improvement of quality and handling methods, fluctuation of auctioned prices and large service cost of auction facility. This forced some of the early entrants, for example Golden Rose and Meskel-Flower, to shift their export channel from Dutch auctions to direct sales through Germany. Another barrier in exporting to the European market in the early stage was the lack of complementary inputs and services such as agrochemicals, cool chain facilities, handling and forwarding services, and air transport. The early entrants had to deal with these problems individually until they form an association to negotiate collectively with the government to seek support by the end of 2002.

d) Legitimation, resource mobilization and guidance of search

In the early stage, there was no government programme specifically targeting the flower industry except for the broad and horizontally applied export promotion strategy adopted in 1998.[9] Consequently, the early entrepreneurs faced various obstacles including: (1) securing reliable and cheap air cargo;[10] (2) obtaining finance for investment at the initial phase; and (3) acquiring land for planting flowers. In order to address these bottlenecks, the existing five firms — at that time — organized themselves and formed an association, the Ethiopia Horticulture Producers and Exporters Association (EHPEA or the association, hereafter) in September 2002. The association negotiated with the government to seek support for the development of this industry. Due to this process, the government became aware of Ethiopia's great potential for flower exports. Only a month after the establishment of the association, the Prime Minister's Office (PMO) requested the

[9] The government scheme for export promotion which carried various fiscal incentives might have encouraged investors to enter into export activity including the flower industry.

[10] Given the low capacity of the industry at the early stage, not many carriers were interested, thus, flower was exported in passenger flights using the Ethiopian Airlines and sometimes Lufthansa. For example, in the early years air space was normally available in passenger flight of Ethiopian Airlines (EAL) and Lufthansa. The latter charged 1.01 USD per kilogram and the former 0.85-0.90 USD per kilogram. Exporters incurred losses at one time or another.

Ministry of Trade and Industry (MoTI) to work out a five-year plan of action for this sector and outlined the sector's constraints and possible solutions. The government also set targets to allocate 1000 hectares of land for flower production by the end of the five years. From 2003 onward, the government launched a programme to improve access to land, access to long-term credit, and infrastructure and air transport coordination with the aim of promoting flower exports.

The association was an integral part for the preparation of the first five-year government plan of action. This joint exercise was the beginning of the strong public-private partnership that has been built over the years to help 'legitimate' the flower industry. It facilitated consensus building between the stakeholders on the target for sectoral growth and mobilization of resources necessary to scale-up the sector activity and through which direction of search was influenced. This shows that the 'legitimization' actually initiated with the private entrepreneurs forming association and mobilizing the government for support. In this context, private entrepreneurs were instrumental in 'guiding the search' by identifying opportunities through 'entrepreneurial experimentation'. The government also strengthened the 'direction of search' and 'legitimation' by announcing sectoral targets and allocating resources in support of this sector.

3.2. The growth phase

a) Entrepreneurial experimentation

In 2004, the number of flower firms doubled, marking the beginning of the 'growth' phase. From this stage on, foreign owned firms (in the form of joint-venture or full ownership) start to dominate the sector.[11] As a result, the industry changed in both structure and functionality. The production sites expanded resulting in the formation of clusters, not far from the capital city[12]. The industry activity also started to diversify into summer flowers and production of cuttings as well as other types of roses.

b) Market formation

In the growth phase, the major market destination for Ethiopian flower exports continued to be the EU. As stated, the Dutch auction continued to be the entry point for most new exporters.[13] The European market is characterized by complex rules and standards covering a wide range of issues, from safety or quality of the products to social (labour conditions) and environmental impacts. The direct sales channel required an even more complex set of standards with additional bilateral regulations such as consistency in volume, quality, and timing of supplies. Hence, compliance with standards and additional bilateral regulations became crucial for continued access to the EU market. Meanwhile, a sense of urgency has developed among stakeholders in the sector with regard to market diversification.

Expanding export outlets and deepening the access in existing markets required multifaceted efforts, among others, improvement of the quality of products, logistical capability, human resource development, and adoption of international standards. These new challenges had great implications for strengthening the coalition, coordination within private firms and collaboration with other stakeholders including the government.

[11] In 2008, fully foreign owned firms and joint venture firms with 50 and above foreign ownership account respectively for about 41 percent and 23 percent of the total number of firms in the Ethiopian flower industry.
[12] This includes such as Sebeta, Sendafa, Holeta, Sululta, Debre Zeit, Ziway, and Koka..
[13] For example according to our survey, about 62 percent of the firms that was operating in 2007 started their exporting through Dutch auction.

c) Resource mobilization, legitimation and influence of the direction of search

In the growth phase, the members of the association increased substantially and the activities of the association broadened further. The association continued to play a significant role in the development of the sector by way of coordination, advocacy, and capacity building. In an effort to address the absence of intermediaries, in 2004, the association established a subsidiary named Ethio Horti-Share Company, which handles both input supply (e.g. agrichemicals) and export handling and forwarding service. Later on, with the expansion of the sector, some private firms (e.g. as Agri-Share Trading Plc. and Flower Port Cargo Plc.) entered this service sector.

In 2006, responding to mounting pressure for standard compliance, the association initiated a collaborative project with the government and donors, particularly the Dutch, to develop a code of conduct in line with internationally recognized standards such as GlobalGAP (Global Good Agricultural Practice) and MPS (Milieu Programma Sierteelt). This project also organized a training programme for member firms to build capability to comply with standards. The majority of farms participated in the training, and as a result about 50 farms were certified with the code of conduct in the period from September 2007 to March 2010. The development of the code of conduct was a big step forward in promoting the image of the Ethiopian flower industry and improving market access.

