The role of innovation in urban farms

(Mathilde Coussy)
The role of innovation in urban farms

Research among urban farms initiatives around the world aiming to define innovation influence on their businesses

Bachelor thesis submitted in partial fulfilment of the requirements for the degree of “International Horticulture Management” at CAH Vilentum of Dronten, The Netherlands

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Preface and acknowledgement

This report is the final result of a four month placement at Wageningen UR Greenhouse horticulture. This internship has been made in the frame of my studies during an exchange programme between Esitpa, Engineering School of Agriculture, France and CAH Vilentum, University of Applied Sciences, The Netherlands.

I came this year 2015 at CAH Vilentum to follow the bachelor degree of “International Horticulture Management” which permit me to specialise in horticulture. This background led me to this incredible work experience where I could have learned a lot about urban farming through my own research. Moreover writing this thesis permitted me to apply many skills and competencies I gained throughout my studies in my both schools Esitpa and CAH Vilentum.

First of all I would like to thank Mr Tycho Vermeulen my company coach for the opportunity he gave me of working at Wageningen UR on my own research. Thank you for your kindness, for having given me support and availability during the whole period of my placement.

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I would like to thank Mr Kevin Frediani, my company coach from a previous placement in Verticrop (Paignton Zoo, England). Thank you for having shared with me your passion for urban agriculture. And sincerely thank you for your continuous support over the years.

Thank you to all urban farms initiatives who agreed to take part to this research and thank to all researchers, journalists, urban farming related companies for your consideration and your help in this research.

Finally, I want to thank my family who had always supported me in all my choices. Thank you for making all this happen.
Summary

This research approaches innovation in urban farming through the different forms it can be implemented. The purpose of this study is to define the role of innovation in urban farms business. Urban agriculture is usually discussed on its economical feasibility or social and environmental benefits it can offered. However in this report, urban farming will be analysed as a revenue generating activity by focusing on their business models.

Five of them have been taken as reference: differentiation, diversification, low cost, reclaiming the commons and experience. In addition, this research gives attention to four specific innovation areas: product, process, organisation and marketing. A literature research have showed that regular growers give their attention in process innovation and scarcely to marketing and organisational innovation implementation.

The research have been carried out on a worldwide scope through a statistical based approach. A number of 34 urban farms initiatives took part to the research and told about their farm characteristics and their innovation strategy. Results have been obtained through statistical analysis on SPSS.

Results show that urban farms have an opposite strategy in term of innovation than regular growers and focus more on product and marketing innovation. It has been noticed that urban farmers often consider themselves as true innovation pioneers despite the fact that they do not have an innovation strategy or a revenue from it. In addition, results showed a relation between innovation and business models. A “differentiation model” is more inclined to offer a high revenue from innovation and on the opposite a “reclaiming the commons model” will hardly support a profitable innovation strategy. Finally 4 levels of innovation investment have been defined depending on how much urban farmers want to invest in innovation.

The research shows that innovation is profitable for urban farming. However the strategy needs to be coordinate with chosen business model in order to have relevant output from it.
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I. Introduction

As a known fact, world’s population is drastically increasing. We are expecting important upheaval making our current earth population of 7 billion people a 9 billion one in 2050. Moreover due to urbanisation we can count since 2007 more people living in cities than in rural areas (UNDP, 2010).

In addition, the supermarkets and agri-business are currently the dominant partners in the food supply chain. The centralised and industrialised system they have developed has provided us with plentiful, cheap food but at enormous cost to the environment and communities (Growing community, 2014). Next to it, people are looking for product of good quality, while recent food scares such as E.coli, mad-cow-disease and salmonella have added to declining consumers’ confidence. That is why knowing where products come from make customers more comfortable in their purchases.

According to this context, urban farming appear as one of the alternatives for the future. It is actually a solution recommended by ONU and Food and Agriculture Organisation (FAO) to face food security needs. Urban farms can respond to many different purposes depending on the role it is given to it, such as public health by providing fresh and healthy food in cities. Urban farms initiatives can also have a totally different objectives not directly related to production of agricultural products. Indeed, a place such as a farm in the middle of a city can be consider for some people as a meeting point for community and a place to learn for instance.

Urban farming need to face a great pressure due to all promises they want to offer as fresh products to an affordable price for everyone. But looking at the global food chain, it can be seen that supermarkets and agri-business have a strong control over food. For this reason it is hard for urban farms to stand out of this strong market. They need to offer something new and different within their products or services. However every urban farms initiatives are really different in their business approach and no innovation strategies specific to urban farming have been defined yet.

This context bring numerous questions in term of innovation into urban farming and led to wonder:

What role does innovation play in the business model of urban farms?

The objective of this research will be to define a classification of urban farms strategies in term of innovation and to see in which way it can influence their company. To this end, four sub research questions will be answered.

Sub research questions:

1. Which business models exist for urban farms?
2. What type of innovation takes place?
3. How much innovation takes place in the success of an urban farm?
4. What is the difference between urban farming and conventional practices in terms of their innovation strategy and relative R&D investment?
Urban farming remain a new activity which still need time and practice to professionalise. Several studies have already been made to define the different production method for instance as hydroponic, aquaponics, rooftop etc... First studies already showed the many purposes an urban farm initiative can accomplish and how they are doing it. Different business models type has been defined as well to reinforce the previous point.

Innovation is still an unknown aspect of urban farming. But by defining it, theoretical implication can apply. Indeed this study can bring a complete scheme urban farms types in term of innovation strategy and what it imply to their success.

The target group of this research would be all type of urban farms initiatives and urban agriculture related companies who are already using innovation or who want to start to implement it. Results will apply on urban farm initiatives from all countries.

FAO estimated eight hundred millions of people practicing urban agriculture today who can produce 15 to 20 percent of the world’s food. Furthermore researchers from Stanford and Berkeley Universities analysed through satellites images, agricultural censuses and socio-economic data the total surface dedicated to urban agriculture. They found out a total of sixty seven million of hectares which correspond to 5.9% of global cropland.

In one hand, three hypotheses have been defined:
- \( H_0 \): Innovation plays an important role in business strategies of urban farmers.
- \( H_1 \): A well-defined innovation strategy leads to better revenues.
- \( H_2 \): Innovation strategies focus on a diverse range of innovations, rather than the more conventional focus on product and process innovation

To address these hypothesis a questionnaire have been developed and a survey was conducted among urban farmers internationally as well as a literature study for references on conventional agriculture. To define the context of the research an interest was given into current knowledge on urban farming, innovation and business models.

Being a global phenomenon, urban farms can be found all around the world. For this reason it appeared important for the study to take in account all these urban agriculture initiatives and to not restrict the research to only one country or continent. It was needed to find a way to reach as many urban farms initiatives in diversified countries in a short period of time. A questionnaire seemed to be the more efficient method to follow for the study.

Thirty four urban farms agreed to participate to the research and answered to the survey. Data from five continents from fifteen countries have been successfully obtained. This gave a broad range of information to be analysed through software as SPSS. Results have been gathered, analysed and classified in order to obtain a clear answer to the research question. Analysis have been made in two steps: a descriptive statistics part, then an explorative part to interpret these results. Several tests have been used within SPSS such as t-test, a multiple correspondence analysis and a hierarchical classification.
This report is divided into six chapters:

- **Urban farming**: This first part will give a short introduction to urban agriculture, present three study cases of urban farms initiatives and finally expose five possible business models for urban farming.

- **Innovation**: This second chapter will present keys information about innovation as the four main innovation areas. A short analyse on innovation within industrials and regular growers will be made as well.

