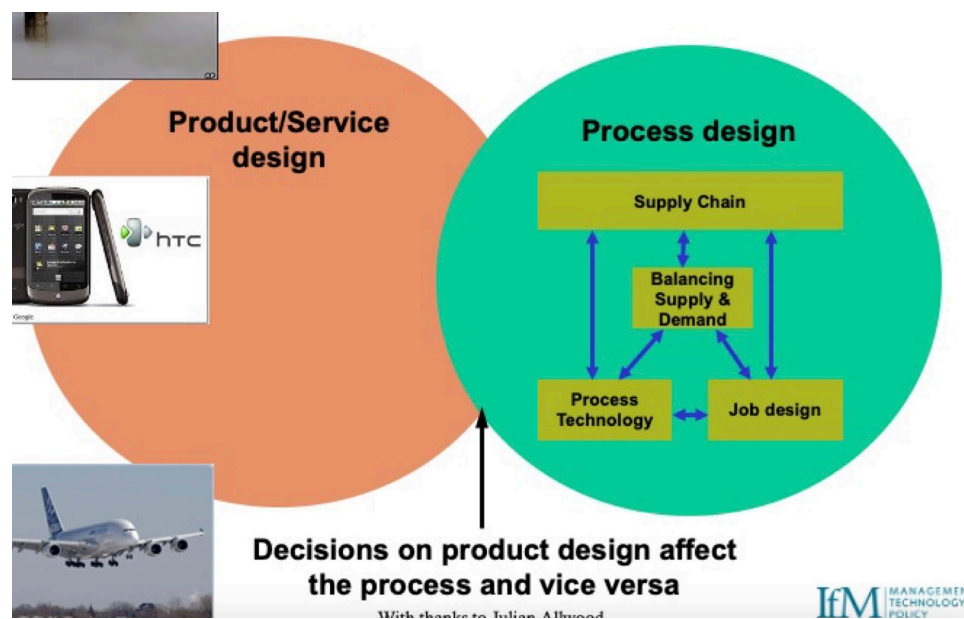


Question 1.

- a. The 4 main operations design issues are: 1) balancing supply and demand; 2) Designing the supply chain and coordinating it; 3) decide what technology to introduce in the manufacturing process; 4) how to balance the technology with the skills and capabilities of the workforce (Job design). These choices are intimately tied to choices in the design of the product itself.



- 1) There are different requirements for products in terms of how much variety and which volumes should be produced. The operations design depends greatly on where the company is on this volume-variety curve. The choices are: One off production, Job shop; Batch production, Mass production. Whilst mature companies require taking these decisions and designing the processes based on the product design only, the decision for young companies often start at the low volume/high variety end, moving progressively towards more mass-manufacturing, if appropriate, as they grow (e.g., Dyson). This is because towards the mass manufacturing end, a company requires a large investment of funding to setup operations which typically young/small firms do not have. Further these investments constrain the company in term of flexibility, and young firms might require innovating the products to perfect them for the market needs.
- 2) The choice of the production technology for both production and distribution of the products. These relate both to production technology (e.g. casting, 3D printing) as well as how to improve communication in the supply chain to make sure that supply-demand curves are smoothened and to what operations should be automatised vs which should be done by humans. Here the balance

needs to keep into account the pros and cons of automating operations (pros: fast production; cons: High setup-costs, inflexibility, complexity and needs to consider how to maintain it efficient) and those related to humans doing the work instead. (People learn and invent improvements, they can be way more flexible than machines and do not require high capital to start but require looking after (good HR policies). The cost of humans running ops applies over time, whilst the automation technology costs become absorbed the longest the tech is used.

- 3) The choice of operations size (how much are we able to produce) depends on the balance between supply-demand. This is very hard to strike as all the stakeholders in the production supply chain have different requirements. At the extremes, customers would like to be able to buy any volume of a product without delay, whilst the owners of the business would like to see all their resources fully and efficiently used all the time without having to pay any of the costs associated with holding stock. This trade off can (partly) be achieved with techniques which counteract the peaks and troughs of market request as well as approaches to keep operations busy at times of low demand.
- 4) Finally, companies need to manage suppliers on one side, to incentivise the timely delivery of the right amount of material and on the other improve the way their operations work efficiently and not wastefully (neither in terms of time nor in terms of material). Decisions on where the flexibility in the supply chain requires high coordination and contractual power with suppliers, as well as capability to decide where the stock should be kept for minimising delays if the market increases demand unexpectedly. Digital technologies help with communicating and sharing information across the supply chain.

b. The main types of innovation refer to the 4 Ps:

- 1) Product or services – this refers to launching new products or services – e.g. a new model of a Tesla is a product innovation. Netflix adding gaming in their offering is a new service innovation.
- 2) Processes (either production or business) – this refers to changing how products or services are made or how they are delivered to customers. Changing wire cutters with laser cutters in a manufacturing plant is an example. Also operations changes fall in this category (e.g. relying on an external distributor for our products, rather than distributing directly to customers)
- 3) Placement (market) – this refers to changing where products or services are sold. Amazon used to be a book seller, moving to using its services to a variety of different markets, outside the bookselling industry.
- 4) Paradigm – this refers to changing what the company does – Google used to be a ‘search engine’. Now it is selling advertisement, mobile OS and services (e.g., cloud storage).