The association also developed very strong connections with the international community and secured wide support for the sector. For instance the association was active in organizing biannual international trade fairs in Addis Ababa (e.g. in 2005, 2007, 2009, and 2011). These events were attended by hundreds of floricultural companies (flower growers, breeders, fertilizer and chemicals traders, greenhouse and irrigation system constructors, refrigeration installation companies, etc.) including a high proportion of foreign nationals (two thirds of participants). These events also received strong political support, being opened by high ranking government officials including the Prime Minister.[14]

The government has played a crucial role in mobilizing resources, thus, sending signals on the prospect of the sector to potential investors. One critical intervention was to coordinate air transport. The government persuaded Ethiopian Airlines to work in co-ordination with flower producers and exporters in the promotion of the sector with a long-term vision. For example, the airline leased additional cargo planes and took other necessary actions to accommodate the rising export of flowers from Ethiopia. The government also made available land for flower farms within the vicinity of the airport in Addis Ababa with favourable terms, such as low-cost, long-term lease and long-term payment period. The government, through the Development Bank of Ethiopia (DBE), also provided finance carrying generous terms including low interest, long-term loan and extended payment period to investors in the flower sector. To address the growing demand for skilled labour, the government, in partnership with the association and donors, launched a long-term capacity building project in 2007. The project included consolidation of higher education to train specialists in horticulture at University level (BSc and MSc) as well as vocational levels.

Furthermore, the government assumed other responsibilities, such as regulating excessive use of local resources by establishing controls such as the code of conduct for the industry, foreign exchange use, location of the firms, and providing phytosantory services. As a result formal institutions evolved during this period. For instance, the Horticulture Development team was formed within the Ministry of Trade and Industry (MOTI) around 2002. This was upgraded to

[14] The association has also been involved in market diversification efforts through visits to potential countries e.g. Russia, Japan, the Middle East.

agency level in 2008 and named the Ethiopian Horticulture Development Agency (EHAD). This has guided the development of the sector while improving its 'legitimacy'.

d) Knowledge transfer and diffusion

In the 'growth' phase, procurement continued to be an important source of knowledge transfer. With the increasing entry of foreign firms with linkages and long-term experience in the global flower industry, FDI also became an important channel of knowledge transfer and diffusion. For example, by 2008, there were six cutting firms (all owned by European breeding companies) exporting young plants worldwide as well as supplying the domestic market. The entry of Sher-Ethiopia, a subsidiary of Sher-Holland – the biggest flower producer in the world, was another case in point, signifying the role of foreign firms in stimulating the transfer of technology and marketing knowledge. [15]

The turnover of skilled workers was one of the main channels for knowledge diffusion, particularly in the growth period. For example, the pioneer firm, Golden Rose was hit by a high turnover of trained employees particularly after the influx of new firms in 2004 and was forced to adjust its wages to retain skilled labour. The pool of domestic expertise increased with the growth in the market for skilled labour. Many new firms in this phase hired Ethiopian workers (managers or supervisors) with prior experience of working in other flower firms (11 out of 15 in 2006, eight out of 11 in 2007) compared to the earlier phase (only one out of eight firms before 2005). Furthermore, during this phase the majority of firms conducted both in-house and external trainings for their employees (production workers and agro-specialist). This accelerated the knowledge diffusion and learning in the sector. The association played a significant role in organizing trainings for workers and managers in the farms, particularly in relation to the development of a code of conduct for the sector.

e) Development of positive externalities

The experimentation of early entrants and consequent entry of new firms was one main source of positive externalities at the 'formative' stage by reducing the risk and helping to identify the potential of the flower industry in Ethiopia. The early phase was marked by an under-development of complementary activities, including an absence of input suppliers and export facilitators, and a lack of cheap and reliable air cargo. Collective action by the private sector was necessary to resolve the coordination problem. For example, the first company involved in importing agrichemicals and also forwarding/handling was the Ethio Horti-Share Company (EHSC), established in 2004 by the industry association. Relatively cheap and sufficient air cargo space was also secured through coordination with the government.

With the growth of the flower industry, firms emerged to take care of complementary activities such as propagation of planting materials, packaging, fertilizers and chemicals suppliers. Several international breeding companies also started to establish production sites in Ethiopia. As a result, the source of input such as planting materials, fertilizers, and chemical materials gradually shifted from import to local suppliers. Other service providing companies, such as forwarding/handling have also started to emerge, although remain under-developed. The supply of air transport has also substantially improved in the growth phase due to the entry of foreign carriers (e.g. KLM, Etihad, Emirates) attracted by the growing market. The development of a skilled labour market is another

[15] Sher-Ethiopia came with special business model, developing a cluster of flower farms with greenhouse and necessary infrastructure to be leased to other businesses. It also provides input supplies and flower exporting services to the those flower farms in the cluster, which makes possible for growers to start immediately on large scale and less hassle of marketing for inputs and the product.

positive externality. Late entrant firms were able to hire people with prior experience of working in this sector.

Throughout its development, the flower export increasingly diversified market channels and destinations as a result of promotional activities implemented both individually and collectively. For instance, in 2007, 41 farms were involved in a direct sales channel, so reliance on auctions decreased. The country destination was also substantially broadened within the EU and beyond (e.g. Far East, Middle East, Eastern Europe, Africa, Australia and USA) providing greater opportunities and a cut in the risk of relying on a single market.

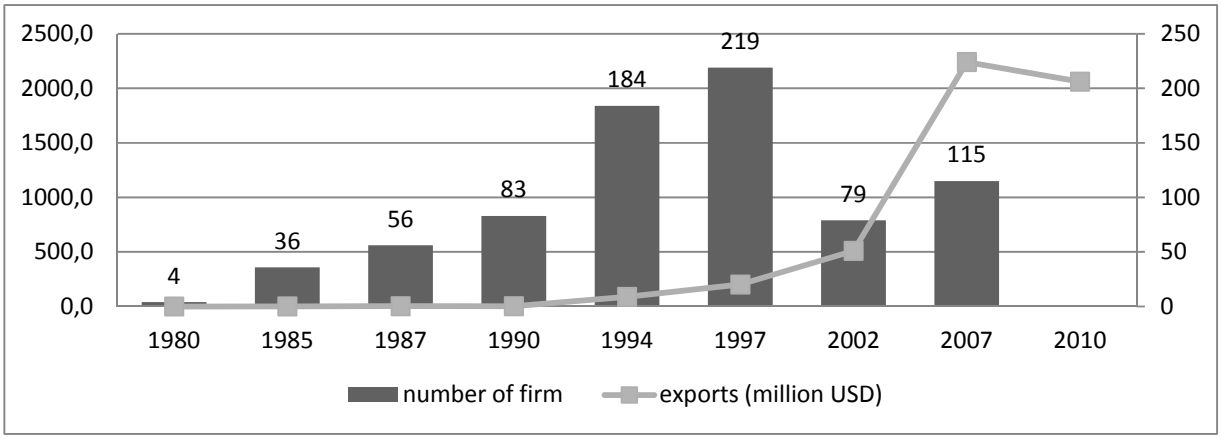
4. Case II: Salmon farming in Chile

Chile is endowed with natural conditions that are favourable for salmon farming: clean water, longer luminosity, quiet environment, adequate water temperature with relatively low cost of labour and important input material, fishmeal. With the development of fish farming technology in the 1960s at the global level, the Chilean government became aware of the potential for engaging in this activity. The government actively tried to evaluate the potential of creating this industry in the 1960s to early 1970s. In the mid-1970s, entrepreneurs started to experiment leading to the emergence of the salmon industry in Chile. It is also worthwhile to mention that the emergence of these entrepreneurs coincided with the start of the open policy towards trade and foreign investment in Chile.

