

FUNDING FRUGAL INNOVATIONS

LESSONS ON DESIGN AND IMPLEMENTATION OF PUBLIC FUNDING SCHEMES FOR FRUGAL INNOVATIONS

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Abstract

This article discusses on the role of frugal innovations in fostering inclusive and sustainable growth. Frugal innovations can be defined as cost-efficient innovations with a social aim, targeting developing or emerging economies. As they can link the aspirations related to business-driven, social and inclusive innovations, they have captured the attention of businesses and policy makers. This article studies the public and charitable funding schemes for frugal innovations, and draws lessons on their design and implementation. It is based on three case studies of funding schemes, which focus on India. There are three types of funding schemes: supporting frugal businesses, supporting grassroots innovations and addressing global development challenges. All these schemes need to address the peculiarities of frugal innovation processes to be successful.

Introduction

After a cataract surgery and 1 month of recovery, a patient looks around amused – he can see his family and surroundings clearly for the first time in years. The patient is 1 of the 32 million treated since 2012 by the Aravind Eye Care hospitals, the world's largest and most productive eye-care service group. The hospitals provide world-class eye care at radical low cost by applying the philosophies of mass production and lean manufacturing. In addition to a low cost, the business model allows offering free surgeries for poor patients. About 70% of eye surgeries are performed for free or below cost, whereas 30% are performed for above cost without compromising quality of care on either side of the price range. The highly efficient operations coupled with this pricing structure allow the hospitals to maintain a 50% profit margin. Profits are then reinvested into growth and expansion of the hospitals, as well as funding ventures like the Aravind Research Foundation (North Eastern University 2011).

Aravind Eye Care hospitals' story is a striking example of a frugal innovation. Frugal innovations can be defined as cost-

efficient innovations with a social aim, originating from or targeting developing or emerging economies (Bhatti 2012). Frugal innovations are distinctive in both their means and their ends (Bound and Thornton 2012). They are distinctive in their means because they respond to limitations in resources, whether financial, material or institutional, and turn these constraints into an advantage. The ends are also distinctive (Bound and Thornton 2012). Successful frugal services, products and processes are not only lower in cost but also surpass or maintain performance dimensions, can be made available at large scale, are compatible with the unique circumstances of the poorest population groups and create considerable social impacts (Bound and Thornton 2012, Nakata and Weidner 2011, Van Beers, *et al.* 2014). Looking back to the example of Aravind Eye Care hospitals, it can be seen that frugality is not limited to product design but spans to new innovative business models and service delivery approaches.

Frugal innovations and business models do not only embrace the distinctive indigenous innovation potential of emerging economies but also entail a promise of a more inclusive and resource conscious

growth globally. Therefore, frugal innovations have captured the attention of policy makers, which in emerging markets face the ever increasing pressure of more inclusive growth and in developed markets economic and environmental constraints. In addition, the international charitable organisations have recently emphasised the role of innovation in poverty eradication (Ramalingam and Bound 2016). For example, this is exemplified by the United Nation's sustainable development goals which mention innovation 17 times.

The promises of simultaneous economic, social and environmental benefits have inspired a growing number of public financing schemes for frugal innovations by national governments and international charitable organisations (Pralhad 2012). This article looks at these schemes with the aim of shedding light on the current practices in providing support for frugal innovations. More precisely, the article studies the objectives and target groups, and draws lessons on the design and implementation of the schemes.

The article will illustrate the current practices by taking three current governmental and charitable funding schemes in the field of health, relevant to SMEs and with a focus on India as case study examples: (1) Tech-Emerge Programme by World Bank; (2) SPARSH Programme by BIRAC; and (3) Affordable Healthcare in India Programme by Wellcome Trust and the Department of Biotechnology, Government of India. The article takes a special focus on India because it has a strong tradition in innovating frugally (Prabhu, *et al.* 2012) and on health sector because it can be considered as one of the most fruitful sector for frugal innovations (Bhatti 2016). The case study is based on desk research and interviews with the programme owners.

Frugal Innovations – a link among business-driven, social and inclusive innovation?

The OECD (2005) defines innovation as 'the implementation of a new or signifi-

cantly improved product (good or service) or process, a new marketing method or a new organisational method in business practices, workplace organisation or external relations'.

