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Wadi Makkah Startups Services Model

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"Innovation support services: inspiring examples (2)"

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Executive Summary
This paper describes the delivery model of Wadi Makkah (WM) start-ups services based on start-ups value chain that is both Lean and Agile. Lean emphasize developing an MVP for early market entry to evaluate start-ups potential as early as possible. It is agile (dynamic) as it is program/process driven not entity/structure driven, and hence entities are activated when needed. This allows managing resources (especially financial) efficiently by deploying when and where they are needed.
In addition to early market entry being key to validating start-ups potential, another important lesson is that higher investment in services for start-ups can only be justified if the product is based on a platform that can lead to several other products (downstream) to ensure market growth and scalability. Another lesson is that developing local talent is key for sustainability, but also attracting non-local talent to leverage non local resources and new markets.

1 Overview

In 2012, the Agency of Business and Innovation in Umm Al-Qura Univeresity, Makkah, took the lead to develop an innovation and entrepreneurship hub, Wadi Makkah (WM) in Makkah aiming to fulfil the third mission of universities in promoting entrepreneurial activities. In 2016, Saudi Arabia announced the establishment of the largest national investment fund worth two trillion dollars as part of Saudi Vision 2030 plan.
WM is the first Innovation and Entrepreneurship Park in Makkah and one of four in Saudi Arabia. One of the primary aims of WM is to develop innovations that can be turned into products for the global market of Hajj and Ummrah (pilgrim and religious visits by Muslims the world over). WM is located at a strategic location within the campus of the University of Umm Al-Qura which is just few kilometres from Arafat, Muzdalefa and Mina, where the Hajj takes place. WM itself faces a main highway leading to the Grand Mosque in Makkah and it is opposite Mount Araft which is located on the other side of the highway. It is for this reason WM is focused on providing a services for start-ups that develop innovative products and services for pilgrims.

Overall, WM has achieved the following within the last six years:

Wadi Makkah in Figures	2010	2016
Invention Disclosures	0	1150
Filed Patents	0	220
Issued Patents	0	30
Start-ups in its initial sectorial focus*	0	15
Commercialized Patents in its initial sectorial focus	0	23
Technical Products in its initial sectorial focus*	0	19
Technical Jobs created in its initial sectorial focus	0	100+

Couple of the start-ups in WM have already benefited from the platform of tools and services to develop technologies that are deployed to serve pilgrims visiting Makkah during Hajj period and for Umrah all year round. One example is the deployment of a smart indoor location and navigation services within the Grand Mosque in Makkah. This paper describes how this was achieved in WM and the lessons learnt.

Knowledge-based Start-ups as the primary mission for WM

Trends of commercialising of technologies in entrepreneurial universities has shifted from licensing to third parties towards start-ups[1]. The most significant advantage of taking the route of start-ups for the commercialisation of innovation and knowledge assets is that it has a higher potential for creating highly skilled jobs for young Saudis. It is well documented that SMEs count for more jobs nationally than large businesses.

Although, this raises the challenge of having to deal with the development of commercially viable products in house rather than relying on a third party licensing partner (which would be a non-Saudi enterprise due to the lack of an industrial base for ICT product development), it was felt that in house development will fulfil national needs of increasing local content in the development of KSA economy in line with the directives of KSA Vision 2030. The start-ups route also impose its own challenges. One such challenge is that it requires a knowledge based entrepreneurial culture. Another is the need to identify technologies that does not require a huge investment for developing MVPs. In other words, passing through the technology readiness levels (TRL 1-11) has to be carried out with low investment. In addition, for these start-ups to succeed given the competition for ICT technology development and market penetration, they have to operate with their own "blue ocean" if at all possible, and hence the need for a lean and agile first to market strategy.

2 Strat-ups Services: Survey and Key Findings Learned for WM

Extensive studies were conducted on various frameworks, models, methodologies for innovation systems, knowledge economy and sustainable developments in order to understand and identify the best practices for WM[2-3]. In addition, WM organised forums on Innovation and Entrepreneurship where each year, a specific topic was chosen as the theme of the forum.

More importantly, WM commissioned Strategy & (formerly Bozz & Co) to develop a strategic plan as well as an operational plan covering many aspects.

Figure 1 presents a comparison of the some of the type of services offered for start-ups in leading universities.