The Chilean salmon industry has demonstrated strong export growth and an increase in number of firms since the mid-1980s. In 1985, 36 firms were operating in the salmon farming industry in Chile. This rapidly increased to 56 in 1987, with 117 farm sites. This further increased to 83 in 1990, 184 in 1994 and 219 in 1997(figure 2). During 1985-6, the value of salmon exports reached over US$1 million, allowing Chile to be recognized as a salmon producer in the world for the first time. Export revenue increased exponentially, rising to USD 2490 million by 2008[16]. Chile is currently the second largest producer after Norway. This fast growth is remarkable considering salmon is not native to Chile and the producers had to learn production techniques from scratch. Looking at the increase in number of firms and export values, the development of the Chilean salmon industry can be divided into three phases: (1) 'formative' phase, from the 1960s to the mid-1980s, (2) 'growth' phase from mid-1985 to 2000; and (3) mature phase from 2000 onwards (Iizuka 2007). In this study we focus only on the first two phases; the 'formative' and 'growth' phases for the purpose of comparison with Ethiopian flower case.

[16] The export value of 2008 is used as the reference. This industry suffered environmental crisis since 2007 and its export revenue dropped significantly in 2009 and 2010. The export value of this industry is currently under recovery since 2011. Even with the decline of productivity during the crisis, Chile maintained the position of 2nd largest export in farmed salmon. Here, in order to avoid complication in discussion, the figure of 2008 is used instead of most recent figure.

Figure 2 Growth of the salmon farming industry in Chile



Source: Salmon Chile 2002 and Revista Aqua, 2010.

4.1. The Formative phase

(a)Guidance of search and resource mobilization

In Chile, the public sector took initiatives in guiding and allocating resources to promote the salmon industry in the 1960s. The government agencies at that time surveyed potential areas to evaluate the feasibility for salmon farming with the help of bilateral technical cooperation (Japan, USA, Canada). This technical cooperation did not bear fruit immediately; however, it had transferred necessary knowledge and created bases for local entrepreneurs.

Early attempts were made by the government to explore the new activity, salmon farming. Despite efforts made using the bilateral cooperation, they did not lead to the emergence of entrepreneurs.

(b)Experimentation by entrepreneurs: early pioneers

In 1974, the first private initiative to farm rainbow trout for strictly commercial purposes took place (SalmonChile, 2004). This was implemented by a company called Sociedad de Pesquerías Lago Llanquihue Ltda established by ex-public officers[17] who had worked in the earlier government trial to promote the salmon farming industry in Chile (Mendez et al, 1989). The company obtained a financial loan from the Chilean Economic Development Agency (CORFO), after long negotiations with the regional government. The firm had to overcome various challenges but in 1978 finally made their first export of cultivated trout to France, followed by other markets in 1980.

In 1976, Union Carbide, USA started salmon production in Chile using ocean ranching operations[18]. The firm started its operation but suffered difficulties due to local climatic and geographical conditions. In 1977, it initiated an open circuit farming system to produce alevines. Although they

[17] Alfredo Valenzuela-ex SAG officer and went to Japan and saw development of cage culture. Alfonso Muena was an ex SERCOTEC officer in Osorno (Hosono, 2010).

18 Ocean ranching operation: Release of young fish (alvines and smolts) to grow in their natural environment after rearing them with highly sophisticated hatchery systems. The animals are harvested upon return to their native rivers. In Chile the return rate of adult salmon was very low. This led Union Carbide to pull out form this business. Some scientists consider the reason for such low return rate as the difference in hemisphere (North and South) while other consider distance of releasing point to the ocean. There is no clear and definitive answers why salmon fail to return in Chile.

manage to produce alevines, the ocean ranching operation was not successful. In 1979, Union Carbide decided to pull out of this business. Chilean experts who had worked for the project in Union Carbide wanted to continue this line of business and persuaded the FundacionChile, a private and non-profit organization investing in new business, to buy the business from Union Carbide. FundacionChile started the new company in 1980 with different fish rearing methods based on net-pen aquaculture operation. The pilot project run by FundacionChile later became a private company, "Salmon Antarctica".

In parallel with attempts by FundacionChile, in 1979, the Japanese company, Nichiro Chile, started to invest in salmon and trout farming in Chile applying net-pen aquaculture operations[19]. Nichiro subcontracted the incubation and fry rearing of coho salmon to the pioneer firm, Sociedad de Pesquerías Lago Llanquihue. The operation of Nichiro Chile demonstrated that net-pen methods of salmon rearing were more feasible than ocean ranching in Chile, in turn fuelling early movers' enthusiasm for the potential growth of this industry.

In 1979, through interaction with the owner of Pesquerías Lago Llanquihue, Pesquera Mytilus, a Chilean mussels company, entered the salmon farming as Sociedad Pesquera Mytilus Ltda. Like many predecessors, this firm also encountered many problems in production of salmon. Nevertheless, through a process of trial and error, this firm shaped the salmon business with a structured, scaled-up production with much higher levels of investments. This firm eventually joined the export market and encouraged various other investors to go into this business.