- **Materials and method**: This section describes the research approach, followed by an explanation of the data collection and analysis.

- **Results**: The direct findings of the research can be found in this third chapter.

- **Discussion**: The previous findings will be discuss in this part. The reliability and the quality of the comments will be analyse.

- **Conclusion and recommendations**: Through analysis of the role of innovation recommendations will be given to advice urban farms on their innovation strategy.
II. Urban farming

Recently, urban agriculture has risen up as a complementary strategy not only to solve food problems, but also for cities to meet their social, economic and environmental challenges (RUAF, n.d.; Starke, 2007). This first chapter will illustrate these words and present a short introduction of urban farming, its objectives and forms it can take.

1. Development of urban farming

The Food and Agriculture Organisation defined urban agriculture as “growing of plants and the raising of animals for food and other uses within and around cities and town, and related activities such as the production and delivery of inputs, processing and marketing of products” (FAO, 2007).

Urban agriculture can take place in numerous locations inside cities or in the peri-urban areas. Their activities can be developed on the homestead, on lands away from residences. Lands can be private, public or semi-public as schoolyards or hospital for instance. In term of production methods, urban farmers know to adapt them depending on their choice of facilities. Indeed product can be grown on the outside but indoor productions or rooftops gardens exist as well.

Numerous food products can be grown through urban agriculture. It includes crops as grain, vegetables, mushrooms or fruits, but also many types of animals such as poultry, rabbits, sheep, fish for instance. Moreover non-food products like aromatic and medicinal herbs can be produce as well. Most of the time the more perishable and quite high valued are favoured by urban farmers.

Finally, urban farming can be more or less controlled. Some are open and do not require any control but others can control every parameters as light, temperature, wind etc… Figure1 resume these different types of urban farms.

<table>
<thead>
<tr>
<th>open</th>
<th>mixed</th>
<th>controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>building</td>
<td>Microclimates in and around the built environment (mushrooms, vines)</td>
<td>Rooftop gardens (vegetables)</td>
</tr>
<tr>
<td>inner city</td>
<td>Permaculture gardens (vegetables, fruits, nuts, roots) Urban livestock (bee keeping)</td>
<td>Kitchen and community gardens (vegetables) Urban livestock (chickens, sheep)</td>
</tr>
<tr>
<td>city fringe</td>
<td>Forest gardens (vegetables, fruits, nuts, roots)</td>
<td>Market gardens (vegetables)</td>
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<tr>
<td>perturban</td>
<td>Agroforestry (fruits, nuts) Extensive livestock (beef cattle, sheep) Ecological restoration</td>
<td>Mixed farming (livestock, staples, vegetables) Semi-intensive livestock (dairy)</td>
</tr>
</tbody>
</table>

Previous researches have proven that urban farming can offer many benefits in three dimension of sustainability (RUAF, 2014; Five borough Farm, 2014)

- **Social dimension**: it can offered a certain food security and safe spaces as well. It can a place for education and integration through community meetings.
- **Economic dimension**: urban farming can stimulate local economic and a job growth. Urban farms are also a promise of affordable food for everyone.
- **Ecologic dimension**: urban farming contribute also to improve microclimate in cities, conserve urban soil, increase biodiversity as well as reduce emissions due to food transportation.
2. Urban farms classification through Business models

This second part of the chapter will give an attention to Business models which would permit to have references to classify urban farms initiatives studied for the research.

2.1. Definitions

From the available definitions of businesses, the one by L. Lehmann-Ortega (2008), as the more common used, will be apply: “A business model is defined as the set of mechanisms which enable a company to create value and to capture this value to transform it into profit.”

In addition, a canvas is the tool, created by Osterwalder in 2004, which is use to map the business model and have a visual representation of it. It show how the company create value for its customers and how earn realise its turnover. A business model canvas is divided into nine building blocks which describe the four main dimensions of an organisation which are: Served customers segments, created value, carried out activities, needed resources as figure 2 shows it:

<table>
<thead>
<tr>
<th>Key Partners</th>
<th>Key Activities</th>
<th>Value proposition</th>
<th>Customer Relationships</th>
<th>Customer segments</th>
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<td>Key Resources</td>
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<td>Channels</td>
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Figure 2: Business Model Canvas (Osterwalder & Pigneur, 2004)

2.2. Urban farming business models classification

The Green Deal research report analysed three different strategies that urban farms initiatives can use. They are: differentiation, diversification and low cost (Porter competition strategies of diversification and market focus). These three models are also an inspiration for initiatives and two other strategies derived from it: reclaiming the commons and staging experiences. Dr. J.W van der Schans from LEI-Wageningen University and research Centre presented these five strategies. (Business models urban agriculture, March 2015)

Differentiation:

A differentiation strategy is aimed at differing from conventional supply chains, ordinary supermarket or HoReCa channel (Hotel, Restaurant, Café). An absolute transparency is the main method in which urban farms can create a distinction with conventional food chains. Indeed they prove easily the origins, the place of production and the conditions under which they are doing their production. Urban
farms initiatives may also distinguish themselves by growing special species, or by stressing the seasonal nature of the offer. In addition they can also use more artisanal methods of preparation and different ways of packaging than conventional food chains.

*Example: The Farmery, Canada*

#### Diversification:

A diversification strategy is based on providing other services and good, aside from agricultural production and have a revenue from it. Several activities have been identified that can be done in parallel to food production and permit to the urban farmer to earn an extra income. It can be: education, community services, social care, landscape maintenance for instance. In addition to these business to consumer activities, it can also be business to business activities such as contract work, recycling, insects growing, or energy production.

*Example: Rotterzwam, The Netherlands*

#### Low cost:

A low cost strategy is about expanding the business in order to realise economies of scale. It must be said that this business development strategy doesn’t have a lot of space in the urban context. Indeed there is a great pressure on urban farms to operate on an efficient way for the reason that they claim to produce fresh and sustainable food available for everyone including people with low income. To this end urban farms initiatives can use empty buildings, organic waste as compost, rainwater, urban heat waste. Volunteers are also a significant possibility to take into account for this strategy.

*Example: Sky Harvest, Canada*

#### Reclaiming the commons:

Currently the food system appear as opaque and elusive. This business development strategy want to reintroduce the feeling of ownership of our own food. For this urban farmers involve people to agricultural product cultivation and want somehow to connect its customers to the initiative. Urban farmers may share their knowledge during workshop, courses or activities and can also sell equipment to do it on your own at home.

*Example: Chicago Botanic Garden’s Windy City Harvest, USA*

#### Experience:

This last strategy as for objective to add value by providing memorable experiences more than regular goods or services. Urban farms can staging unique experience because of their very short farm and customers. This is actually why we can find so often photos of urban farms in life style magazines. Urban farmers can offer different type of experiences such as physical (working the land), sensorial (tasting), visual (LED illumination).

*Example: Seattle Urban Farm, USA*
3. Three study cases of urban farms initiatives

To describe the type of companies included in the research, this paragraph describes three typical urban farms that can be found in respondents’ list.

Rotterzwam – Rotterdam, The Netherlands

Launched in 2013, Rotterzwam is a for-profit cooperation. As its name suggest it, Rotterzwam has been set up in the city of Rotterdam in The Netherlands and produces mushrooms (Zwam=mushroom in Dutch).