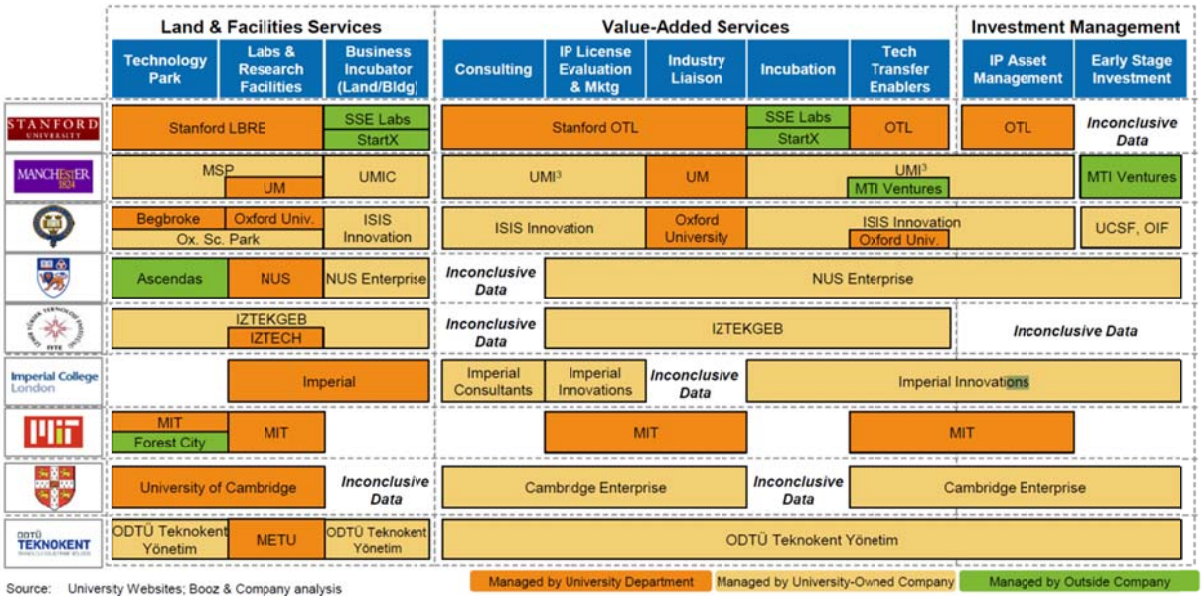

Figure 1: Innovation and Management Entities in Leading Universitites

Some of the most significant lessons learnt that were raised by these studies and which require strategic decisions to be made that has direct impact on the services offered and the investment needed in developing these services as well as their supporting facilities and infrastructure. However, it was felt that in order to priorities funding and resource management, selecting and developing such models requires understanding of start-ups development stages and processes. These issues are at different levels as well cross-level activities as discussed below[4-6] based on a generic framework for system modelling[7]:

- Macro Level: Strategic and Enterprise Level, Enterprise Characteristics and Attributes, Governance, Management, and Objectives (some of these are discussed further in section 3)
- Requirement for inducive and conducive policies, incentives and knowledge-based entrepreneurial culture
- Requirement for ccommitment of top management and SMART KPIs
- Requirement for clearly defined strategies for public and private sectors partnerships and the role of the public sector
- Funding for facilities and research IP ownership policies
- Role of universities and knowledge base in fostering and enabling innovation and entrepreneurship activities and culture
- Level of funding and types of services for supporting students, academics and their start-ups (business development, proof of concept, prototyping MVP, etc.)
- Meso Level: Types of Activities and Their Relationships to meet Objectives and Satisfy Characteristics and Attributes
- Clarity about market areas of focus for innovation and entrepreneurship activities and their fit with the strengths of knowledge base; this is discussed in section 4
- Requirement for strategy and activities to achieve synergy between technology push and market pull
- Clarity about the recipients of services (to whom the services are offered) and their priorities: Students, Faculty members, Entrepreneurs, Start-ups, SMEs
- Requirement for business models to be adopted in developing relationships with the private sector and in supporting services to start-ups
- Requirement for flexible and dynamic environment and support for office space, engineering and development facilities, recreational space, etc.
- Micro Level: Operational-Level:
- Clarity about the type of services being offered. The major types of services that are offered to start-ups are:
    - Facilities and space services (space and technical)
    - IP services
    - Value Added services
    - Logistics and business support services
    - Fund and investment services
    - Incubator/accelerator services
    - Funding for prototyping and product development facilitates
    - Training, mentoring and coaching programs and activities
- Clarity about capabilities: Who provides start services
    - Using in house capability (which needs to be developed)
    - Outsourcing
- Clarity about the methods of offering and delivering start-ups services
    - Programmed or on individual needs basis
    - Free or fee based

- Own premises or external
- Own facilitates or third party facilitates
- Cross-level Issues
- Stakeholders Perspective which is relevant to all levels:
- Who are the different stakeholders, especially those that could enable and provide traction for start-ups
- Requirements for Stakeholders engagements at all levels of operations where possible with a clear overall Interaction model between different the stakeholders
- How to insure synergies between activities of stakeholders (Increased Innovation through Interaction)
- how to manage the relationships and interaction between stakeholders such that alignment with WM objectives of enabling and empowering knowledge-based start-ups and young Saudis is maintained
- how to manage the relationships and interaction between stakeholders such that alignment with WM objectives of enabling and empowering knowledge-based start-ups and young Saudis is maintained
- Requirements for attraction strategies for different stakeholders (including Partners discussed in section 5, and Young Saudis and Entrepreneurs discussed in section 6)
- Cultural and PESTEL issues
- Strat-ups Services Delivery Model: Another important issue raised by the studies that needs cross levels consideration is the type of service delivery model. Clarity about such delivery models are essential to plan funding priorities and resource management in line with priorities of services to allow start-ups to develop, sustain and grow. In general, these can be either structural driven models or process driven models. The advantages of process driven delivery model rather than structural based ones are
- Easier to evaluate, modify and develop
- Clarity of roles between entities as well responsibility of coupling between the entities

This is discussed in section 7.

3 Stakeholders Organisation, Links and Governance

Clearly, WM stakeholders are varied and range from organisations and enterprises to individuals[8-9]. These include

1- government organisations, academia and research & development organisations,
2- private sector including SMEs, large Saudi and international enterprise, and investors
3- Comparable organisations
4- Saudi entrepreneurs and innovators, and young Saudis
5- Knowledge based start-ups

WM carried consultations with many stakeholders to identify needs for Hajj and Umrah, including amongst others:

A- Public Sector: Amarah (Province) of Makkah, Ministry of Interior, Harameen Organisation, Makkah municipality, Ministry of Hajj and Umrah, Ministry of Health, Ministry of Commerce, etc.

B- Private Sector: Holy Visist and Tourism Association, Transport companies, Supply and logistics companies, Food companies

C- Societal and Charity Organisations (important role in Saudi Vision 2030)

Effectively, WM operates as a service provider. WM stakeholders are organised in terms of Porter's value chain in supporting knowledge-based start-ups, covering primary and supporting activities, including:

1- Customers, consumers and beneficiaries of WM services
2- Representatives of markets of start-ups products
3- Partners and collaborators that support delivering WM services for start-ups and entrepreneurs
4- Value and supply chain partners and collaborators
5- Enablers such as Researchers, innovators, technologists and developers
6- Stakeholders of supporting activities in the value chain
7- Relevant government organisations and other public sector stakeholders
8- Other relevant private sector stakeholders

This organisation of stakeholders based on value chain benefit and cost helps to clearly define the relationship between them, and eases the formation and continuity of corresponding links. It has identified that any delivery model need to engage stakeholders at all levels.

As the current practices for service providers, WM adopted an inclusive approach in its governance by ensuring that as many stakeholder are involved in its decision making process and in improving its delivery of services.