(c) Knowledge development and diffusion

The 'formative' phase was characterized with knowledge transfer and diffusion rather than knowledge creation of its own. There were mainly four channels of knowledge transfer and diffusion. First, knowledge transfer via bilateral cooperation with support from the government in the 1960s. Early pioneer included those who had learnt the basics of salmon farming from government trials, through bilateral technical cooperation, in the 1960s. The entrance of the pioneer (Sociedad de Pesquerías Lago Llanquihue Ltda) was slow due to various risks and shortages of finance, technological know-how and complementary inputs and services. The second source of knowledge transfer was foreign investment (Union Carbide& Nichiro) in the late 1970s. This made an important contribution to skill upgrading among local experts, particularly in experimenting with new technology, such as net-pen cultivation. The successful application of new technology provided a demonstration of effectiveness, and helped to spread knowledge on salmon farming among domestic producers. Thirdly, cooperative culture among early pioneers also helped greatly in finding solutions and knowledge diffusion in the period of trial and error.

Last but not least, the role of FundacionChile cannot be ignored in the diffusion of technical know-how for this industry. First it promoted entrepreneurial experimentation via purchase of the project from Union Carbide. Second, it contributed to the successful diffusion of net-pen aquaculture together with Nichiro, Chile. Third, FundacionChile contributed greatly in searching and adapting knowledge in the local context by conducting production related research as well as experimenting with new technologies, such as artificial reproduction, behavioural studies and breeding, creation and exploitation of new freshwater, seawater farm sites (Achurra, 1997; SalmonChile, 2004), and designing net-pen farms for different species of salmon (i.e king, pink and coho salmon, and rainbow trout). Fourth, Fundacion Chile provided technical assistance to firms through sale of technology. FundacionChile, therefore, played a vital role as the intermediary for technology transfer and diffusion.

[19] Net-pen aquaculture operation: rearing fish in captivity in sea water through use of floating structures (cages) or other types of enclosures.

(d) Market formation

The market for salmon was already present at a global level. In the 'formative' phase, Japan was the major destination of Chilean salmon exports with 60 per cent of total exports. The price of salmon during this phase remained high due to high market demand. Under the condition of high demand, Japanese buyers technically supported Chilean producers to ensure that Chilean salmon could enter the market by complying with high minimum standards for quality and sanitation.

4.2. The Growth Phase

(a) Entrepreneurial experimentation: Increase in the number of entrants and positive externality

In the 1980s, the number of local salmon farming firms increased and exports soared. At the same time the price of salmon started to decline. This price pressure obliged industry to change its production structure at the local level: firms started to outsource their auxiliary activities (such as cage making, maintenance, feed making, diving, transport), while remaining specialized in the core activities of fish rearing. As a result, groups of subsidiary firms were created. Consequently, there emerged a cluster of local firms involved in the salmon and trout farming business. For example, the start of fish feed, net and net installation services firms date back to this period. In fact, the number of supplier firms listed in the industrial directory increased dramatically from 75 in 1993 to 461 in 2003. If only selected for the ones in the 10th region, the increase is from 14 to 228.

(b) Market formulation and development of positive externalities

Although local producers grew rapidly, many producers faced a difficult time in the early 1990s as two large markets, Japan and the US, started to buy less, reacting to the high prices of Chilean salmon. The industry soon realized the danger of relying too heavily on two markets.

Efforts to diversify the market were made via collective action among stakeholders. In 1986, the Association of Producers of Salmon and Trout in Chile (APSTC) [20] was established to tackle two objectives: market research and establishment of a quality certification system (SalmonChile, 2003; Achurra, 1997; SalmonChile, 2004). Both challenges are related to maintaining the access to export market (Maggi, 2002). A collaboration among competing firms was made possible under the common goals.

The major destination of Chilean salmon exports was initially dominated by Japan. The US market was explored later, followed by the EU market. Recently, new markets in Latin America (Brazil, Argentina and Mexico), as well as in Asia (China, Thailand and Taiwan) have been added[21]. Despite these new destinations, the shares of the top two countries, Japan and the USA, still account for almost 80 per cent of export volumes.

The market formation for this phase has focused on ensuring access to the global market. Strategies adopted by firms include collective marketing and establishing quality certifications via Association.

[20] Earlier efforts of collective action existed prior to the establishment of association. It is called Salmocorp. This was established among 13 local firms and set up a joint venture company, to diversify markets. The firm participated were Salmon Mainstream SA, Robinson Crusoe SA, Salmones Tecmar SA, Fiordo Blanco SA, Invertec SA, AntarFish SA, Cultivos Marions Chiloe, Ancar and Salmones Andes, among others. The association was formed among larger group of firms: 17 companies

[21] In fact, markets in Latin America – Argentina (1991), Mexico (1992), Venezuela (1995), Colombia (1996) – as well as in Asia – Taiwan (1994), Thailand (1994), Singapore (1995), China (1997) (Maggi, 2002; SalmonChile, 2003) were opened in the 1990s.

(c) Guidance for the search, resource mobilization and legitimization

Early institutional development took place during this phase. As mentioned above, the Association for Salmon Industry (APSTC) was established in 1986. The government sector continued to support this industry; however, the nature of support changed during this phase. This is partially due to the transition of government that took place in 1990 from a military regime to a democracy. Due to this change, several government institutions were established including various financial mechanisms for supporting the development of the private sector[22]. These funds were not intended solely for the development of aquaculture, but a substantial amount was allocated for its development (Bravo et al, 2007).

During this phase, the government concentrated its efforts on facilitating the firms' administrative processes by establishing a clear regulation and institutional framework. For instance, in 1991, the government, through its General Law of Fishing and Aquaculture (LGPA), tried to organize the responsibilities of respective authorities to dictate the regulations pertaining to the sustainable operation of aquaculture[23]. Similarly, several other reforms on legislation concerning aquaculture took place[24].

Furthermore, the government has established a dialogue with private firms in aquaculture, mainly by creating a National Commission for Aquaculture (Comision Nacional de Acuicultura) in 2002 along with the publication of the National Aquaculture Policy (Politica Nacional de Chile: PNC) in 2004 (SubPesca, 2004) within the Under-Secretary of Fisheries (Subsecretaria de Pesca). This provided, for the first time, formal mechanisms to discuss future policy and strategy for Chilean aquaculture with all related public institutions as well as private-sector representatives by the associations (interviews with SubPesca, 2004).

This phase is characterized by a clear form of public and private partnership. This was possible due to institutional development on both sides, strengthening the role of association at the same time as the emergence of new government institutions under the new democratic government. Furthermore, in this phase the role of the state changed from a strong promoter of the industry to a regulator and facilitator of consensus building for this sector. Hence, it is possible to say that during this phase, guidance to search, resource mobilization and legitimization took place under the private-public partnership.