Innovations are seen not only as a key driver for economic growth and competitiveness (Schumpeter 1934) but also as a tool for poverty alleviation through inclusive growth (Schumacher 1973). To better understand different types of innovations, this article classifies them as: (1) business-driven innovation for boosting competitiveness; (2) social innovation covering societal challenges and needs; and (3) inclusive innovation targeting the (Indian) social challenges and poverty alleviation.

Typically, business-driven innovations are oriented towards new processes and products, which are expected to increase productivity and create profit. They are often based on incremental product development and resource intensive R&D process, to create new demand rather than to satisfy existing needs of the customers (Basu, *et al.* 2013).

If profit generation is the main motive for business-driven innovations, social innovations are critically driven by a social mission. The social innovations are social in both their ends and their means (Howald, *et al.* 2015); a financial return is often equally balanced or outpaced with the desire to achieve social impact and the value created accrues primarily to society as a whole rather than private individuals (Phills, *et al.* 2008).

Inclusive innovation is correspondingly directed towards, and arising from, vulner-

able groups in the society. Although social innovation responds to social demands of vulnerable groups, tackles common social challenges and targets systemic change, inclusive innovation 'creates or enhances opportunities to improve the well-being of those at the bottom of the pyramid' (George, *et al.* 2012; OECD 2015). Furthermore, in the heart of the idea of inclusive innovation is that it enfranchises individuals and communities in the process of innovation (George, *et al.* 2012).

Although in its narrow meaning, frugal innovation could be defined as the stripping of attributes of technologically sophisticated products, systems and services to make them cheaper without losing technical functionalities, and therewith make them affordable for low-income customers, many scholars (Bhatti 2012) have stressed that frugality goes beyond costs reduction. Indeed, this article argues that frugal innovations can bridge the aspirations and characteristics associated with business-driven, social and inclusive innovation. A fruitful ground for frugal innovations can be found in their intersections (Figure 1):

Frugal innovations in the intersection of business-driven and social innovation:

Frugal innovations in the intersection of business-driven and social innovation aim to address the problems of the poor and simultaneously create profit for a business by developing new (frugal) products to low-income markets in developed and developing economies. With the new products and services to low-income

markets, the innovators aim to achieve the cost leadership as a competitive advantage by generating high profits through low cost and high scalability (Nakata and Weidner 2012). As the new products and services improve the well-being of the poor, they are simultaneously socially relevant (Prahalad 2012). Following this, the social business-driven frugal innovations are ideational to achieve social improvement with aspiration for high scalability (Bhatti 2014).

Frugal innovations in the intersection of business-driven and inclusive innovation:

Frugal innovations in the intersection of business-driven and inclusive innovations put forth the needs of the citizens at the bottom of the pyramid to develop appropriate, adaptable, affordable and accessible services and products to respond their needs. To do this, conventional views to empower the poorest population groups are inverted. According to Prahalad (2012), this gives rise to new kinds of partnerships, which allow poor people to partner with entrepreneurs for win-win situations and to actively be engaged in the innovation processes (Prahalad 2012). Indeed, frugal innovations that respond to a specific challenge of the poor are ideational on proving inclusive outreach by exhibiting proof of concept for a challenging concern (Bhatti 2014).

Frugal innovations in the intersection of inclusive and social innovation:

The intersection of inclusive and social innovations occurs non-profit or local activities by the civil society to address the needs of the low-income groups. These innovations solve the personal needs of users with little or no aspiration to profit or scale from the innovation (Bhatti 2014). However, they can create local employment benefits because of enabling entrepreneurship. These kinds of frugal innovations route to social movements, institutional entrepreneurship, non-profit activities and new collaboration arrangements between actors and have been largely addressed by organisations from international development actors to local NGOs (Mair and Marti 2009).