4 Market Areas of Focus and Fit with Strength of Knowledge-base

WM selected Hajj and Umrah services as its initial sectorial focus. Bozz&Co recommended that WM becomes the catalyst for developing technologies for Hajj Umrah to leverage proximity. Focusing on Hajj and Umrah would:

- be unique to Makkah region and do not duplicate efforts in other regions
- align with the directives of Vision 2030 priorities
- be a phenomena with a significant global impact
- be nationally strategic for the standing of KSA in the Muslim world
- be a tremendous economic value for the western region
- have high impact on regional challenges

Hajj raises many challenges in serving a large number of pilgrims in such a relatively confined space and short period of time. Umrah on the other hand gives rise to its own challenges especially that KSA is planning to increase religious visits to up to 15 million by 2020.

These consultations identified that Hajj and Umrah services can be considered at different levels with different aspects:

1- Governmental and public sector
a. Security and command and control, and Civil defence
b. Infrastructure, spatial monitoring, transport and crowd management
c. Health and hygiene monitoring, management and control
d. Environmental monitoring and management
e. Public information systems
2- Private sector covering many aspects
a. Hotels and Accommodation
b. Welfare
c. Supply chain and logistics
d. Food and water
3- Community level needs for different nationalities
4- Groups level needs within each community
5- Needs for families
6- Needs for individuals especially the elderly

Clearly, Hajj and Umrah services cover a wide range of areas and hence scientific disciplines. This mean that start-ups that serve the Hajj and Umrah market could well find opportunities for their products and solutions in other non-Hajj and Umrah applications. For example smart technologies for Hajj and Umrah Applications can be adopted for smart biuldings facilitates and amenities. Hence, although the primary focus is Hajj and Umrah services, start-ups would be in a good position to diversify to other markets.

The team however recognized that embarking on innovation on a wide range of disciplines would be difficult to support in transforming intellectual economical assets into a viable products that are suitable for market penetration.

Bozz&CO recommended that WM leverages the strengths of college of computing as the entity which provides the knowledge base as it had the highest number of funded projects from the

National Science, Technology and Innovation plan. They noted that the research capability and technologies being developed in the college of computing can provide smart platforms that can support many Hajj and Umrah services that could lead to commercial opportunities in the application of ICT for smart Hajj and Umrah services; the beneficiaries for these smart services ranges from governmental organisations, private sector as well as individual pilgrims.

Given the heritage in KSA and Makkah in dealing with Hajj and Umrah over decades, one might consider hajj and Umrah as a red ocean. However after extensive consultations, the main conclusion is that Hajj and Umrah can be considered a blue ocean for smart technologies and intelligent systems.

It was also noted that focusing on innovation and generating knowledge assets in the specific sectors of application of smart ICT in Hajj and Umrah is still too general. In order to sustain the development it is important to focus on developing a base technology that:

- can support a broad range of applications for Hajj and Umrah needs and services
- has plenty of opportunities for developing propriety technologies

WM carried out extensive consultations which identified several key opportunities that exists to serve the millions of pilgrims and which satisfies such requirements:

- Smart transport (management and monitoring)
- Smart places (holy places)
- Smart supply chain and logistics
- Apps (informational) for communities, groups, families with children, and individuals especially the elderly

WM identified several technology areas that can be provide platforms for developing products that can meet the requirements of such opportunities:

- Geo-informatics and location-based services
- IoT, sensor networks, and smart systems
- platforms for mobile apps for Hajj and Umrah services

To consolidate research, innovation and development efforts, WM established innovation incubator with a specialist technical team to develop such technologies. WM was successful in obtaining funding from Saudi research funding agency (KACST) for a Technology Innovation Centre (TIC) in Geo-informatics based on the work and team of the innovation incubator. The TIC in Geo-informatics is one four national TICs that are funded in the Kingdom addressing different topics. The objective of the TIC in Geo-informatics is to

- develop smart platform technologies
- develop MVPs
- fund start-ups that use the developed MVP in Hajj and to the success of the TIC in Geo-informatics in developing different MVPs, WM also decided to establish its own facility for the development of such MVPs in house.

5 Partner Attraction and Interaction Model

Bozz & Co recommended a value proposition framework for attracting partners (Figure 2) and a corresponding interaction model for each type of stakeholders (Figures 3.a-e)). This include public and private sectors. In addition to entrepreneurial and start-ups services, the framework covers value proposition in terms of: technology and expertise provider, access to and expertise of Hajj and Umrah market, commercialisation of innovation and knowledge assets, implementation of national plans such as Vision 2030 and Transformation 2020 especially on developing "local content", advanced technologies deployment for Makkah regional development, etc.

WM also developed an inductive and conducive environment that made it the place of choice for networking, cooperation, collaboration and partnership between varied stakeholders to generate and exploit WM knowledge assets.