(d) Knowledge creation and diffusion

In this phase, the Chilean salmon farming industry followed a process of 'learning by doing'. During this phase, all foreign firms, except Nichiro Japan preferred to operate through local partnerships to avoid various unforeseen risks particular to local climate and environmental conditions. This allowed domestic firms to receive technical assistances from their clients as the local operator.

[22] Many government-funding mechanisms were established during this period. These included: the Scientific and Technological Development Fund (FONDEF), the Fisheries Research Fund (FIP), the National Fund for Technological and Productive Development (FONTEC), and the Development and Innovation Fund (FID).

[23] There were eight institutions involved in the process of granting permission from different perspectives These were: the Office of the Undersecretary of the Navy, the Office of the Undersecretary of Fisheries, National Fisheries Services (SERNAPSECA) the Hydrographic and Oceanographic Service of the Navy, the General Water Authority, the National Borders and Frontiers Authority, the National Commission for the Environment and General Treasury of the Republic. In addition, the police force of Chile was included within the controls established by the National Fisheries Service and Merchant Marine and Maritime Territory Authority to oversee compliance with the applicable regulations. There were eight institutions involved in the process of granting permission from different perspectives

[24] The Supreme Decree No. 475(1994) of the Ministry of National Defence was established to clarify national policy for the use of Chile's littoral coastline, the National Register of Aquaculture dictated by DS No.499 (1994), and the Regulation on Information of Fishery and Aquaculture Activities, DS No. 464 (1995) were established to grasp and disclose information on aquaculture. Furthermore, the Basic Environmental Law (LBMA) took effect in 1994 (Law No. 19300), to place aquaculture under the control of the Environmental Impact Assessment System (SEIA).

Furthermore, through actual operation of business, domestic firms made various incremental improvements in their production processes. For instance, harvesting methods, fish handling, cold chain management and the mechanization of the extraction systems underwent important improvements..

FundacionChile continue to play an important role in knowledge transfer and diffusion. It has organized multidisciplinary work teams in areas such as trout pathology and pen construction, with foreign and Chilean technical consultants. From 1986, it also started a cycle of international seminars on salmon farming in certain countries, which was repeated in 1987 and 1988. Furthermore, their representatives were placed in Norway, Japan, Scotland and the USA to channel vital information on market and production technology. In addition to the above, FundacionChile established a company called Huillinco, one of the first companies to work with Atlantic salmon smolt (baby fish) in Chile. As can be seen, this institution predicted the future needs of the industry and invested in R&D in advance. However, in the early 1990s, FundacionChile ceased to perform the role of 'benevolent knowledge transferor and facilitator of knowledge diffusion' due to its internal change of policy[25].

Parallel to such change taking place in FundacionChile, the Association of Salmon and Trout Producers created the Institute for Salmon and Trout (INTESAL) in 1995 with financial support from the Chilean Economic Development Agency (CORFO) to enhance production technology in the industry. This institution aimed to raise the productive efficiency of the industry, and was concerned with the sanitary, environmental and training of the industry as a whole.

During this phase, many cumulative/incremental innovation/improvements were made by coping with daily operation within and among the firms. During the 1980s Fundacion Chile still played an important role in research and diffusion of sector specific productive knowledge; this role was later transferred to INTESAL of Association.

5. Comparison of the Ethiopian flower sector and Chilean Salmon sector

The last two sections provide analysis of the cases separately. This is necessary to fully understand the evolutionary process of each sector. In this section, we compare the two cases, which are rather different in various aspects. Table 1 spells out the features of each industry in a comparative perspective.

The main focus of this section to identify the common patterns by comparing the evolutionary process in the two cases, specifically by applying the framework of functions in 'formative' and 'growth' phase. We pay attention to the contents of each function required and how this had changed over the 'formative' and 'growth' phase to substantiate our earlier findings (appendix 1 of comparison). Figure 4 illustrates the evolutional process of functions in 'formative' and 'growth' phase, which will be referred to during the comparison.

[25] Since around 1990s, FundacionChile obliged to change its business strategy introduing self-financing mechanisms due to decreasing endowment funds (interview, Dec, 2011).

Table 1 Comparison of the Chilean salmon and Ethiopian flower industries

	Ethiopian Flower industry	Chilean Salmon industry
Favourable conditions	Flat lands on high altitudes, cool climate, low cost labour, short distance to European market	Clean water, longer luminosity, quiet environment, suitable water temperature for aquiculture, low cost labour, access to fishmeal, key input for fish farming
Year of start	1980s	1960s
Year appear the pioneer	1993, Meskel Flowers	1974, Sociedad de Pesquerias Lago Llanquihue Ltda
Year entered FDI	1999, Golden Rose Agrofarms (UK based)	1976, Union Caribe, USA, 1979, Nichiro, Japan
Year of take-off of industry	2004	Mid 1980s
Year industrial association was established	2002, Ethiopia Horticulture Producers and Exporters Association (EHPEA)	1986, Association of Producers of Salmon and Trout in Chile (APSTC), later changed its name to SalmonChile
Successful technological choice	highland roses using modern steel structured greenhouse (Introduced by FDI)	Ocean ranching to Net Pen operation (Introduced by FDI)
Main Market	Europe (UK, Germany, Netherlands)	Japan and the USA
Main Product	Rose, High quality 'T-hybrid'	Salmon Salar, Salmon Coho, Trout
Market leader	The Netherlands	Norway
Rank in the export Market	7th in the world and 2nd in African continent since 2010	2nd in the export of farmed salmon (2000 onwards)
Dominant economy policy at the time of take off	Transforming to command economy to market oriented	Transforming to market oriented economy
Formative phase	1993-2003	1974-1985
Growth phase	Since 2004	1986-2000
Export value at time of take off	USD6.5 million (2004)	USD 1million (1985-86)
Current export value	USD 170 million (2010)	USD2,490 million (2008)

Source: authors

a. The 'formative' phase

The **entrepreneurial experimentation** by the private sector was the core function in the 'formative' phase in both industries. The initial movers were domestic entrepreneurs, but early followers were a mix of foreign and domestic entrepreneurs. In both cases, the initial knowledge was imported from abroad but in different forms. In the case of Ethiopia, **knowledge transfer,** at the early stage, was achieved through acquisition of embodied knowledge through purchase of equipment and planting materials as well as hiring of foreign experts. In the case of Chile, the government played an important role in importing knowledge through bilateral technical cooperation, prior to any entrepreneurial activity. For both cases, the entrepreneurs had to overcome various obstacles by learning in a 'trial and error' process. Even though technologies were matured and available in the market, finding the right combination that suits local conditions remained the major challenge for entrepreneurs.