Each of these innovation types could be ‘small’ innovation steps – i.e., incremental, or more ‘radical’ innovation steps.

- c. Design rights (DR) a special type IP protection. these protect the shapes/forms/appearance of an innovation, rather than its function (for this latter, traditional patents are more appropriate methods of protection). For example, DR could be used to protect the shape, colour of an innovation and prevent companies from copying and launching something looking similar, but made of different material. To obtain this type of rights, the appearance should be novel (i.e., not publicly available anywhere prior to registration, although there is a 12-months period for the innovation to be tested in the market for an application could be filed) and to be judged novel by an informed user (not a professional designer). Once given, these rights are registered for up to 25 years. There are anomalies/limitations to DR: unregistered DR, similarly to copyrights, protect the 3D shape of innovations for up to 10 years without applications or registration. In the EU, using the unregistered community design, allows for 3 years of protection. Topographies (maps, arrangements of components which are not functionally dictated), are also protectable by DR. When the topography instead depends or impacts on functionality (e.g. to make components compatible with each other), DR cannot be enforced. Examples of important design rights include the original Apple design for flat electronic devices with round edges that was one of the patents that started the “patent wars” between Apple and Samsung. Design rights do not protect the underlying function, which is what patents protect. In contrast to patents, who are examined extensively before being granted, the examination process of design rights is much less extensive and shorter. Also, the duration of design rights tends to be shorter than for patents. Similar to trademarks, design rights are often used complementary to patents and/or when patents have expired, such as in later lifecycle stages of an industry. For instance, we have seen design rights becoming increasingly important in the automotive industry, where the underlying technologies increasingly are standardized or commoditized, but companies differentiate their cars from competitors by their appearance. Also, design rights are used in industries where patents do not have such importance, e.g. in the furniture or fashion industries.

Question 2

- a. The identification of what users want would allow the company to setup the design specifications for their platform. As first important steps, the company would need to identify the key stakeholders around this idea. Hopefully the students will realise that this type of service requires a dual market to exist, and hence at least the perspectives of two types of ‘users’ would be required: the students and the providers of social work opportunities. Both types of users could be segmented in different ways. For

example, the students seeking social work internships could be 'segmented' in at least 3 groups (during school, during gap year, at university), the providers of social work opportunities could be for instance providing local, national, international opportunities or to be government, non-government or private organisations. One could assume that the platform should particularly appeal to students rather than the providers of the social work or vice versa, and hence concentrate in employing techniques only within that group of users.

Hence different types of techniques to understand what the different types of users might be integrated. For example, starting with some more quantitative techniques (e.g. surveys), would allow to collect few key insights from a large number of people, to narrow down the groups of users Young & Bright ltd would like to target more specifically.

After a review of the surveys, more qualitative techniques which could draw out insight and inspiration (e.g. interviews passive observations, focus groups or ethnographies) could allow the firm to anticipate the key characteristics for the design of the platform. Examples of how explicit qualitative techniques could be used would add value to the answer.

b. There are 6 types of trademark TM (Word, figurative, Figurative with letters, 3D shape, colour per se and sound) and they are used to prevent famous established products being substituted by generic ones.

To obtain a TM, an application should be filed and examined first, then it needs to be published to be exposed to oppositions from competitors. It is only after the opposition period is finished that the registration is carried out and finally the TM is published.

To obtain a TM the mark must be distinctive of the goods and services of the trader without being deceptive or misleading or easily confused with another TM. The TM must not be a description of the goods to which it is applied (e.g. Orange could be used for a telecom company but not for the fruit) and could not resemble symbols such as flags or hallmarks.