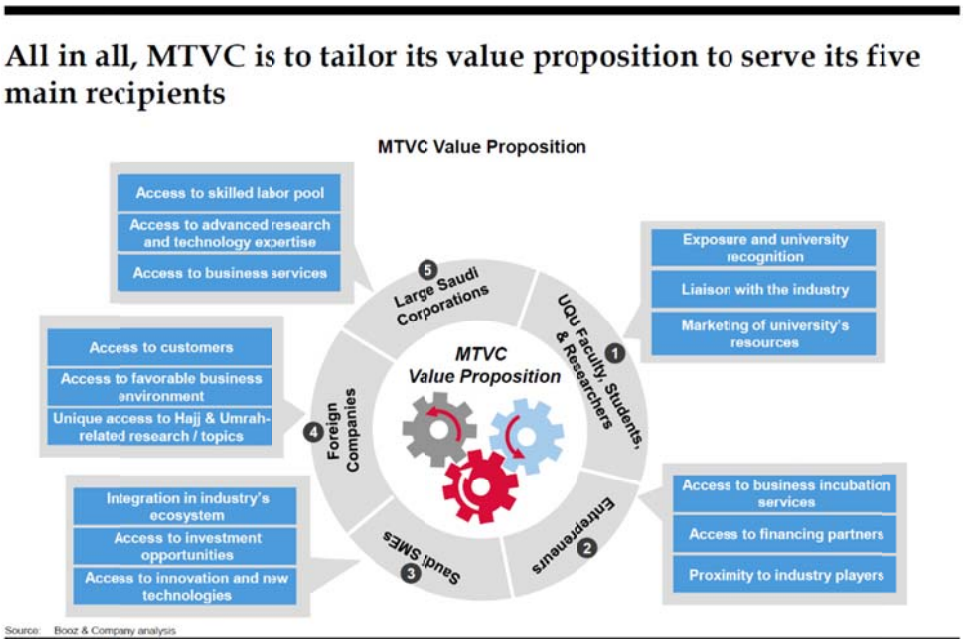

Figure 2: WM Value Proposition Framework for different stakeholders

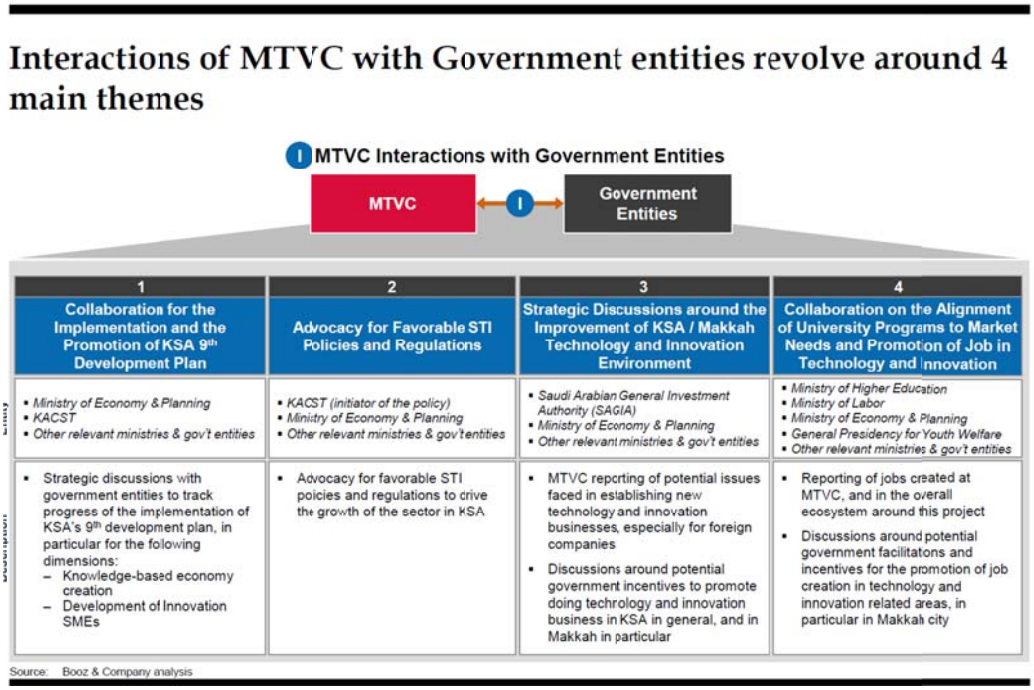

Figure 3.a: Government entities interaction model

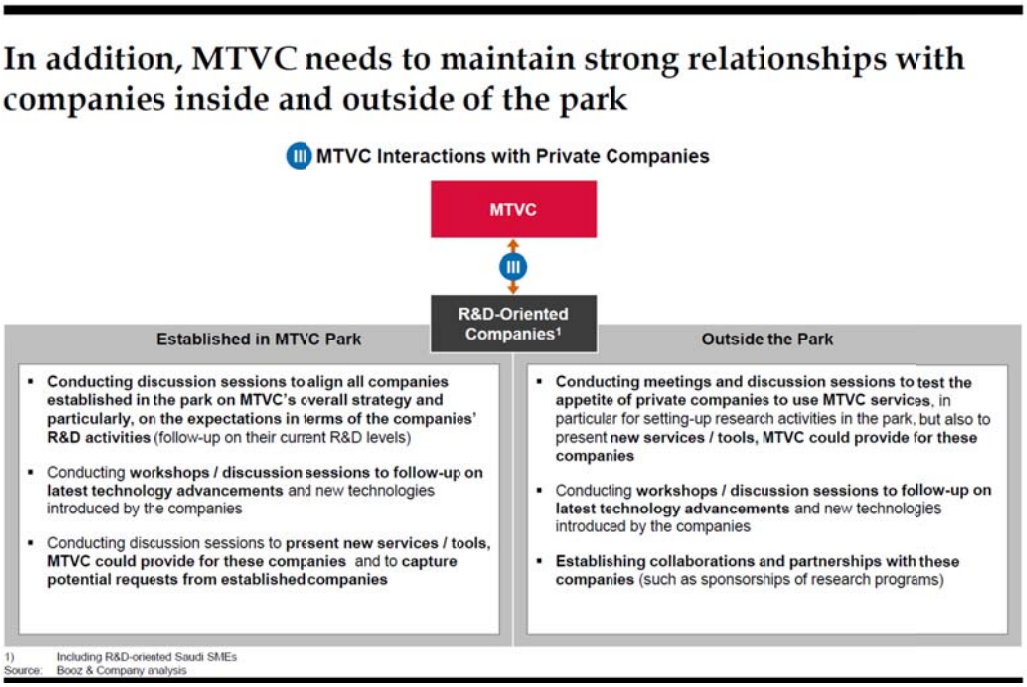

Figure 3.b: R&D-oriented companies interaction model

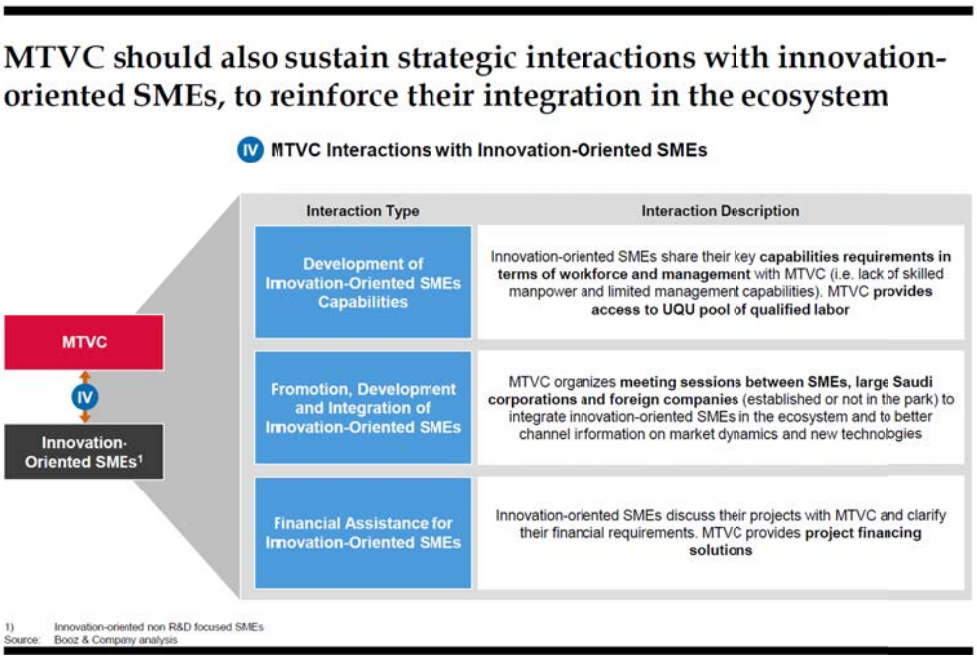

Figure 3.c: Innovation-oreiented SMEs interaction model

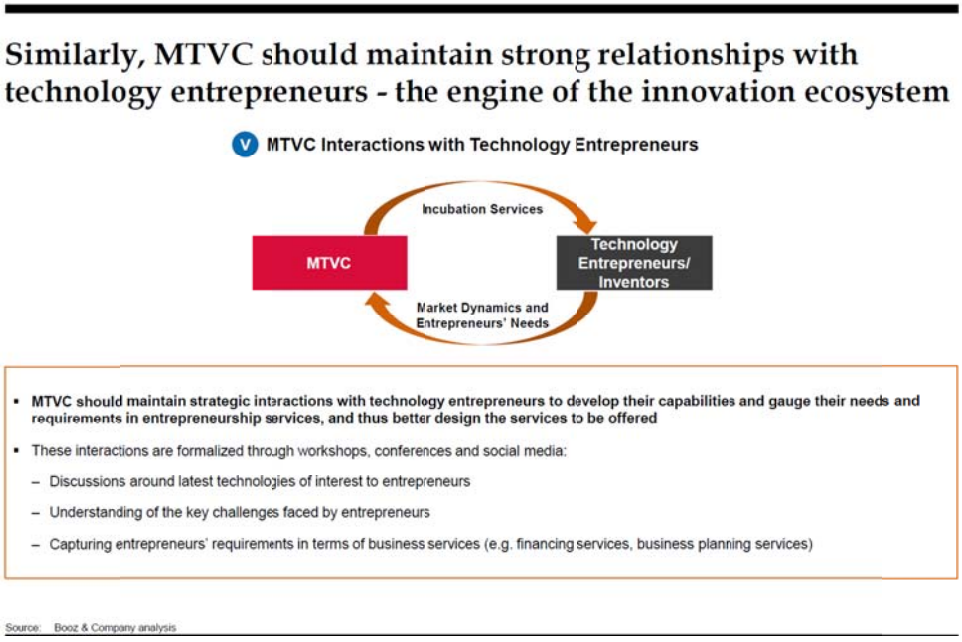

Figure 3.d: Technology entreprenures/innventors interaction model