In addition to bridge the more traditional types of innovations, frugal innovations

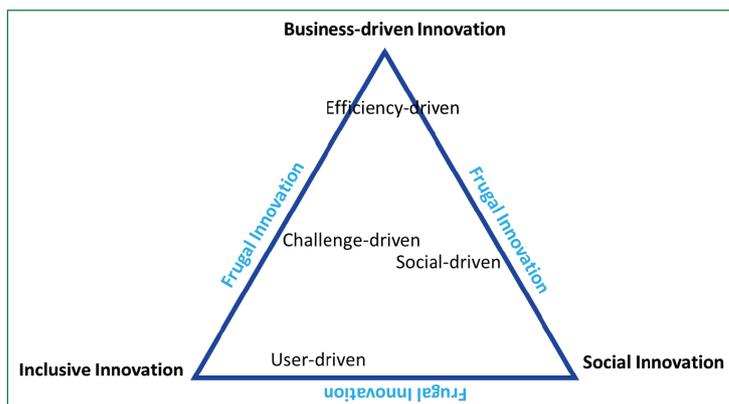


Figure 1: Relation of frugal innovation to business-driven, inclusive and social innovation as well as the motivations to innovate frugally (Bhatti 2012)

entail technology transfer to unconventional directions. First, technology transfer occurs from developed economies to emerging markets, when businesses access new markets with adapting their existing technologies and knowledge. Second, technology transfer occurs from emerging to developed markets because globally relevant innovations initially developed for or at the emerging economies flow upstream to developed countries. Third, technology transfer occurs between emerging economies, when businesses expand to countries facing the same conditions or problems.

Innovating frugally – frugal innovation actors and processes

As the previous chapter shows, frugal innovations bridge essentially different types of innovations and entail technology transfer to unconventional directions. This chapter shows that the bridging character and different motivations behind frugal innovations lead essentially to different kinds of frugal innovation processes by the main frugal innovators: businesses (multinational and small and medium-sized enterprises), civil society, universities and public R&D institutions.

Businesses

There are examples of Western and Indian origin multinational enterprises (MNEs), which have successfully adopted frugal innovation as a strategy, such as General Electric, Siemens, Tata and Godrej (Chataway, *et al.* 2013). Adoption of frugal innovation as a strategy confronts these large multinational enterprises with regard to their traditional innovation processes and business models. Their innovation processes have taken place in centralised corporate R&D laboratories, often located in vicinity of the headquarters, and their business model has based on serving consumers in high-income countries and creating profits through economies of scale (Radjou and Prabhu 2015). Overall, successful adoption of frugal innovation strategy entails the following:

- **Satisfying needs of customers:** Many MNEs have a 'glocalisation' strategy to tailor their existing products to local

needs, implying a compromise between global scale and local responsiveness to achieve new markets in the emerging countries (Zeschky, *et al.* 2011). This is not often enough to create successful frugal products and processes because they need to be as appropriate as possible to customer needs. Instead, adoption of frugal strategy may require developing a new product, complete re-engineering of an existing product or a more iterative R&D process involving users (Radjou and Prabhu 2015).

- **Localised process of innovation:** Organisationally placing customer needs in fore means that the centralised and product-focussed (innovation) structure has to change to a more decentralised and local market-focused structure (Bhatti 2014). This means proximity to the local markets throughout the entire value chain from conceptualisation of the product to designing, commercialisation and delivery.
- **Low-unit costs and utilisation of economies of scale in profit generation:** As the unit costs of frugal products and services need to be low, profits can be only generated through scale. This means finding new means to distribute products and reach customers (Nakata and Weidner, *et al.* 2012; Zeschky, *et al.* 2011) as well as lean, flexible and highly networked R&D (Radjou and Prabhu 2015).
- **Categories of products:** Products aimed at high uptake need to reflect lower income groups' consumption preferences and conditions. The types of products that will matter most for those with small budgets relate to health and food as well as agriculture production. Other categories are products aimed at improving basic living conditions and education. For middle-income groups, cheap cars and laptops will also be a part of the consumption priority lists (OECD 2015).