The urban farm initiative founds its place inside an old swimming pool (Figure 3) where mushrooms are being grown in an unusual way. Indeed Siemen Cox, Mark Slegers, Nathan and Melissa van der Beek are using coffee peels as substrate to cultivate their mushrooms. However mushrooms are not an end for Rotterzwam team. Coffee peels; usually considered as residues to be thrown away but; can there be transformed into a compost of good quality after harvesting mushrooms.

Running by only two part-time employee and six volunteers, Rotterzwam offer to its customers an interesting products range. Rotter mushroom-grow Kit is one of them and allow clients to grow their own mushrooms at home. However their main targeted customer remain restaurant in Rotterdam. For instance, Ooesterzwam croquettes and meatballs are the result of a cooperation with a baker Mr van der Heijden. In addition to their product, this urban farm propose also several activities as guided tours, workshop, apprenticeship and inspiring speakers. Rotterzwam team could be associate to true innovation pioneers as their Agriculture city Award and Radical innovators election in 2014 can testified.

Brooklyn grange rooftop farm:

Started in 2010, Brooklyn Grange is a for-profit corporation in the USA. This company of more than 20 employees (full-time and part-time together) know quite a big success. Indeed they are leader in rooftop farming in United States. They are operating the world’s largest rooftop soil farms, situated on two roofs in New York City, and grow over 22000 kg of organically cultivated produce per year. In addition to growing and distributing fresh local vegetables and herbs, Brooklyn Grange also provides urban farming and green roof consulting and installation services to clients worldwide. Next to it they collaborate with numerous not-for-profit organisations throughout New York to promote healthy and strong local community. (Brooklyn Grange, 2015).
They create their own compost by turning away organic waste from several different channels in order to continuously bring a new and fresh biodiversity in their soil. Their different products can be found in New York restaurants as Coffeed, The Dutch or The Cleveland among others. Retailers and caterers can also provide Brooklyn Grange products.

Innovation has its place in this urban farm since they are experimenting new crops every year in addition to their reliable perennials.

Brooklyn Grange knows how to diversify itself by offering many different activities (Figure 4) no agricultural related. Indeed, in addition to farm and garden workshops, they propose fitness classes, film screenings, concerts, weddings, fashion shows etc…

Windmill Hill City farm, Bristol, England

Created in 1976, Windmill Hill City Farm is a charity that provides recreation, education and therapy using food, farming and the environment as a theme. (Windmill Hill City Farm, 2015). They provide a great amount of facilities for its customers as a farm with its animals and gardens but also a café place, a play area, a gift shop and rooms to hire.

The goal of this initiative is to improve the daily life of local neighbourhoods with services and facilities. They want to help people with social care and health needs through activities and to encourage personal development by offering opportunities.

Windmill Hill is “a place where people grow” where children and their family are the heart of the city farm. “In this environment, we provide opportunities for children to learn, develop, gain a variety of life skills and have fun through a variety of play opportunities and experiences within these natural surroundings” (Windmill Hill City Farm, 2015)

Many organisations from Bristol support and work with Windmill Hill to help them to achieve their aims. For instance: Children’s University, Bristol drugs project, Bristol food connection…
III. Innovation

The third chapter will focus on innovation key principles in order to knowledge on existing areas of innovation but also to know what current innovation strategies of regular industrial companies and conventional growers are.

1. Areas of innovation

"Innovation isn’t anything until it becomes part of your everyday business"

Carina Kemp, Head of insight and planning, HSBC

Innovation can be defined as the application of new ideas to the products, processes or any other aspect of a firm’s activities. Innovation is concerned with the process of commercialising or extracting value from ideas (Mark Rogers, 1998). Numerous definition of "innovation" have been invented in literature. Joseph Schumpeter has been the first economist to draw attention to the role of innovation. In the 1930s he defined four types of innovation: Product, process, marketing and organisational innovation. To be innovative, the firm need at least to implement one of them.

In 1997, the OECD had produced a second edition of The Oslo Manual where they aimed to propose a benchmark for surveys about innovation. Based on J. Schumpeter’s work the manual clarifies innovation types as follows:

**A product innovation:**

It is an introduction of good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvement in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. (Oslo Manual, 1997)

**A process innovation:**

It is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. (Oslo Manual, 1997)

**A marketing innovation:**

It aims to implement a new marketing method involving significant changes in product packaging, product placement, product promotion or pricing. (Oslo Manual, 1997)

**An organisational innovation:**

It consist on the implementation of a new organisational method in the firm’s business practices, workplace organisation or external relations. (Oslo Manual, 1997)
2. Innovation within industrials firms

“Eurostat, statistic explained” made researches about innovativeness of enterprise in European Union which their most recent data are from January 2015. A community innovation survey (CIS) is currently carried out every two years to obtain statistics analysis across Europe. Through this survey they found out that almost half of companies in the EU-28 (48.9%) reported a form of innovation during the period of 2010-2012.

They discovered that more than one quarter (27.5%) of companies reported organisational innovation. Then marketing innovation comes in second rang with a score of 24.3% of all companies. Product innovation has been implemented in 23.7% of companies. Finally process innovation is the last one with a total of 21.4% of all companies. Each enterprise can implement more than one type of innovation at the time (Eurostat, 2015).

All over the world, companies invest in innovation to improve their market share, reduces cost or most of the time to become more efficient. On average, companies spend 1-2% of their turnover for innovation activities. In some larger firms this expenditure can exceed 5% in some countries as Canada for instance with an average close to 6%.

3. Innovation within regular growers

Regular growers who grow agricultural products in rural areas may use innovation as well. Researches have been made among companies in the Dutch horticultural sector to study their relation with innovation and more especially about four areas of innovation: product, process, marketing and organisational. (Het innovatiesysteem voor de glastuinbouw in 2020, Dr. Alkemade, Dr. Hekkert, Dr. Farla, 2010)

Based on their analysis they found out that process innovation is the most current among growers. Horticulture sector is mainly focused on process innovation; leading to cost-reduction; where specialised suppliers play an important role in the realisation of these innovation. For instance all new crop varieties consist on process innovation. Then product innovation comes to second range of importance. It need to be noted that this type of product innovation are often not caused by demand from end consumers but is more supply-driven.

Marketing and organisational innovation are way less important for regular growers. Although flower section require more attention to marketing innovation than vegetables.
IV. Materials and methodology

This section describes the research approach, followed by an explanation of the data collection and analysis.

1. Literature research

After choosing the global research topic, a literature review has been made in order to define mains focusing points of the study. The literature research has been mainly achieve through internet where articles were being found on Wageningen University Library search engine and other general information on Google search engine. Next to it, few books have been a support as well for this review.

It has firstly been necessary to make a study on urban farming to have a better understanding of its models diversity and their purposes. Then three study cases of urban farms initiatives have been conducted through their official websites and reports online. In addition, a review on business models has been made to give an insight of urban farms existing models. These models were taken as a reference in results analysis.

Finally, a literature research have been done on innovation to know the key elements and then to be able to apply them on urban farming. Researches on innovation within industrial firms and regulars growers have been conducted as well to have a reference for later comparison with urban farming.

2. Questionnaire study

2.1. Questionnaire design

The literature review was a needed tool to decide the survey’s question. Both innovation and urban farms business models were used as the framework of the survey. It consist on 27 questions distributed on three parts which are: general information, agricultural production and innovation. A survey’s form can be found in annex 1.

The survey has been formatted on the website ZE-questionnaire.Com. Questions type are all single or multiple choices and several comment spaces were added to let respondents explain their opinion if wanted. Any question were mandatory to give more confidence to contacted potential respondents.