It is advisable to research the meaning of TM in different cultures before applying for TM, to avoid any faux pas (although bad publicity is a form of publicity, after all)! Many examples exist of trademarks for technical products. For instance, the Apple iPhone is protected by a family of trademarks. Companies tend to employ trademark strategies where they combine trademarks on different levels, such as the company level (e.g. Apple), the product level (e.g. iPhone), but maybe even component levels (e.g. Bluetooth). In many cases companies use trademarks to protect their brands. Thereby, trademarks represent another instrument for companies to protect their technologies, even though more indirectly (i.e. via the artefacts that embed technologies) and thereby represent complementary instruments that companies can

use in addition to patents. Trademarks tend to be more relevant later in product/technology development processes than patents, particularly when technologies (e.g. embedded in product/service offerings) are launched on the markets. Companies also tend to build their brands while patents are in place so that customers are loyal to the brand when patents expire. In other words, companies IP strategies change from relying on patents to relying on trademarks at later stages in product/technology lifecycles.

c. The choice of technology in the production process is important and has different consequences:

- there are fundamentally 4 different types of process technologies to make artefacts: Casting, Forming, Subtractive and Additive. The product design and specification would indicate the best type of technology to be adopted for manufacturing. However, as products are often made of many components, it is likely that all types of technologies are employed somewhere in the making of a complex product.

- product components are in fact not just manufactured in isolation, but also need to be assembled and distributed. Hence technologies play a great role in the design of the operations to manufacture and distribute products.

- Beyond the technologies used to manufacture each component, considerations relating to technology apply to how and where technologies are integrating or substituting humans. Technologies such as CAD/CAM support humans in the design of products and computer-aided manufacturing technologies integrate with human input to allow the factories to control the operations, manage the production (e.g. scheduling and coordinating with suppliers). Particularly in production, technologies could take over humans in the handling of the products (e.g. manufacturing, assembling parts) indicating that the addition of digital technologies and robots have substituted humans in many ways.

- Hence there is a tension between the adoption of technologies to automate production and the design of jobs. whilst adding production capacity. Increasing automating technology increases the costs of plants and the money required upfront, (robots do not need to rest overnight, their costs can be abated the more the technologies are exploited). However, humans allow more flexibility to manufacturing.

- New digital technologies in manufacturing are combining with additive technologies, potentially revolutionising the way in which the balance between volume and variety could be obtained (pushing the variety volume curve up!)

- Technologies allow also to communicate and coordinate needs across the supply chain and to help the smooth run of operations across sites and companies (e.g. anticipate inventory or maintenance problems)

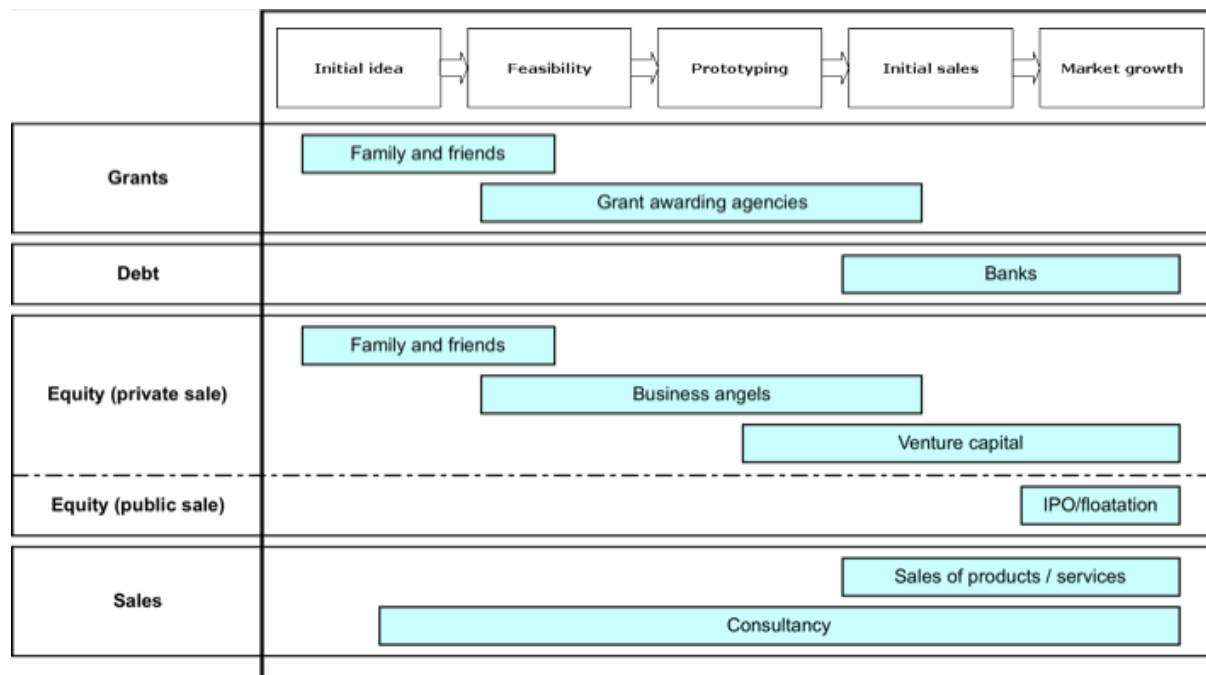
3.