Compared to the large multinational enterprises, SMEs face additional hurdles when innovating frugally because of lack of resources, networks and internal R&D capaci-

ties. Yet, although largely undocumented, it has been found that SMEs located in emerging economies play a key role in producing 'below the radar frugal innovation' (George, *et al.* 2012). There are also some Western SMEs seeking to enter into new markets in a similar manner to their larger counterparts. Many of these SMEs seek to enter the emerging markets by exporting (Hollenstein 2005), utilising government support to overcome trade barriers, becoming subordinate partners to a MNE or becoming a part of production networks (Miranda, *et al.* 2013). Miranda, *et al.* (2013) argue that entry to emerging markets and successful operation can also be achieved by altering their innovation process, which are as follows:

- **Satisfying needs of customers:** Similarly to MNEs, the products and services of SMEs need to be designed or re-engineered to satisfy the existing needs of the customers at emerging markets.
- **Low-unit costs and utilisation of economies of scale in profit generation:** As MNEs, SMEs aim at creating profits through scale.
- **Utilisation of open innovation networks in conception and implementation:** Open innovation is a paradigm that assumes that firms can use external ideas as well as internal ideas, and internal and external paths to market, as firms look to advance their technology (Chesbrough, *et al.* 2008). At the conception state, SMEs can take advantage on open innovation networks by using external ideas to substitute the lack of R&D resources. Later, the international networks can be utilised in product testing and delivery (Hollenstein 2005).
- **Exploitation of local markets and resources:** The local SMEs can successfully develop frugal innovations by exploiting local markets and locally available resources. The products need to be more accessible to the poor and utilise new technologies which are more inclusive of poor producers (Chataway, *et al.* 2013).

Civil society

Individuals in emerging economies are important frugal innovators at a local scale,

where innovations are often developed by a chance or through experimentation (Gupta 2013). The ideas emerge from a variety of situations, often from a problem either the innovator or a family member suffers and the process often utilises bricolage – individuals improvise by recombining existing, but individually less useful, resources to create value through creative reconstruction (Gupta 2013). The products either involve traditional knowledge or an adapted use of modern technology that most people can afford (OECD 2015).

The grassroots innovations are commercialised or scaled up only rarely as the innovators experience lack of tangible and intangible resources. However, scaling up is not an absolute necessity – the very process of designing local innovations to serve local needs may support the innovating individual and an inherently small-scale market, while also contributing to poverty alleviation (Chataway, *et al.* 2013).

Yet, NGOs can play an important role in promoting the development and adoption of more inclusive local innovations.

Universities and Public R&D institutions

In the previous studies, universities and public R&D institutions are rarely mentioned as a source of frugal innovations. However, there are two kinds of processes in universities leading to frugal innovations: specific research activities targeting for developing frugal solution, and basic and applied research, which can be commercialised in a frugal manner. An example of the former are university programmes such as Frugal Innovation Laboratory at Santa Barbara University and Entrepreneurial Design for Extreme Affordability programme at Stanford University. An example of the latter are initiatives at the Indian CSIR laboratories conducting applied research, which have developed technology applications for rural India (Utz and Dahlman 2007).

Public funding instruments for frugal innovations

As the previous chapter shows, the frugal innovators range from large MNEs

wanting to enter new markets to poor individuals searching solutions for everyday problems. The multitude of frugal innovation actors and processes has also spawned different kind of public or charitable funding schemes for the support of frugal innovation.

In a mapping, implemented as a part of this study, together 17 funding schemes for frugal innovations were found, 11 with a particular focus on India (Table 1). On the basis of their objectives and target groups, they can be classified into:

- **Support to frugal innovations at grassroots:** Means to encourage local grassroots innovation include technical assistance to support scouting and documentation, rewarding individuals behind innovations (e.g., IPR protection), prototype development, and diffusion through networks (Gupta 2013). Therefore in India, based on idea of finding and documenting grassroots innovations and disseminating them, a series of initiatives have been emerged, including the National Innovation Foundation, the Grassroots Innovations Augmentation Network and the Honeybee Network.
- **Support to frugal businesses:** The recent years have seen a rise of impact investments funds, that is venture capital funds, which produce social benefit to the society and finance, and social and frugal enterprises with a viable business plan (Dutt and Ganesh 2014). Yet, most social enterprises are too early stage and high risk to be attractive to investors and rely mostly on bootstrapping to acquire sufficient working capital. This has inspired funding incubators to support early stage social enterprises to improve their chances of survival and growth. One example of such an incubator programme is INVENT by the DfID. In addition, there are initiatives aiming to bring together Western and Indian companies to jointly produce innovations and catalyse technology transfer. Such initiatives include TechEmerge Programme by the World Bank, the Finnish Innovation Foundation's India Cooperation and CEFIPRA Industry

Academia Research and Development Programme. Common to all these business support instruments is that their main objective is to bring up viable profit generating businesses, which also generates some social impact.