2.2. Data collection

The survey has been released during approximately one month from 29th June 2015 to 2th August 2015. For a global overview it has been decided to collect opinions of urban farmers all around the world. To this end several channels were being used. First of all it was posted on the City Farmer News website and two LinkedIn™ groups related to urban farming. Around 150 urban farms were individually contacted through email. Organisations as RUAF foundation (Resource centres on urban agriculture and food security) among others, were being reached as well to ask for urban farmers email addresses. Finally researchers and urban farms related companies from different countries brought a precious help to the survey’s distribution.
2.3. Data analysis

Answers to questionnaire were gathered on my ZE-questionnaire account. The first step consisted on the collect and counting of answers, which have been transferred on a excel sheet to have a good overview for each question. This first step permit to see the non-response rate, have a first impression of general results and read every comments let by respondents.

Secondly results needed to be codified and enter on a quantitative analysis software: SPSS (Statistical Package for the Social Sciences). Survey is characterised by two type of questions: the ones with a single answer and others with multiple possible answers. Each single answer type questions were considered as one variable codified by different number for each answer proposition (ex: What type of company is the urban farm: 1=for-profit, 2=not-for-profit, 3=combine of both). In another hand, multiple choice question were codified another way. Each answer proposition was consider as variable and was codified: 0= No, 1= Yes. After codification, SPSS sheet was composed of the 34 respondents and 134 variables.

Through this data, a first basic analysis was conducted with frequencies table. For each question SPSS could define answers rate divided in percentage. In this way, graphics could have done and individual analysis for each question as well.

Then to determinate relation between criteria, additional analysis have been conducted. First of all a t-test was made to see the relation between continents and innovation strategy. All variables related to innovation strategy was analysed through this test. Then a multiple correspondence has been made as well to confirm first results of the t-test. In another hand, several cross tabulation were made to observe relation between criteria. Results were compared to information obtained in literature research.

Finally, a hierarchical cluster classification have been conducted to define levels of innovation strategy. Label cases were considered by urban farms initiatives, and the studied variables were business models, areas of innovation, investment in innovation and revenue from innovation. A dendrogram could have been obtained which gave four group corresponding to four different level of innovation strategy.
V. Results

This chapter is a statistical presentation of obtained answers at each question from the survey by 34 respondents which the list can be found in annex 2.

1. General information

1.1. Geographic overview

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<thead>
<tr>
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</thead>
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</tr>
<tr>
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<td>Singapore</td>
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<td>Australia</td>
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</tr>
<tr>
<td>South America</td>
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<td></td>
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</table>

Numerous urban farms initiatives took part to the research questionnaire leading to a result of 34 respondents by the 31th July 2015. Urban farming being a global phenomenon, participation arrived from countries (Figure 6) all around the world. The survey collected the opinion of urban farmers from 15 countries on a total of 5 continents. It has been observed that 44% (n=15) of them are coming from North America of which 67% (n=10) from The United States. The second most present continent in those results is Europe with a result of 38% (n=13) of total respondents. England is the most representative country of Europe in this research with a total of 38% (n=5). Furthermore it has been counted that only 18% (n=6) of participating urban farms were coming from South America, Asia and Oceania together. No response from Africa could have been obtained.

1.2. Urban farms size

Respondents to the survey are farms from different size with a more or less balanced distribution in each size category. Although more than the half (55.2%, n= 18) have a size bigger than 1001 m² and only 10.3% (n=3) of respondent have a size below 100m². Moreover it has been observed that almost the half (41%, n=14) are using greenhouses.
1.3. **Launched year**

Majority (38%; n=13) of responding urban farms are quite new and opened within the last three years. Two respondents started this year 2015 and the oldest urban farms participating to the survey is 39 years old (1976).

![Launched year of urban farms initiatives](image)

**Figure 8: Launched year of urban farms initiatives**

1.4. **Ownership model and type of urban farm**

A similar balanced distribution applies for the different ownership models. However it has been noted that 38% \( (n_{\text{Sole owner}}=6 \text{ and } n_{\text{Partnership}}=7) \) have a multiple owners or shareholders model. 8.80% \( (n=3) \) correspond to another type of ownership model absent from the list. Respondents didn’t specified in their responses to which other one they were referring to.

As it is be presented on figure 10, almost half (44%, n=15) of participating urban farms are not-for-profit organisations. Not far behind with a comparable amount, it has been count that (38%, n=13) are for-profit organisations.

![Type of company](image)  ![Type of ownership](image)

**Figure 10: Type of company**  **Figure 9: Type of ownership**
1.5. Employment and volunteers

A large amount of questioned urban farms present a working team of either zero (26%, n=9) or two to five full-time employees (32%, n=11). In addition, 15% (n=5) of participants are working in a team of more than 10 employees. Referring to part-time employment, it has been observed that 38% (n=13) of respondents are situated on a range of two to five employees. Only four farms (12%) have six to ten part-time employees.

To finish this part, volunteers have been studied too. It showed that 12% (n=4) of respondents do not have volunteers. Majority of questioned have one to five, or eleven to twenty volunteers (21% in both cases, n1=n2=7).

![Employment profile](Figure 11: Employment profile)

1.6. Customers and competitors

Customers: An almost perfect balanced has been revealed looking at the customer’s strategy. Indeed, sixteen respondents (47%) answered to have a specific targeted customers group against eighteen (53%) who do not. Restaurants are appeared often in comments of the questionnaire as a targeted group. Then families, schools, low income community members, disabled and disadvantaged persons were example of other targeted groups.

Competitors: In most of the cases (53.6%), respondents consider other local food initiatives as their competitors. Then with 25% (n=7) supermarkets has been designated as a competitor. Only one respondent (4%) point nearby restaurant. 17.9 % (n=7) of respondents said to do not have direct competitors.

![Urban farms' competitors](Figure 12: Urban farms' competitors)
2. Part 2: Agricultural production

2.1. Agricultural production

Agricultural product: Urban farms can produce a variety of different agricultural product. Most of questioned ones produce common vegetables (70%, n=24), special vegetables (62%, n=21) and herbs (70%, n=24). Then 47% (n=16) of them propose fruits to their customers. Flowers (39%, n=13), compost (38%, n=13) and micro greens (35%, n=11) are also quite appreciate by urban farms.

Production method(s): The question about their type of production methods was a type of multiple choices. With 70% of them, organic is a current production method among respondents. High-tech methods as vertical farming, aquaponics or substrate-based are quite present with 32% (n=11). Only 12% of respondents are using conventional farming (n=4) and 15% for conventional farming.

2.2. Business model(s)

As production methods, the question about business models was a multiple choice type. More than the half 54% (n=18) of respondents present a “reclaiming the commons” business model. Next to it with 45% (n=15) of them present a business model “experience”. The less represented one is the model “low cost” with 12% (n=4).

![Figure 13: Business models of respondents](image)

2.3. Distribution channel(s)

Farmer’s market and on farm shop are the most current distribution channels used by questioned urban farms with respectively 35% (n=12) and 32% (n=11). Only 9% (n=3) are using web shop. Twelve respondents selected “other type of distribution channels” where they were referring to restaurant and home delivery.

2.4. Main streams

Main cost stream: Half (50%, n=17) of respondents answered that their main cost stream is coming their agriculture production services. Then 12% (n=4) of answers were education services. All other respondents split very different expenditure pole as technical innovation (3%, n=1) or volunteer opportunities (3%, n=1).
**Main revenue:** In comparison to very similar answers within respondents concerning activities causing main cost stream, it has been showed that activities generating most revenue are very different depending of the urban farm. On a total on twenty-eight answers, ten of them (30%) are “production sale from own farm”. Six other one (18%) chose “Agriculture production” and five participants (15%) said that education services is the activity generating the most revenue. Only one (3%) earn most of its money from tourism.