a) The sentence means that inventors can plan strategically on how to share their knowledge with the rest of the world. They can dictate the rules. They can decide how to protect their invention (e.g. which means of protection to use) and how to allow others players how they can use that IP and what to receive in return. Some groups (e.g. social and non-for profit companies working to solve world problems such as diseases) for instance could be let to use the IP for free, whilst other players (e.g. commercial companies in other sectors) might have to pay royalties. The owner might use this power to make sure that that certain companies (e.g. direct competitors) would not be able to use the IP at all (e.g. by retaining the rights in a particular sector).

b)

i. The First thing to consider is how much funds would I need. This would give a sense of the type of funding sources that may be available and also of how I could stagger them (e.g. where would a certain amount from one type of source lead me to, and what I would need next).

Considering the four types of funding -gifts, equity, debt and sales - several combinations are possible, but roughly a staggered map for when it is appropriate to access funds is shown below.



- The debt sources (i.e. banks loans) could be excluded, unless the start-up means to create a very traditional business which banks would feel confident could grow according to known market trends. Even in these circumstances, I would need to persuade banks the startup owns enough ‘collaterals’ that the bank could repossess if the startup will not be able to repay the debt.

- the gift sources (i.e. Family or friends or grants) might not be able to cover all that the startup needs, but they would be a great way to start when the startup is developing the initial idea through to a feasibility test. Family/friends are great sources (if they can spare the money), but the risk is that, if the startup is not successful, personal tensions might emerge with people in the private sphere. Being successful with Grants would be excellent, but the downside is that there are many grants, all quite specific and finding the appropriate one plus fully have the characteristics that fulfil the eligibility of each might be hard.

- Business Angels and Venture Capitals (VCs) are sources of funding that will want to possess part of our startup (take an equity) in exchange for funds. They are a pivotal source of funding capable of substantially contributing from the feasibility through to starting the sales in earnest. On top of funding, these sources provide coaching, connections and strategy formulation help. BA and VCs need to be persuaded that the startup can grow. The startup requires being quite clear about its plans (have a clear business plan where the answer to the following questions should be clearly laid out). Business Angels invest their own money and hence tend to be relatively flexible. VCs need to respond to their own investors, so they particularly want a startup to be very successful in a short time so that they can ‘exit’ and get their returns fast.

The market

- Who has the problem that you attempting to fix?

Product or service

- What solutions are going to be used to address the problem?

Management team

- Who is going to do it? What is their track record?

Business operations

- How are you going to do it?

Financial projections

- How and when will money be made?

Marketing strategy

- How will get people to buy your product / service

Resources required

- What do you need to start your business?

Exit opportunities

- How will your investors get their returns?

- The startup could consider making money from exploiting their own knowledge early (i.e. sales are sources of funds also during the feasibility stage). This is very positive not just in financial terms, but as it also gives confidence that the startup's knowledge is needed in the market (and so it is a great contribution to persuading VCs and investors). There are several ways to sell what the startup knows: e.g. in case of a technology startup, it is possible to sell knowledge as consultancy services or training to others from the very early stages of the technology development. Selling products requires great investments in the manufacturing infrastructure first, so it might come quite late as a source of funds.

If the startup becomes very successful, the company might consider selling equity in the market (i.e with an IPO).

bii.

With crowdfunding, funds can be gathered from a crowd of individual independent investors. Thanks to the diffusion of the internet, crowdfunding has become increasingly popular. Crowdfunding emulates the mechanisms of the sources listed in b)i. The most common use of crowdfunding is to gather funds as gifts (i.e. there is no commitment to return the investment) through sites such as kickstarter. In this case, startups often use the opportunity to reach early a market of lead users, interested to test and support the development of new ideas. Increasingly the other types of funding (Debt and Equity) are becoming popular. The peer-to-peer lending via crowdfunding is a system which has substituted banks for startups which have less strong credential in traditional terms (e.g., small businesses in less developed countries). Equity via crowdfunding is only a recent opportunity, since the US's law has allowed this form of fund gathering. However, this is a source of funding that comes from non-financial institutions, and non-experienced investors. it is an additional source of investment

only at the early stages of development – and it comes with its own challenges (managing campaigns, not always regulated, etc).

c) Radical innovation means that the innovation is really new both in terms of what the company knows (new to the company) and sometimes even to the world knows (new to the market). So, the experienced consultant knows that radical innovation is very risky and could fail. Most large companies will have large number of ongoing innovation projects and managers balance the investments in projects considering the cost and risk of each innovation with the potential reward. Hence they are likely to support a few radical projects at any one time.