For these two products (flower and salmon), the matured international market was already present with high demand. The **market formation** process therefore helped to overcome trade barriers for entering the market. At the initial stage, the major destination for Ethiopian flowers was the EU (particularly Netherlands and Germany); while for Chilean salmon the major destination was Japan. For both industries, firms had to deal with uncertainties related to price, choice of market channels, and transportation costs. The initial cost of searching was substantial and was met by the early pioneers.

Collaboration among the firms and establishing a public-private partnership was instrumental in determining **resource mobilization** in favour of the emerging industry. **Legitimation** was achieved by the private sector holding a dialogue with government. After **legitimation**, it was possible to **influence the direction of search** in resolving uncertainties faced by early entrants. In Ethiopia, the industry association was instrumental from the start, not only in creating consensus

among its member firms but also in convincing the government to get involved in the promotion of this sector. In Chile, an association was only established rather late in its development (i.e. 1986); so in the 'formative' phase private entrepreneurs had to interact individually with these organizations.

In the 'formative' phase, both countries had institutional support for the discovery process by means of **resource mobilization**. For example in Ethiopia, by the end of the 'formative' phase the government set targets and began to provide direct support (e.g. land, finance, transport coordination, and other fiscal incentives) to stimulate the development of the sector. Similarly, in Chile the government and FundacionChile were involved in an early transfer of technology as well as resolving the technological challenges through interaction with private entrepreneurs. These supportive actions not only reduced uncertainties but also further **legitimized** activities, while sending out positive signal to entrepreneurs. As a result, several domestic and foreign firms entered the industry, which helped these industries in exploring new knowledge leading the industry to take-off. Despite the fact that institutional support was instrumental in the development of industry at the 'formative' phase, this support was never mobilized at this stage without the presence of entrepreneurs willing to take risks and explore opportunities (as shown in Figure 3). **Entrepreneurial experimentation** was therefore a core function in the 'formative' stage linking not only the 'market functions' or 'learning network' (market formation, knowledge development and diffusion, entrepreneurial experimentation), but also 'non-market functions' or 'political network' (resource mobilization, guiding the direction of search (see upper part of Figure 3).

b. The 'growth' phase

The 'growth' phase is marked by the rapid growth in the number of firms entering the industry. We have observed such a trend in both Ethiopia (between 2003 and 2008) and Chile (mid-1980s to 2000). During this phase, complementary activities also emerged, helping to create clusters of firms involved in related activities. The flow of FDI was observed in the 'growth' phase in Ethiopia while it was limited in Chile, at least until the 2000s, although foreign companies did form partnerships with local firms during the 1990s.

The increasing number of firms enhanced competition within the existing 'niche' market. This made it clear that relying on too few export destinations is a threat for the sustainability of the industry. Moreover, firms are obliged to comply with existing international standards to ensure access to the market. To overcome these challenges required firms to act in a collective manner — i.e. coalition building among stakeholders (government, association, and donors). This is because the establishment of industry-wide standards and ensuring their compliance, as well as searching for alternative markets, cannot be achieved by one firm in isolation. In Chile, the association was formed in 1986 to diversify export destinations (market diversification) and to establish a quality certification system. The quality standards provided a competitive edge to the less well-known Chilean salmon against those from Norway and Canada. Similarly in Ethiopia, in 2006, the industry association took the initiative to develop an industry code of conduct in line with international standards. It has also been engaged in market diversification efforts within Europe and toward Asia. Associations in both countries have played an important role in industrial advocacy activity by organizing international seminars/trade fairs. As stated, these actions were in collaboration with government and donors. In Ethiopia, a special emphasis was given to human resource development, particularly for middle and high-skilled expertise in horticulture. In Chile, the focus was mainly on technology adoption and R&D activity related to improved productivity. Thus, '**market formation**' was the 'core' function that drive firms to organize and mobilize various actors in conjunction with other functions in the 'growth' phase (see figure 3).