![Financial streams](image)

3. **PART 3: INNOVATION**

3.1. **Innovator types**

A subjective opinion about their own urban farm in term of innovator type has been asked in the questionnaire. Half of them see themselves as true innovation pioneers (50%, n=17), then early adopters are 44% (n=15). Only one respondent think to be a follower and another one admit to do not use innovation.

3.2. **Innovation process**

Concerning their innovation process, exactly half of them (50%, n=17) conduct their strategy on an informally way. They build projects depending of market need or good ideas. In addition 30% (n=10) adopted a structured way and have an alignment from concept. Only five respondents (16%) have a formal strategy and coordinate all innovation activities.

*Figure 14: innovation process*
3.3. Collaboration with external sources

Most commons collaboration for innovation are customers with 62\% (n=21) and strategic partners with 65\% (n=22). Only five respondents (15\%) work with suppliers and a single (3\%) urban farm do not work with external sources.

3.4. Innovation stream

It has been asked the percentage of overall revenue spent on innovation over the past years. Only 76\% of participants answered to this question. 17.6\% (n=6) did not invest in innovation. 17.60\% (n=5) spent more than 11\% of their overall revenue which 9\% (n=3) of the total spent more than 30\% of their overall revenue.

Next to innovation investment the revenue coming from it has been studied as well. There are this time 4 missing participant’s answers. 23.50\% of respondents (n=6) do not earn money from innovation. A total of 17.6\% (n=6) have 16\% to 30\% of their revenue coming from innovation. The last but not the least, 15\% (n=5) of cases where innovation has an importance higher than 30\% in overall revenue.

3.5. Company profile

**Company activities:** 68\% (n=23) of respondents conduct a production of agricultural products. However many activities non-related to agriculture are also significantly present in results. For example 71\% (n=24) are providing education services. Only 9\% (n=3) a producing energy. All other activities are more or less well balanced with equivalent amount of selection.

**Innovation implementation:** It has been asked to respondent whether or not they introduced new ways of performing in their activities during the last three years. More than the half (53\%, n=17) did it in the case of their production of agricultural product. A lot of them (44\%, n=14) made it also for their education services. None of them did it for energy production and only 6\% (n=2) for product processing.
Further need of innovation: Following the previous question, it has been asked if respondents were seeing a further need of innovation in its activities. Two of them (7%) said that they do not see a need of innovation for now. Concerning the other ones, they showed that the production of agricultural product is an activity which need innovation in their urban farms (53%, n=16). “Product sale from other suppliers” haven’t been selected so much (10%, n=3).

3.6. Innovation strategy

Eight respondents (23%) think that their strategy has been totally implemented in a successful way until now. An equal result has been found with 30% (n=10) who say that it has been more or less successfully implemented and another 30% who say that it has been slightly successfully implemented. Finally, five respondents (15%) admitted that their strategy hasn’t been really effectively applied until now.

3.7. Coming growth

94% (n=32) of respondents are expecting a coming growth of their company within the next five years. From these thirty two respondents, twelve of them (35%) expect a slight growth and twenty (59%) of them expect an important one.
VI. Discussion

In this chapter an analysis of previous results will be done in order to find a relation between urban farms criteria and their innovation strategy. This will lead us to a strategy classification we are looking for.

1. Urban farmers’ subjective opinion by innovation criteria

As it has been found in results part, many respondents see themselves as true innovation pioneer (50%) or early adopters (44%). However this is only their subjective opinion. Cross tabulations were done to compare their own opinion to their real innovation strategy.

Based on cross tabulation results, it has been found that 31% (n=5) of “True innovation pioneers” and 25% (n=3) of “Early adopter” don’t earn money from innovation. In addition, 15% (n=2) of “True innovation pioneers” and 36% (n=4) of “early adopters” do not invest at all in innovation. Furthermore, 47% (n=8) of “true innovation pioneers” and 57% (n=8) of “Early adopters” do not have a well-defined innovation strategy but on the contrary they do it on an informally way and build their project depending on market need or good ideas. Finally, 41% (n=7) of “True innovation pioneer” and 50% (n=7) of “Early adopters” don’t think that their innovation strategy has been well implemented. Through these information, it appears that urban farmers may have a wrong idea about their innovator type.

The concept of urban farms is already an innovation on itself according to the report of INNSULA called “Innovationsfelder für die nachhaltige Stadt?” (INNSULA, 2014). Urban farmers may stop their attention to the fact that their initiatives is already an innovative idea and might not see a further in innovation.

2. Innovation streams

Analysis have been conducted in order to see if innovation is actually profitable to urban farms initiatives and in which ways. To this end, cross tabulation have been done to see if innovation investment can really be profitable to urban farms. Results can be found in figure 18.

<table>
<thead>
<tr>
<th>Investment in innovation</th>
<th>Revenue from innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>1%-5%</td>
<td>0</td>
</tr>
<tr>
<td>6%-10%</td>
<td>2</td>
</tr>
<tr>
<td>11%-15%</td>
<td>0</td>
</tr>
<tr>
<td>21%-25%</td>
<td>0</td>
</tr>
<tr>
<td>+30%</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 18: Innovation streams
In major cases the revenue from innovation is higher than the investment made. There is only 11% (n=3) of situation where the revenue from innovation was lower than the investment. According to the results it appears that invest in innovation is profitable to urban farmers.

It can be noticed that even lower investments can bring a high revenue from innovation. Indeed one respondent for instance invested [1%-5%] and managed to obtain a revenue between [26%-30%] from their overall revenue.

Furthermore, as the table show it 50% (n=13) of respondents succeed to have more than 10% of their overall revenue due to innovation. As it has been shown in the literature research: "in most countries, 5 to 7% of firm’s turnover comes from products that are new to the market" (OECD, innovation microdata, 2010). The table is showing that 50% of respondents have a revenue from innovation higher than 10% of their turnover which is way more important than others types of companies. In this way, innovation is can be more profitable in the case of urban farming.

Secondly, the relation between customers and revenue from innovation could be relevant. A cross tabulation (figure 19) have been made to see if a targeted group of customers can be beneficial to urban farmers in term of revenue.

<table>
<thead>
<tr>
<th>Revenue from innovation</th>
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</tr>
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<tbody>
<tr>
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</tr>
<tr>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

Figure 19: Type of customers by revenue from innovation

It can be observed that even without a targeted group of customers, the urban farm can manage to have a high revenue from innovation. However a targeted group of customers give more chance to earn a high revenue. Indeed among urban farms with a revenue from innovation higher than 20% of the turnover, 75% (n=6) of them targeted a group of customer.

Urban farms who have targeted customers answer to a specific type of need. Moreover as it has been presented in results part, urban farms work a lot with their customers on innovative project. A higher revenue can be explain with a targeted group because needs are better defined and the direct relation with customers help to implement the type of innovative project that they want to see.

Then, another table (Figure 20) were made to see how innovation process can influence revenue from innovation. Results shown that a well-defined and structured innovation strategy can offer interesting revenue. Indeed 44% (n=4) of respondents who have a structured way of implementing innovation have a revenue from innovation higher than 30% of the overall revenue which is quite impressive. Moreover 22% (n=2) of them have a revenue from innovation is between 11% and 25% of their total revenue. In another hand 43% (n=7) of respondents having an informal way to implement innovation see their revenue from innovation below 10%.
According to these results, even though an informal way of implementing innovation can bring a revenue to the urban farms, it seems that a more structured way and a defined strategy might be more profitable to urban farmers.