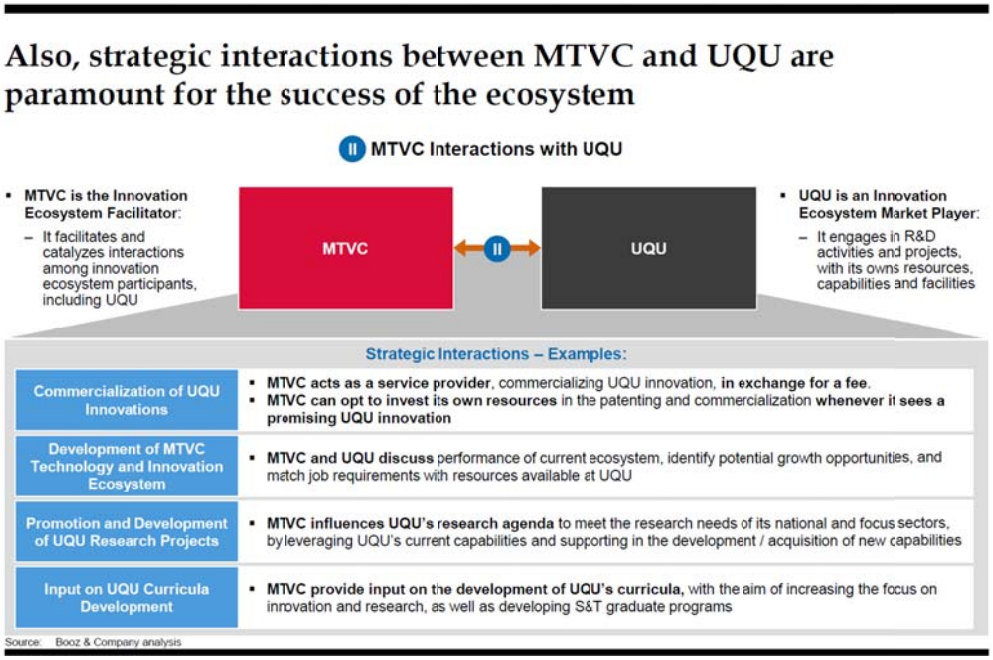

Figure 3.e: University Umm Al-Qura interaction model

6 Strategy for Exciting and Attracting Young Saudis

Regular awareness events and workshops are organised to introduce young Saudis to WM facilitates and services as well the role of Innovation and Entrepreneurship to fulfil their true potential. During these events young Saudis also meet successful Saudi and international entrepreneurs and innovators.