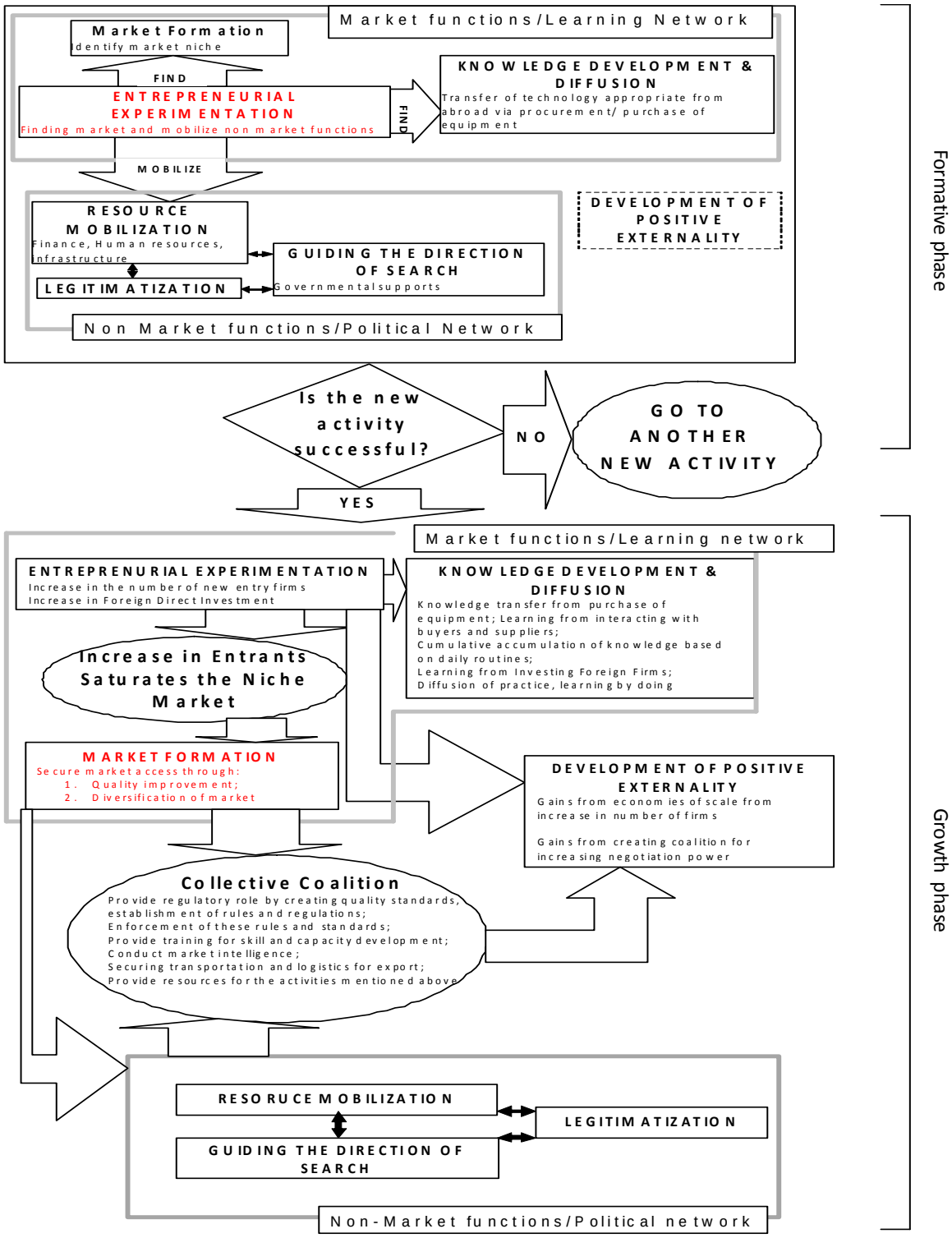
In the 'growth' phase, relations between the private and public sector become more formalized and governments start to assume a regulatory role. For example, in 1991 the government of Chile through its General Law of Fishing and Aquacultures (LGPA) tried to reorganize the responsibilities of respective authorities in an effort to enhance the competitiveness of the sector. Similarly in Ethiopia, the horticulture development team was created under MOTI, upgraded in 2008 to Agency level to improve coordination between the government and the private sector and enhance regulatory measures.

These newly established institutions in the private sector facilitated *collaborative activities* with public institutions to implement **knowledge transfer/diffusion** and facilitated strengthened '**legitimation**' further. This prompted further investment (**influence the search**) in the industry both in the main activity (production of flower/salmon) and complementary activities/services. As a result of this virtuous cycle, exports to existing markets grew substantially and market destinations diversified[26]. We would expect this process will continue until the industry reaches the 'mature' stage, which is the case in the Chilean salmon industry.

The **development of positive externality** appears to be more important in the 'growth phase' because this is caused by dynamics interaction within the system (Jacobsson and Bergek, 2006). Positive externality is achieved either naturally by clusters (Marshall, 1920) or politically through collective action among firms by means of association (Olson, 1965). Although naturally occurring positive externality is equally important, due to a rather undeveloped government institutional mechanism, collective action seems to turn the virtuous cycle of 'legitimation', helping to 'influence the direction of search', 'resource mobilization', and to make the environment more 'entrepreneur friendly' in the catching up countries. In the case of Ethiopia, the creation of the Ethiopia Horticulture Producers Association (EHPEA) triggered the further development of this sector. Likewise, the establishment of the Association of Producers of Salmon and Trout in Chile (APSTC, later changed its name to SalmonChile) facilitated a dialogue with the government as well as creating internal consensus on crucial strategic issues, including standards and new markets.

[26] For example, for the Ethiopian flower exports within the EU and outside EU and for Chilean salmon exports toward the USA, EU, and regional markets in Latin America.

Figure 3 Framework for understanding emergence of successful industries in developing countries



Source: authors

6. Summary and concluding remarks

In this paper we analysed the evolutionary process of new export activities in developing countries using the functional approach. We paid particular attention to the differences in both sequence and contents of functions in emerging non-traditional export products: Ethiopian flowers and Chilean salmon. Although these cases are very different in many respects, we find striking similarities in their evolutionary patterns.

The industries under our study are agricultural activities, thus resource endowments are a good starting point for seeking activities with growth potential. The natural comparative advantage can be an instant aide for 'cost discovery' at the early stage (Lin, 2010, Lin and Monga, 2011) with a good combination of factors of production, 'window of opportunity' and policy interventions. For example, in Chile the combination of natural endowment for rearing salmon with government induced technological transfer at a time when technology in fish farming was emerging was instrumental in stimulating 'enlightened' entrepreneurs. In Ethiopia, a combination of success of flower exports in neighbouring Kenya, government provision of generous incentives for all export activities and an improved business climate helped to spur on entrepreneurs. The emergence of these entrepreneurs also coincides (or encouraged) with the opening up of economies, the 'landscape'; that took place in the mid-1970s for Chile and around 1992 for Ethiopia.

From both cases, we learned that there is an emerging pattern that can be considered a 'formative' phase in the development of the new export activity. In this phase, initiatives taken by private entrepreneurs in identifying opportunities were critical. Unlike cases in advanced countries, the 'entrepreneurial experimentation' in catching-up economies does not require a new product or process for world export but a 'cost discovery'. However, entrepreneurs still have to overcome barriers and select the right technology/knowledge to match the local productive endowment: this involved the choice of net-pen aquaculture operations in the Chilean salmon industry and highland, high quality rose production with modern greenhouses in Ethiopia.

In the 'growth' phase, firms encounter new forms of challenges: saturation of niche markets due to the increase of numerous new entrants as well as increasing demand from market to comply with international standards. The main concern for the new activities is no longer the 'cost discovery', but sustaining its presence in the increasingly competitive market. Hence, the core activity in this phase shifts from 'entrepreneurial experimentation' to 'market formation'. Two actions were necessary: first, improvement in product quality and logistical capabilities; and second, diversification of market destinations. To this end, the firms and industry are required to engage in collective actions involving not only the private sector but also public agencies.