<table>
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<tr>
<th>Revenue from innovation</th>
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<td></td>
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</tr>
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<td>1</td>
</tr>
<tr>
<td>[1%-5%]</td>
<td>2</td>
</tr>
<tr>
<td>[6%-10%]</td>
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</tr>
<tr>
<td>+30%</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 20: Innovation process by revenue from innovation

3. Relation between business models and innovation strategies

In a second hand, analysis have been conducted to determine the relation between business models adopted by urban farms initiatives and their innovation profile. Results of this analysis are resumed in figure 21:

- **Targeted customers**: The five business models have most hove the time a targeted customers group except the model “Reclaiming the commons”. This can be explained by the purpose of this particular business model which is aimed to include every kind of people. “Everyone is welcome” as some of them replied in the survey.

- **Innovation process**: Results shows that the five models often opt for an informal innovation strategy. However in the case of Differentiation strategy a balance between the two innovation strategies appears. They are more inclined (54%) to well-defined their innovation process.

- **Investment in innovation**: All five models will most of the time invest 1% to 15% of their overall revenue in innovation. However, Differentiation model is the more willing one (29%) to invest a high amount of more than 30% of its turnover. Followed by the Low cost model who is also ready to invest a lot in innovation, with 25% of respondent who invested more than 30% of their
turnover. This result is surprising due to their purpose to make economy of scale. However this result might be explain with the revenue from innovation.

- **Revenue from innovation:** Indeed it appears that the Low cost model is the one where half of respondent (50%) said that innovation represent more than 30% of their overall revenue. In addition, with 30%, Differentiation model also manage to have a good revenue from innovation with 50% of them a revenue higher than 15% of their turnover. In another hand, Diversification model is the one which has less chance to have more than 30% of their turnover due to innovation.

<table>
<thead>
<tr>
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<th>Differentiation</th>
<th>Diversification</th>
<th>Low cost</th>
<th>Reclaiming the commons</th>
<th>Experience</th>
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<th>Low cost</th>
<th>Reclaiming the commons</th>
<th>Experience</th>
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<table>
<thead>
<tr>
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<table>
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<th>Low cost</th>
<th>Reclaiming the commons</th>
<th>Experience</th>
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<td>30%</td>
<td>11%</td>
<td>50%</td>
<td>17%</td>
<td>16%</td>
</tr>
</tbody>
</table>

*Figure 21: Business models by innovation strategy criteria*

4. **Areas of innovation: Product, process, marketing, organisational**

According to answers from survey and literature research, areas of innovation depending of urban farms initiatives have been defined through frequencies analysis.

Companies implementing process innovation are the ones who acquired advanced technology in their production methods for instance or/and adopted E-Business (web shop). Product innovation take in account urban farms who released a new product or/and are intending to develop a new product coming year. The investment in innovation is also a criteria for product innovation. Organisational innovation required a networking with research and educational institution and a staff training. Finally a marketing innovation would be implementation of a new product packaging or detailed website of their activities. Result can be found in figure 22.
Results show that product innovation is the most important one with 88.2% of respondents who implemented it. Then comes marketing innovation with a total of 73.5% of studied urban farms who used it. Organisational innovation are present in less than half of respondent with 44.1%. Surprisingly process innovation is the last one with a very low amount of implementation (35.3%) compared to the three others.

By taking literature research as a comparison, it appears that regular growers and urban farmers adopt a different strategy in term of innovation. When growers focus on process innovation, urban farms give more importance to product and marketing innovation.

This can be explained by the direct relation that urban farmers can have with their customers. Indeed it has been shown in results part that 62% of respondent do work on innovation with customers. It explain the difference with regular growers who do not always have a direct contact with their customers. Urban farms know exactly what the expectation of their clients are and can improve their product range depending of the demand.

In addition, as it has been said earlier, supermarkets have a control over food which make it hard for urban farms to stand out of this strong market. By giving an importance to marketing innovation, urban farms initiatives can work on their image and differentiate from supermarkets. Most of initiatives who do not implement marketing innovation are mostly ones who do not consider to have direct competitors (17%).

In terms of financial aspect, analysis have been conducted to determinate the relation between the revenue from innovation and areas of innovation implemented. Results are presented in figure 23.

- **Product innovation**: 27% (n=7) of urban farms initiatives who do implement product innovation have no revenue from it. However, 35% (n=9) receive more than 15% of their revenue from innovation versus 7% (n=2) of urban farms who didn’t implement a product innovation.

- **Marketing innovation**: Respondents are perfectly divided in two groups. 50% of them who do implement it, innovation represent less than 15% of their revenue and the other 50% are above 15% of their revenue. However it need to be noted that any urban farms who didn’t implement a marketing innovation could receive more than 15% of their revenue from innovation.
- **Organisational innovation**: 77% (n=10) of respondents who did implement organisational innovation receive more than 15% of their revenue from innovation of which 50% (n=5) received more than 30%.

- **Process innovation**: All respondents who made a process innovation saw more than 5% of their revenue coming from innovation. And 42% (n=8) of the ones who didn’t implemented it didn’t receive money at all from innovation.

<table>
<thead>
<tr>
<th>Revenue from innovation</th>
<th>Process innovation</th>
<th>Product innovation</th>
<th>Organisational innovation</th>
<th>Marketing innovation</th>
</tr>
</thead>
<tbody>
<tr>
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<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
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<td>1</td>
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<td>[26%-30%]</td>
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</tr>
<tr>
<td>+30%</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

*Figure 23: Areas of innovation by revenue from innovation*

Results show that one innovation implementation do not guarantee a specific amount of revenue from innovation. It appears that other criteria need to be taken in account.

5. **Classification of levels of innovation implementation**

Finally a strategies classification has been made through a hierarchical cluster analysis. This classification take in account the innovation process (informal and structured), the five business models (differentiation, diversification, low cost, reclaiming the commons and experience), areas of innovation (process, product, organisational and marketing), investment into innovation and revenue from innovation. A dendrogram has been obtained by using a Ward linkage which gives four distinct groups of urban farms initiatives. The cluster classification and dendogram can be found in annex 3 and 4. Each groups define a level of innovation strategy an urban farm initiative may adopt as the figure 24 resume it.

**Level 1**: This first strategy require of having an innovation process well-structured and defined which mean to have an alignment from concept of their different project. Then considered business models here are “Reclaiming the commons” and “Experience”. Urban farmers will involve customers in farm’s activities and provide them memorable experience. Within this strategy
investment into innovation is low and remain below 5%. Implemented innovation would be in product and organisational areas. However, this strategy provides a low revenue due to innovation and remain below 5% as well. In this model, innovation doesn’t take an importance place in urban farm company but a well-structured strategy permit the farmer to earn a small revenue from it.

**Level 2** The second strategy is conducted on an informally way but is mainly focusing on a business model “Reclaiming the commons”. Urban farmers involve their customers in farms’ activities. Innovation investment is around [1%-10%] and will be implemented in product and marketing areas. This approach can provide to the urban farms an interesting revenue due to innovation of [10%-20%] of the turnover.

**Level 3**: In this strategy the idea is to have business models “Diversification” and “Experience” which are similar in a way that they aimed to offer a type of products or services which won’t be exclusively related to agriculture production and would be unforgettable for the customer. Innovation process will be conduct on an informal way and will focus on product and marketing areas. This third strategy require a higher investment included between 6% and 10%. However this strategy is profitable and can provide a revenue due to innovation of minimum 20% of the overall revenue.