Different networking events are also organised between different stakeholders (public sector, private sector and investors) for different objectives including: finding partners and collaborators and opportunities, speed dating, demo days, launching events, open days as intro to customers, etc.
WM also provides several pre-start-ups programs for young Saudis which includes internships in ICT technologies (software and hardware), mobile HCI design, and entrepreneurship. In the later, young Saudis are placed in start-ups in WM to learn the skills needed and challenges encountered. These programs are open to all Saudis nationwide.
WM also organise different competitions with mentoring, coaching and "boot camp" activities for "ideas to MVPs" and "MVPs to market", to match strengths with opportunities, etc. which is open to young Saudis nationwide.
In addition, induction programs and mentoring and coaching services are organised for faculty and students to align graduation projects with requirements and opportunities in WM.
The aim of all these events and programs is to identify and empower high flyers and highly motivated individuals who want to engage in WM and be part of a start-ups success stories.

7 Start Ups Services Delivery Model: Some of the best practices

Several process based delivery models for start-ups services have been proposed and used in practice. These can be classified into several types:

- Entrepreneurial value chain, networks, streams, activities and QMS (variants of Porter's value chain described below and McKinsey's Model[10])
- Entrepreneurial value creation theory[11]
  - venture formulation (Stage 1)
  - venture monetization (Stage 2)
- Lean and agile delivery models
- Products Value Chain:
  - Modular Platforms rather than integrative
  - Vertical or horizontal Product Value

Three of these models are briefly described below:

1- Innovation, Entrepreneurship and Strat-ups Value Chains, Streams, Networks, etc. These all have links to the well-known Porter's value chain which is described in Figure 4.

Primary Activities				
Inbound Logistics: Quality Control, raw material, supplies orders, resources	Operation: manufacturing, production, packaging	Outbound Logistics: Finishing goods, order handling, dispatch, delivery, invoicing	Marketing and Sales: market research, promotion, customer management, order taking, etc.	Servicing: maintenance, upgrades, warranty, etc.
Support Activities				
Administrative	Legal, Accounting, Management, Secretarial			
Human Resource Management	Personnel, training, staff planning			
Product and Technology Development	Product and Process design, production, engineering, R&D, market testing			
Procurement	Supplier management, subcontracting, specification			
Finance and Funding	Financial management, Secure Funding and Investment			

Figure 4: Porter's value chain

2- Lean start-ups (proposed first by Eric Ries) carry out the following at a very early stage:

- Stop or minimize any non-value adding activities in the hub including activities by start-ups or entrepreneurial ventures
- Make all value adding activities more efficient and effective
- Use KPI to periodically asses activities and use red-yellow-green labelling to classify their status: green means continue, yellow means assess at shorter intervals, red means stop
- Use the KPI to understand reasons for the status of each activity and act upon any lessons learnt from it

3- Agile start-ups (devised first for software development) in that
- Services are offered in a modular format that can be configured according to needs of start-ups
- Provide services integration framework based on start-ups value chain
- Out-sourcing of activities to collaborator and partner companies especially run by young Saudis is seen as a strategic choice as this will:
  - Offer services on demand
  - strengthen the competencies of the eco-system as a whole
  - help develop these collaborating and cooperating companies commercially and economically

8 WM Start Ups Services Delivery Model

A start-up is like any other business. The basis of any successful business model is about making a sustainable return on investment in meeting market need/demand with a product that customer are willing to pay for. This triad of Product, Market, and Investment has been addressed extensively over the last decades with regard to innovation and entrepreneurship and from different perspectives: Technology Transfer, Business Development, Start-ups, Financials and Investment. However, it has not been used explicitly to develop and drive a start-ups services delivery model for start-ups value growth as shown in Figure 5[12].

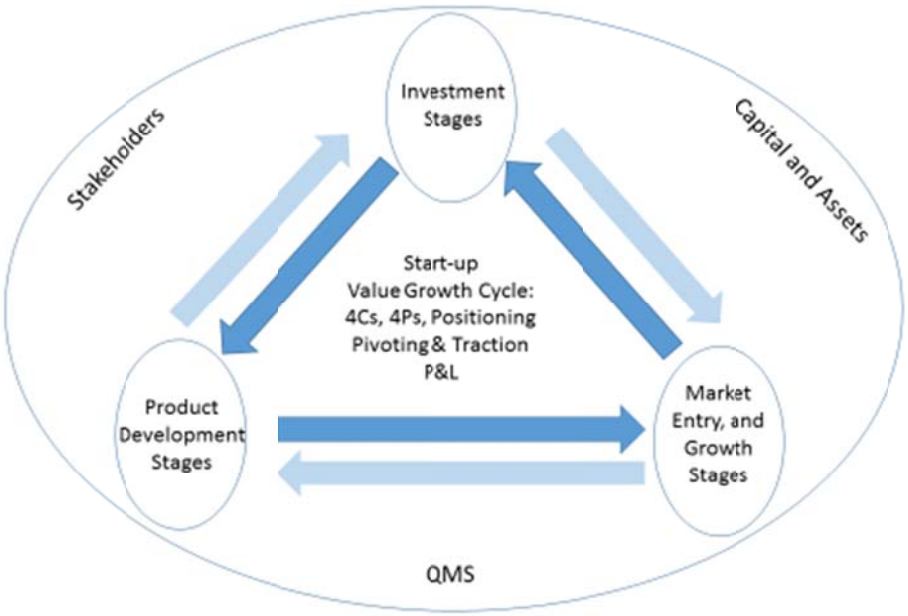

Figure 5: Types of Activities of Start-ups Value Growth Cycle and Their Relationships (Meso-level Perspective)

The link between product and market is well known in the four types of market strategies shown in the table below.

Table 1: Market Strategies

	Existing Product	**New Product**
Existing Market	Market Penetration (Share Growth) More competitive (lean) Improving Customer Service and after Sales Service Increasing value for the customer	Market Entry Developing Products with Added Value Increasing Product Range
New Market	Market Growth Development New customer segments New geographical markets	Market Scale/Diversification Diversification into related and/or different businesses Integration (Upstream and/or downstream)

This is re-represented in the table below to include investment to illustrate the different stages in the start-ups growth cycle in Figure 5[12].