- **Innovations to tackle global challenges:** These schemes aim to address the global challenges or benefit the population at the bottom of the pyramid. They are either funded by foreign aid or national governments, and the main impacts are expected to occur in India. Examples include Affordable Healthcare in India Programme, SPARSH Programme by BIRAC, and Millennium Alliance and Newton Fund – DST/DBT Cooperation.

From these three groups of schemes, the latter two have particular relevance to Western and Indian SMEs. We illustrate that the current practices through three case studies on frugal innovation funding schemes in the field of health with relevance to SMEs: (1) TechEmerge, (2) SPRASH, and (3) Affordable Healthcare in India.

TechEmerge

The TechEmerge Programme was launched by the International Finance Corporation (a part of the World Bank) in 2015. It is a matchmaking programme for proven technology companies around the world that are looking to grow their business in emerging markets, namely in India. The inaugural programme connects innovators globally to health care providers in India to accomplish the dual goals of improving health care delivery and patient outcomes in India (World Bank 2015).

The establishment of the programme was motivated by the World Bank's notion of companies not entering new markets despite of market ready technologies because of lack of awareness of market potential, funding for technology adaptation and business networks. Therefore, the programme sources innovations worldwide and gives the innovators a boost to accessing Indian markets. Contrary to many other schemes, the programme is open to companies with already a

Table 1: Funding schemes for frugal innovations, with a focus on India

| Scheme | Initiator |
|--|--|
| Support to frugal innovations at grassroots | |
| Honeybee Network and the Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) | Development Voluntary Organisation (India) |
| National Innovation Foundation | Department of Science and Technology, Government of India |
| Grassroots Innovation Augmentation Network | National Innovation Foundation, India |
| Support to frugal businesses | |
| INVENT Programme | UK Government's Department for International Development, The German agency for International Cooperation (GIZ), Technology Development Board (TDB), India |
| Tech-Emerge-Health | World Bank (International Finance Corporation) |
| Tekes-India Collaboration | Finnish Funding Agency for Innovation (Tekes), Department of Biotechnology, Department of Science and Technology, Government of India |
| Industry Academia Research and Development Programme | CEFIPRA, France |
| Support to frugal innovations to tackle global challenges | |
| SPARSH Programme | BIRAC, India |
| Newton Fund competitions | UK Government's Department for International Development and Innovate |
| Millennium Alliance | USAid, Department of Biotechnology of Government of India and Federation of Indian Chambers of Commerce & Industry |
| Affordable Healthcare in India scheme | Wellcome Trust |

proven technology. These companies are selected through a competitive application process, in which their technologies are judged against the criteria of usability, sustainability, affordability and relevance to the needs of the health providers in India (Barisik 2016).

Selected innovators will be invited to meet with senior executives from health care providers in India, and discuss the potential of conducting a pilot together. In preparation for these meetings, the innovators are offered background information on the Indian market and help to better understand how their technologies can be applied to the Indian context. Up to \$1 million are available in a funding pool to support pilot implementations. The joint pilots will be provided with a grant (6–9 months) aimed at technology adaptation, testing and piloting. In addition, innovators will be able to join educational workshops, receive pilot implementation support from the programme as well as present their pilot results at major health events and conferences (World Bank 2015).

SPARSH programme

The SPARSH Programme was initiated by Biotechnology Industry Research Assistance Council (BIRAC) under the aegis of Department of Biotechnology, Ministry of Science and Technology, Government of India in 2013.

The programme aims at promoting the development of innovative solutions to (India's) society's most pressing social problems. The scheme aims to invest in ideas and innovations that improve health care of all Indians and encourage affordable product development in the social sector (BIRAC 2013). The programme has three main objectives: (1) identify and provide support to cutting edge innovations towards affordable product development that can bring significant social impact and address challenges of inclusive growth; (2) provide support in the form of impact funding of biotech product innovations (with social goals) that can be scaled and; (3) create and foster a pool of social innovators in biotech and provide a platform to share best practices and

understand intricacies of business models in social innovation and network.