**Level 4**: The last strategy gives an important place to innovation. The process must be structured. The ideal business model for this innovation strategy is “Differentiation” which aims to provide products and services different from the conventional supply chain. This difference and newness will be supported by a major investment in innovation higher than 30% of the turnover. This innovation focused in three areas: process, product and marketing and will provide a high revenue from innovation with a total superior of 30% of the turnover.

<table>
<thead>
<tr>
<th>Level</th>
<th>Innovation process</th>
<th>Business model(s)</th>
<th>Area(s) of innovation</th>
<th>Revenue from innovation</th>
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<tr>
<td>1</td>
<td>Structured</td>
<td>Reclaim the commons and experience</td>
<td>Product and organisational</td>
<td>[0%-5%]</td>
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<td>2</td>
<td>Informally</td>
<td>Reclaim the common</td>
<td>Product and marketing</td>
<td>[1%-10%]</td>
</tr>
<tr>
<td>3</td>
<td>Informally</td>
<td>Diversification and experience</td>
<td>Process, product, organisational and marketing</td>
<td>[6%-10%]</td>
</tr>
<tr>
<td>4</td>
<td>Structured</td>
<td>Differentiation</td>
<td>Process, product, and marketing</td>
<td>+30%</td>
</tr>
</tbody>
</table>

**Figure 24: Four levels of innovation implementation**
6. Hypotheses verification

Three hypotheses have been formulated at the beginning of the report, which were:

- **H0**: Innovation plays an important role in business strategies of urban farmers.
- **H1**: A well-defined innovation strategy leads to better revenues.
- **H2**: Innovation strategies focus on a diverse range of innovations, rather than the more conventional focus on product and process innovation.

Through research results and their analysis, these three hypotheses can be validated or refuted.

Although every urban farms have different approaches in term of innovation strategy, most of questioned urban farmers showed in the questionnaire the importance they give to innovation. Even though a minority of 23% do not have a revenue from innovation, only one respondent did not implement innovation in his urban farm. H0 is validated, innovation do play an important in business strategies of urban farmers.

In addition, results showed that not-well-defined innovation strategy could offer as interesting revenues than well-defined innovation strategy. H1 is refuted, a well-defined innovation strategy do not lead to better revenue. However it must be noted that a well-defined strategy combined a suitable business model permit to have the higher revenue from innovation.

Furthermore, analysis showed that urban farming do implement innovation in four areas: product, process, marketing and organisation whereas conventional growers focus their attention into product and process innovation. H2 is validated, innovation strategies do focus on diverse range of innovation, rather than the more conventional focus on product and process innovation.

7. Research limitation and future research

An attention must be given to the fact that a questionnaire is not a science exact. Respondent may understand question on a different way that it is wanted. An amount of 34 respondents in one month was correct, however more reliable results can be obtain with more time allowing a bigger number of respondents. Finally, many countries couldn’t be reach because of a language limitation. For instance no urban farms from China were able to answer to the questionnaire.

In addition, two exploratory analysis such as a t-test and a Multiple Correspondence Analysis (ACM) have conducted in the frame of this research in order to determinate a correlation between continents and innovation strategies. However no correlation could have been find. This can be explained by an unequal number of respondents by continent and a too unimportant number of respondents from some countries. In a further researches, a comparison between countries could be effectuated in order to see in what are their similarities and differences in term of innovation strategy. For this a bigger amount of respondents would be needed as a research literature on economic’ situation of studied countries.
VII. Conclusion and recommendations

1. Conclusion

Through this research main aspect of innovation and its benefits could have been defined for urban farms companies. This research was leaded by four sub-research questions:

1. Which business models exist for urban farms?
2. What type of innovation takes place?
3. How much innovation takes place in the success of an urban farm?
4. What is the difference between urban farming and conventional practices in terms of their innovation strategy and relative R&D investment?

Urban farms initiatives are not all similar from each other and it is explained by their different purposes. These aims are classified in five business models dedicated to urban farms which are: differentiation, diversification, low cost, reclaiming the commons and experience.

Although innovation is not the only responsible criteria of an urban farm success, however it can be really profitable in term of revenue by implementing innovation in one of these areas: process, product, marketing or/and organisation.

Differences have been observed between urban farming and conventional growers. Indeed the research showed that urban farms strategies do not focus only on product and process innovation but they also focus a lot on marketing and organisational innovation.

To conclude, innovation do have a relevant place within urban farming and can offer great financial benefits if it carried out in relation with farms characteristics as business model. Innovation strategy has a strong relation with the chosen business model and a good association of the two of them can lead to a successful and profitable innovation strategy.
2. Recommendations

First of all, it is indeed recommended to implement innovation in an urban farm initiative. Results show that majority of studied cases have revenue from innovation higher than the investment they made on it. In addition, “Product innovation” appeared as a “must have” in innovation strategies but other areas as organisation and marketing have interesting benefits as well. It must be said that “Process innovation” is often forgotten by urban farms initiatives, however this innovation area shouldn’t be disregard since it can provide very interesting revenue from it. In this way, it can be recommended to urban farmers to invest in advanced technology or E. Business (web shop) for instance.

Secondly, an informal or a well-defined innovation strategy have both interesting benefits, and can both be used on an interesting way. However, urban farmers should be aware that for high investment; +30% of total revenue; a well-structured and defined strategy should be implemented in order to have a better control and guarantee a positive outcome from investment.

In another hand, urban farms are recommended to target a group of customers and above all to work with them on innovation. Urban farms have an advantage on regular growers to have a direct relation with their clients, they should take profit on it. By working with them, urban farms can know customers’ needs and expectation and come up with an innovative idea which have higher chance to work than ideas without customers’ opinion.

The last recommendation but not the least, urban farmers should choose carefully an innovation strategy which match with its business model to be assure of results he will obtain from it. Each urban farmers have his own objectives and choose a business model depending on it. Any business model can be recommended here, however it is strongly suggested to adopt an innovation strategy adapted to chosen business model as the four level of classification showed it.
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Annexes

**Annex 1**: Questionnaire sent to urban farms initiatives around the world through the website ZE-questionnaire…………………………………………………………p33

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The role of innovation in business development of urban farming

Welcome and thank you very much for agreeing to take part in this survey!
We would like to ask you some questions in order to get a better understanding of the role of innovation in business development of urban farming.
This survey should only take you 10 minutes to complete. It will be divided in three parts like follow:
- Part 1: General information
- Part 2: Agricultural production
- Part 3: Innovation
Be assured that all your responses will be kept confidential and only analyse as a group and not individually.
I sincerely thanks you for your precious time!

Part 1: GENERAL INFORMATION
1. Name of your urban farm:
2. Where are you located? (City & country):
3. What is the year of launch of your urban farm?
4. What is the approximate size of your production area? (Specify if it is in open air or greenhouse)
5. What is the type of your company?
   □ For-profit
   □ Not-for-profit
   □ Combine of both
6. What is the type of ownership of your company?
   □ Sole owner
   □ Partnership (multiple owners)
   □ Corporation (Shareholders)
   □ Foundation
   □ Association
   □ Other
7. How many full time employee do you have?
8. How many part time employee do you have?
9. How many volunteer do you have?