Table 2: Alignment of Activities for Start-ups Value Growth, Product, Market and Investment Stages (Mapping Meso-level Activities to Micro-level Perspective)

Start-Ups Value	Value Manifesta-tion	Value Creation and Validation	Value Capture A	Value Capture B	Value Capture C
Product	Prototyping and MVP Development	MVP with Competitive Advantage	Development of Variants of Product	Development of Portfolio of Products	Mature process of developing portfolios of products
Market	Market Testing	Entry	Penetration	Growth	Scale
Investment	Public Self & 3Fs	Seed/Angle	VC Series A	VC Series B	VC Series C

It is well know that the most fundamental challenge that faces a start-up is achieving market entry with knowledge based products. Breaking through the doubt barrier into the trust zone.

Typically, a market entry strategy has to be very clear about the value proposition:

- 4Cs: Customer, Company (SWOT), Competition, Community (PESTEL)
- 4Ps: Product, Price, Place, Promotion
- Positioning: Selling this Product, To This Customer, At this Price, To Solve this Problem
- Profit and Loss

WM developed several mechanisms to exploit the synergy between product development stages, market growth stages and investment stages to achieve market entry and drive start-ups value growth. This is achieved by offering several services that can be configured in several ways to meet the needs of participants, users and stakeholders of WM based on the start-ups value growth cycle in Figure 5. This flexibility allows WM to operate in different modalities depending on the needs of beneficiaries from WM services.

One configuration for the structure of WM start-ups services based on the start-ups value growth cycle is shown in Figure 6. The configuration for the structure of WM start-ups services in Figure 4 has a flat structure in that entities are resources that are deployed by any stage based on needs of a start-up. The stages are managed by a director and a committee with overlap membership between the

committees of the different stages. The three stages has an investment committee oversight that reports to an Executive board. In here, public funds are also seen as an investment in talent and technology as well as economical investment.

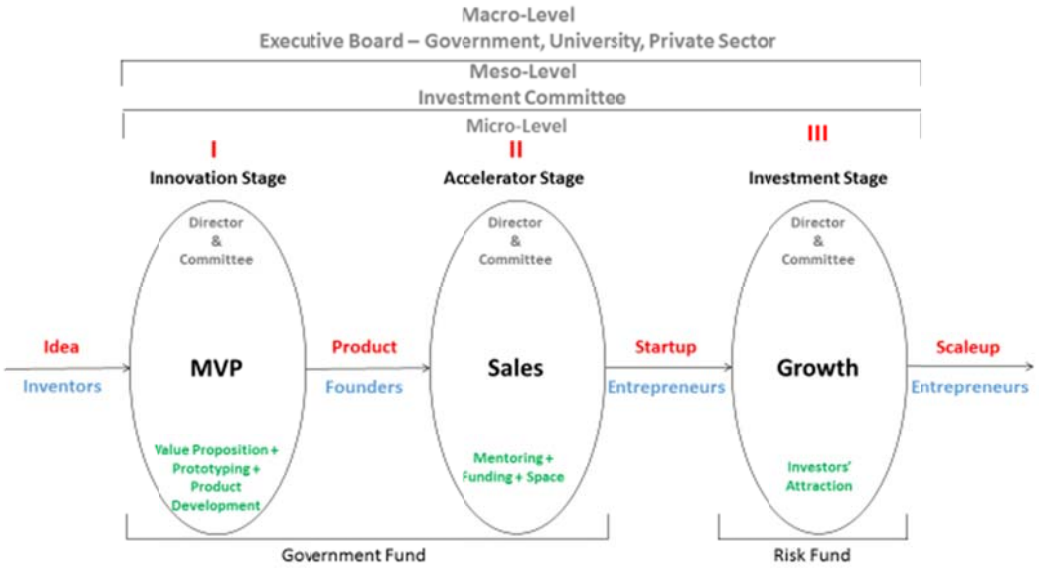

Figure 6: One configuration of the start-ups value growth cycle

Although this configuration appears to be linear, it is actually cyclic in that "investment consideration" has oversight over product development and market growth and it provides feedback for both.
In addition, the start-ups service delivery model in Figure 6 has three levels for operation processes and stakeholder engagements:

1- Macro-level: Provides oversight, policies, QMS etc. It has executive members representing public and private stakeholders to ensure engagement and allows leveraging support at this strategic level. There is an executive board with membership representing different stakeholders including government (national and municipality), academia, and private sector (industrial and investors).

2- Meso-Level: This level is managed by an investment committee that acts as the gatekeeper for identifying teams, MVPs and start-ups with the highest potential. The investment committee manages this level to ensure investments in the three stages at the micro level are synergised, integrated and focused on the priorities specified at the macro (strategic) level. The investment committee has members from different stakeholders. It has members at the rank of senior managers representing public and private stakeholders to ensure engagement at this integration level. Emphasis on investment at this level is necessary so that all involved must show a return on investment in one form or another.

3- Micro level: Representing operations and processes for the three stages of start-ups development and growth covering product, market and investment perspectives:

a. Innovation: From idea, value proposition to minimum value product(s)
b. Entrepreneurship: Market entry and market penetration of product(s) of start-ups
c. Growth and Scale-up of start-ups

In order to drive effectiveness and efficiency in line with best practices for service providers, WM used clearly defined, agreed upon and well communicated KPI to measure performance on regular basis to identify weaknesses and introduce improvements.
The structure for WM start-ups services is:

- lean because it is based on engaging VC perspective as early as possible to see if the entrepreneurial value created by a start-up has a VC value proposition that is matched by the value proposition of the corresponding entrepreneur
- agile because the supporting hub can provide services in different modalities to meet the different demands and requirements needed by different start-ups and/or entrepreneurial ventures

One cannot over emphasise the importance of public and private sector partnerships in order to increase local content on the one hand and diversify the national economy on the other. Clearly, knowledge-based start-ups provide value propositions to both public and private sectors. For this reason the start-ups services delivery model involves varied stakeholders in the governance at different levels of its operation to insure stakeholder engagement with a clearly defined mechanisms for insuring effective interaction.