Hence, the 'growth phase' needs a different set of policy intervention than that of the 'formative' phase. This includes the establishment or strengthening of institutions and capabilities such as quality control and certification agencies, knowledge base institutions (R&D centres or/and training institutions), and efficient logistical services. Identifying the appropriate areas of policy intervention is not an easy process (Lin and Monga, 2011, Hausmann, Rodrik and Velasco, 2005, Hausmann, Klinger and Wagner, 2008). The emergence of advocacy coalitions in the form of association can facilitate this process through public-private collaboration. In the 'formative' phase, governments targeted key bottlenecks for the new activities (e.g. in Ethiopia transport coordination, finance and land, and in Chile finance and technical support) to reduce uncertainties faced by the early entrants. Government support should not be limited to helping 'pioneers' to

reduce bottlenecks in the formative phase but need to extend into the 'growth' phase in the form of building sectoral public goods with more of an institutional focus.

Even though we believe that the use of the function of innovation framework can improve in guiding the policy intervention in promoting new activities, we should not forget to mention that establishing a successful industry or economic activity is a complex and long term task. As shown in Table 2, we can draw some lessons. *First,* it takes a long time. From the very first initiatives (Ethiopia, 1980s; Chile 1960s), it took 'at least 10 years until the first pioneer appeared (Ethiopia in 1993, Chile in 1976) and 15 to 20 years until the time of take-off (Ethiopia, in 2004, Chile, in the mid-1980s). *Second,* the discovery process of new activity is full of failures and learning. The Ethiopian government failed to export summer flowers from state farms, and the Chilean government failed to adapt 'ocean ranching' methods after 15 years of trial and error. However, both countries learned from these failures. *Third*, although countries can 'leapfrog' by imitating already existing technology, the actual adaption of technology to local conditions (factor of production, natural conditions) still remains a big challenge. Technology transfer, in agricultural products requires a good understanding of local natural conditions (Katz, 2006) which in turn requires good human capital. Both cases demonstrated that selecting the right technology in conformity with the comparative advantage of the country was not a straightforward process.

Finally, with regard to the functional framework we have shown that it is a useful analytical tool in understanding the evolution of new activities in the catching-up context. Having separately analysed the 'formative' and 'growth' phase enables us to understand, with a richer insight, the dynamics of constraints, and identified different policy needs in each phase. This framework therefore, does not provide a policy prescription for the emergence of successful activities. Nevertheless, it could be a useful reference for policy elaboration by helping to identify system specific constraints in a dynamic manner. We also believe that further case studies are needed to develop a more systematic understanding about the functions and phases for different types of activities to refine the framework itself.

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APPENDIX 1

Functions	Developed countries	Developing countries & order of appearance
Knowledge development and diffusion	There are different types of knowledge (scientific, technological, production, market, logistics, and design knowledge) and sources of knowledge (R&D, learning from new applications to production, imitation). Pragmatic and problem solving learning process takes place in following progression in different combinations: (1) scientific knowledge from R&D, (2) design knowledge from learning from application, (3) R&D of inputs for application in main business. (e.g. German solar cell)	Not a creation of 'new knowledge to the world' with R&D but the process of improving the access, transfer and mastering of already established technology/knowledge in the new context (imitation and adaptation). Learning takes place in interacting and application of acquired knowledge to production in site. Diffusion of knowledge is done through informal means. The local adaptation of knowledge may lead to scientific knowledge creation through R&D.
Influence on the direction of search	Sufficient incentives and/or pressures from the actors. This comes from combinations of factors happened both outside and inside of system cause by combinations of following changes: visions and expectations and belief in growth potential, factor and product prices, growth occurring in other countries, the 'land scape' or macro conditions, development of complementary resources, types and sources of knowledge, assessment of potential opportunities and appropriability conditions, regulation and policy, articulation of interest from leading customer, technical bottlenecks or discovery of solution and crises in current business.	Amongst others, reducing uncertainty and creating complementary inputs/services through boosting vision, expectation and beliefs in growth potential of the given activities, demonstrating improvements in governance and institutional reforms. Adequate incentives or offering to share the cost of self discovery process through factor/ product prices.
Entrepreneurial experimentation	Probing new activities/technology through application by entrepreneurs. This is measured by the number and variety of experiments realized. Diversity in the experimentation is important for identifying the successful technology/product/industry.	Experimenting in 'cost discovery process' to find the competitiveness in market through evaluating the different combination of factors of production (natural resource, finance, labour) in context of emerging 'window of opportunity' in the market.
Market formation	Market does not exist or is greatly under-developed. This is due to: potential customers not articulating their demands, poor price /performance of new technology/product/activity. Institutional change through setting standards is prerequisite. Process of market formation goes through (1) 'nursing market' thereby opening the learning space for entrepreneurs, (2) 'bridging market' to enlarge the established space, and reaching to the establishment of (3) 'mass market'. The users or consumers, their purchasing patter and demand profile would influence the market formation process.	Mainly to overcome technical, institutional and physical barriers to enter into already existing market. These barriers are: (1) quality requirement; (2) trade restrictions by private/public standards, (3) other type of bottlenecks that prohibit entrepreneurs from linking to the market (e.g. lack of physical infrastructure, market channels, regulation)
Legitimation	Matter of social acceptance by diverse actors and compliance with relevant institutions. Acquisition of political strength. Often it is the creation of a new institutional framework in alignment with existing institution. This influences expectation and strategy of entrepreneurs.	Matter of social acceptance. More specifically, presence of dialogue between government and private firms. Political power is achieved with the emergence of self-organizing industrial associations or advocacy coalitions. Presence of such organization would lead to private-public partnerships.
Resource mobilization	Mobilize competence/human capital (scientists, entrepreneur etc), financial capital (seed and venture capital etc) and complementary assets (service, inputs, network infrastructure).	How to search and build often lacking resource in human capital, finance and complementary products and services as well as physical infrastructure (road, electricity, air flight etc).
Development of positive externalities	Generation of positive external economies both pecuniary and non pecuniary gains. This comes after emergence of all the above functions. There are two types of sources for positive externality: Marshalian (labour pool, suppliers, and information flow and knowledge spill over) and Olsonian (increasing political power of association).	Generation of positive external economies both pecuniary and non pecuniary gains. This comes after emergence of other functions. There are two types of sources positive externality: Marshalian (labour pool, suppliers, and information flow and knowledge spill over) and Olsonian (increasing political power of association).

Source: based on Bergek et al 2008, Jacobsson and Berkeg, 2006 and Gebreeyesus and Iizuka 2011.

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