PART 2: AGRICULTURAL PRODUCTION

10. What agricultural products does your urban farm produce?
    - Common vegetables
    - Special vegetables
    - Herbs
    - Micro greens (Seedling)
    - Fruits
    - Mushrooms
    - Egg
    - Dairy
    - Fish
    - Poultry
    - Pork
    - Beef
    - Honey
    - Flowers
    - Compost
    - Worms
    - Processing of food (cooking, compote, jams…)
    - Other

11. What is/are your production method(s)?
    - Conventional
    - Organic
    - Permaculture
    - Rooftop
    - High-tech (Substrate based, indoor, vertical farming, aquaponics)
    - Other

12. Here it is a list of business models for urban farms made by Dr Jan-Willem Van der Schans (LEI Wageningen UR), which one would correspond the most to your Urban farm? Please write in comment how did come to this choice of business model.
    - DIFFERENTIATION (A differentiation strategy is based on creating distinctions with conventional supply chains, the ordinary supermarket or HoRe (hotel restaurant cafe) channel)
    - DIVERSIFICATION (A diversification strategy is aimed at providing other goods and services, aside from food production)
    - LOW COST (The low cost strategy in conventional is usually about expanding the business in order to specialize and realize economies of scale.)
RECLAIMING THE COMMONS (Give the opportunity to regain control over their food supply and become aware where their food is coming from.)

EXPERIENCE (This strategy is based on the insight that more value is added by providing memorable experiences than by providing basic goods or services.)

13. Does your company has specific targeted customers? (If your answer is YES, please tell us your target group in comment.)
   - Yes
   - No

14. What distribution channel do you use?
   - Self-pick
   - On farm-shop
   - Web shop
   - Vege bag delivery to home
   - Farmer's market/fairs
   - Supermarkets
   - Indirect distribution; through an agent or distributer
   - Other

15. Who would you define as your competitors?
   - Supermarket
   - Farmer's market
   - Nearby restaurants
   - Other volunteer organisations
   - Other local food initiatives
   - Other

PART 3: INNOVATION

16. How would you define your urban farm in term of innovation?
   - True innovation pioneers
   - Early adopters
   - Followers
   - We don't use innovation

17. Which of these three sentences reflects your company’s innovation process best?
   - Informally, we build our new projects depending on good ideas or market demand
   - In a structured way, our projects aligns from concept
   - Formally, there is a coordination in all innovation activities
   - Other
18. Which one of the following external sources do you work with to find inspiration for innovation?
- Customers
- Competitors
- Strategic partners
- Suppliers
- Academics
- We do not work with external sources
- Other

19. What percentage of your overall revenue did you spend on innovation over the past years?
- 0%
- 1%-5%
- 6%-10%
- 11%-15%
- 16%-20%
- 21%-25%
- 25%-30%

20. What percentage of your company's annual revenue comes from new products and services put on market in the last year?
- 0%
- 1%-5%
- 6%-10%
- 11%-15%
- 16%-20%
- 21%-25%
- 25%-30%

21. Do you think you have successfully implemented your strategy until now?
- Yes, totally
- Yes, slightly
- More or less
- Not really
- Not at all

22. A Which activities does your company conducts?
- Production of agricultural produce
- Agriculture production services (contract work)
- Products sale from own farm (farm shop)
- Products sale from other suppliers
- Product processing
Tourism
Education services (training, courses, workshop...)
Restaurant
Community activities and neighbourhood involvement
Volunteer opportunities
Recycling (water, waste...)
Composting
Environmental services
Social care services
Energy production
Technical innovation
Consultancy services for other initiatives
Providing work experience opportunity for unemployed or other groups of people
Art projects
Other

23. B Did you introduce new ways of performing these activities (introduce innovation on these areas) during the last three years

Production of agricultural produce
Agriculture production services (contract work)
Products sale from own farm (farm shop)
Products sale from other suppliers
Product processing
Tourism
Education services (training, courses, workshop...)
Restaurant
Community activities and neighbourhood involvement
Volunteer opportunities
Recycling (water, waste...)
Composting
Environmental services
Social care services
Energy production
Technical innovation
Consultancy services for other initiatives
Providing work experience opportunity for unemployed or other groups of people
Art projects
Innovation has played no, or just limited role in our company
Other

24. C Where do you see further need for innovation – new technology, new ways of doing, new processes?
Production of agricultural produce
Agriculture production services (contract work)
Products sale from own farm (farm shop)
Products sale from other suppliers
Product processing
Tourism
Education services (training, courses, workshop...)
Restaurant
Community activities and neighbourhood involvement
Volunteer opportunities
Recycling (water, waste...)
Composting
Environmental services
Social care services
Energy production
Technical innovation
Consultancy services for other initiatives
Providing work experience opportunity for unemployed or other groups of people
Art projects
Currently we don't see a need for innovation
Other

25. Which activity causes the main cost stream?
26. Which activity generates most revenue?

- Production of agricultural produce
- Agriculture production services (contract work)
- Products sale from own farm (farm shop)
- Products sale from other suppliers
- Product processing
- Tourism
- Education services (training, courses, workshop...)
- Restaurant
- Community activities and neighbourhood involvement
- Volunteer opportunities
- Recycling (water, waste...)
- Composting
- Environmental services
- Social care services
- Energy production
- Technical innovation
- Consultancy services for other initiatives
- Providing work experience opportunity for unemployed or other groups of people
- Art projects
- Other

27. Do you expect growth of the company in the 5 coming years?

- Yes, much so
- Yes, slightly
- No, remain status quo
- No, slight decline
Annex 2: List of responding urban farms to questionnaire

1. Sky Harvest (Vancouver, Canada)
2. Brooklyn Grange Rooftop Farm (New York, USA)
3. La Ferme urbaine du Début des Haricots (Bruxelles, Belgium)
4. City Farm Schoenbrunn (Vienna, Austria)
5. Konsangfarm Co-Farming Space (Saraburi, Thailand)
6. Dakakker (Rotterdam, The Netherlands)
7. Indonesia Berkebun (Indonesia)
8. Napoli (Italy)
9. The Urban Farm (Phoenix, USA)
10. The Farmery (Raleigh, USA)
11. Frisch Farms (Vancouver, Canada)
12. Crown Garden (Kansas city, USA)
13. Stepney City Farm (London, UK)
15. INFARM (Berlin, Germany)
16. Inner city farms (Vancouver, Canada)
17. Vauxhall City Farm (London, UK)
18. Growing Awareness Urban Farm (Albuquerque, USA)
19. Homeless Garden Project (Santa Cruz, USA)
20. Huerto Orgánico (La Paz, Bolivia)
21. Beacon Food Forest (Seattle, USA)
22. My Farm Shop (Canberra, Australia)
23. Food Field (Detroit, USA)
24. Bee Urban (Stockholm, Sweden)
25. Pocket Greens Urban Farm & Barn (Singapore)
26. RotterZwam (Rotterdam, The Netherlands)
27. Spitalfields City Farm (London, UK)
28. Seattle Urban Farm Company Gardens (Seattle, USA)
29. Centre for Sustainable Food Systems at UBC Farm (Vancouver, Canada)
30. v'île fertile (Paris, France)
31. wagtail urban farm (Adelaide, Australia)
32. Chicago Botanic Garden's Windy City Harvest (Chicago, USA)
33. Windmill Hill City Farm (Bristol, UK)
34. Anonymous urban farm
### Agglomeration Schedule

<table>
<thead>
<tr>
<th>Stage</th>
<th>Cluster Combined</th>
<th>Stage Cluster First Appears</th>
<th>Next Stage</th>
</tr>
</thead>
<tbody>
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<td>Cluster 2</td>
<td>Coefficients</td>
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Annex 4: Obtained dendrogram through hierarchical analysis on SPSS using Ward Linkage