WM has a portfolio of start-ups services which includes: working spaces, infrastructure/facility based services, administration and secretarial services, business services, financing and access to finance, IP and legal services, people connectivity and networking (including technologists and investors), education/access to knowledge, brand building, etc. WM also provides product development facilities (design and engineering), and MVP services with product validation in real environments, as well as access to private and public investment funds. It includes technology development units, design centres, accelerators, incubators, living labs amongst others. WM also provides seed funding to establish start-ups which enables the development of potential ideas into MVP as well as initial market penetration.

Deployment of WM Start-ups Services Delivery Model (2011-2016) and Lessons Learnt

The deployment of WM Start-ups services delivery model between 2011 and 2016 is shown in the following table where different priorities are given in different years depending on the development stages, where priorities are scaled as Low (L), Medium (M), High (H). In here, 'O' implies outsourced activities, while 'I' implies in-house activities.

The table below clearly illustrates that WM had to give higher priorities to early stages of development at the early years with targeted financial and human resources. The reason being a lack of critical mass of knowledge-based entrepreneurs within the knowledge-base and local community at the time as well as the lack of know-how of developing such skills within the knowledge base during those early years. Once this critical mass started to develop, resources were targeted at later stages especially to address the bottleneck stages of developing MVPs and ensuring market entry.

To ensure a steady stream of knowledge-based entrepreneurs, WM worked in partnership with the knowledge base to develop expertise and know-how within the knowledge base to develop the necessary skills so that the development of knowledge-based entrepreneurs is carried out by the knowledge-base as an integral part of main-stream education and curriculum development. Yet this remains a challenge and needs to be addressed in future years.

It should also be added that during 2012 and 2013, MVP development stage was given highest priority in order to target financial resources towards establishing a product production facility for smart sensors and systems. With hindsight, perhaps the use of financial resources would have been more effective if the development of such a facility was carried out in partnership with sister organisation in the region, as establishing such facilities and maintaining it proved to be expensive. However, it should be added that having such a facility in-house greatly helped in developing porotypes and MVPs at a faster cycle than if such activities were outsourced to third parties. It also allowed quicker constructive feedback and insight to product developers on possible enhancements and improvements to their products. In fact the product production facility personnel became part of the product development team. In any case, it remains to be seen if WM will sustain maintaining such a facility.

Finally, activities for market entry were outsourced at the beginning to third parties as the necessary know-how and skills were lacking within WM and its start-ups. At the same time plans were put in place to embed such know-how within WM and to make it part of its start-ups culture and training, mentoring and coaching activities.

Table 3: Deployment of WM Start-ups Services Delivery Model (2011-2016)

WM Start-ups Value Chain Stages	**Market Perspective**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Funding Perspective**
WM Stage I Value Proposition	Business Model	H-I	H-I	M-I&O	M-I&O	L-O	L-O	Research through Public Fund IP protection through public fund for Students and Academics
WM Stage I Value Manifestation	Market Testing & MVP Development	_	H-I	H-I	M-I	M-I	M-I	Engineering and Development Facilities through public fund. Use of facilities through a Seed fund
WM Stage II Value Creation and Validation	Market Entry Pivot/ Traction	_	L-O	M-O	H-I&O	H-I&O	H-I&O	Seed Fund and Angle Investors
WM Stage III Value Capture A	Market Penetration Pivot/ Traction A	_	_	L-O	M-O	H-O	H-O	Series A Venture Capital One Start-up received such fund in 2016 from UAE
WM Stage III Value Capture B	Market Growth Development Pivot/ Traction B	_	_	_	_	L-O	H-O	Series B Venture Capital No Start-up received such fund to date
WM Stage III Value Capture C	Market Scale/ Diversification Pivot/ Traction C	_	_	_	_	_	L-O	Series C Venture Capital No Start-up received such fund to date

9 Evaluation of Model, Overall Lessons Learned and Conclusion

Interviews of different stakeholders including users of the services endorsed the effectiveness of WM start-ups services delivery model. However, some of the main negative points raised were:

1. The requirements for start-ups to develop MVPs as early as possible was too aggressive and perhaps killed some projects with commercial potential prematurely
2. The agile model would work more effectively if there are partnerships with sister organisations nationally to allow focus and expertise of services

3. There were too much outsourcing at the early years at the expense of building in house capability even though that would have taken longer to mature
4. More dedicated and organised activities for engagements with the knowledge base would have identified more talent and would allow more effective sharing of facilities
5. A more structured multi-disciplinary programs for developing local talents with knowledge-based entrepreneurship skills throughout the academic year would cultivate more successful projects with commercial potential in a sustainable manner; perhaps this remains the biggest challenges to sustainable development of WM

Several have commented that WM is successful primarily through:

1- Focusing on specific market sectors and empowering start-ups to leverage the synergy between the strength of knowledge base (university colleges) in ICT and market sectors that are unique to Makkah with the aim of developing technologies that can lead to commercially viable products
2- Adopting an overall interaction model between different stakeholders that enables start-ups to exploit market opportunities and harness technological capabilities and assets

Furthermore, WM is seen to be successful in empowering young Saudis to fulfil their true potential with the aim of exploiting opportunities that become apparent as a result of commercialization of innovation and knowledge assets by start-ups in WM. The most successful of these programs was the summer internship at WM which include programs that focus on:

1- Developing knowledge based Saudi entrepreneurs
2- Developing the technical and business skills and know-how of young Saudis
3- Knowledge-based entrepreneurial skills in its initial sectorial focus of smart services for Hajj and Umrah

Finally, the recent Makkah Distinguished Achievement Award for Science and Technology given to WM by Prince of Makkah Provence, HR Prince Khalid Al-Faisal, is a testimony that WM and its start-ups is now being recognised nationally to fulfil the requirements of Vision 2030 and make an important contribution to realising National Goals:

- Indigenising and Commercialisation of innovation and knowledge assets that can be monetized into high impact economic value
- Creates knowledge-based jobs
- Support Hajj and Umrah services
- Provide entrepreneurs with the opportunity to form their start-ups in high impact sectors of focus that have a high potential to become successful SMEs
- Diversification of Economy especially in high priority areas and those with high impact on the economy and society
- Developing know-how and skills of young Saud