The programme launches annually calls for proposals, which address unmet national needs, which need special attention and have large societal implications. Till date, the programme has launched three calls for proposals 'Maternal & Child Health', 'Healthy Mother, Healthy Child' and 'Innovative Technology Solutions for Waste to Value', which are open for Indian applicants. The calls aim at affordable product development and fund projects, which are at different stages:

- **Idea to Proof of Concept:** Proposals are invited for taking an idea to proof of concept, which is at an ideation or nascent stage and that would aim to bridge significant challenges in the social innovation arena.
- **Proof of concept to validation:** Proposals are invited to social innovation arena, which have crossed the ideation and PoC stage and are in the stage of need for validation.

Funding frugal innovations

- Innovative pilot scale delivery models: Proposals are invited for demonstration of delivery models of innovative health care products and services pertaining to social innovation that can show positive social impact, sustainability of operations and potential for scale up.

Depending on the innovation stage, the funding takes the form of a grant or loan, complemented with mentoring support. In addition to the annual calls for proposals, SPARSH implements a fellowship scheme 'Social Innovation Immersion Programme', which intends to create a pool of social innovators in the biotech arena who can identify specific needs and gaps (BIRAC 2013).

Affordable health care in India

The Affordable Health Care in India scheme was initiated in 2008 in a partnership between the Wellcome Trust, a charitable foundation aiming at improving health, and the Department of Biotechnology, Government of India. The \$64 million scheme was set to run for 5 years, and is currently ongoing a scheduled review (Wellcome Trust 2010, 2016).

The objective of the scheme is to fund translational research projects to deliver safe and effective health care products for India – and potentially other markets – on a large scale at affordable costs (Wellcome Trust 2016). The idea behind the programme is that the most promising research results are found and handed through the whole process of commercialising and scaling (Mukherjee 2016).

A key feature of the scheme is to encourage innovations that bring together researchers from both the public and private sectors to extend access of such innovations to the greatest numbers of beneficiaries, without compromising on quality. The scheme is open to applications from for-profit or not-for-profit institutions, governmental or non-governmental organisations and international organisations operating within the territory of India. Projects must take into account the criteria for affordability, and

that the development path proposed maximises wide-spread adoption and has a realistic possibility for downstream uptake by a follow-on partner (Wellcome Trust 2016).

The support is provided in the form of a grant and mentoring. It is also possible to apply for smaller amounts of funding for the proof of concept and validation of the technology to reach an adequate level of readiness to be eligible for full-scale funding. Awareness raising and training activities have also been available for eligible institutions (Mukherjee 2016).

Lessons learned

The case studies introduced three different types of funding schemes for frugal innovations with relevance to SMEs. Despite their different set-up, common lessons can be learned with regard to their design and implementation.

Call theme and description create the pathway to frugal outcomes. Certain thematic areas, including health, are more fruitful for frugal innovations. The call text should include a clear problem statement and draw applicants' attention to the requirement of affordability and social impact. The project selection criteria, on the other hand, ensure that projects responding best to the call will be selected. Common to the three case study schemes was that affordability and social impact were part of the core project selection criteria.

Understanding the needs of the target group is elemental for innovating frugally. Therefore, the schemes should encourage acquiring knowledge on the needs, and piloting and testing at the target markets. Attainment of local knowledge to understand the operating environment is particularly relevant for international collaborations and it can be ensured through involvement or relevant partners in the projects, for example, TechEmerge-partnered global innovators with Indian care providers. As frugal principles or target groups may be new to the businesses, awareness raising, training and mentoring have also proved to be useful. Indeed, all the case study schemes provided advisory services in

addition to financial support.

The case study schemes focussed on supporting different stages of innovation process. However, common for them was placing emphasis on scalability of the innovations and implementation of the innovation process in a partnership. Although the frugal innovation projects might involve above average risk, the schemes should include a risk aversion mechanism. This could take a form of staged funding or a provision of soft loans as in the SPARSH programme.

Conclusions

Frugal innovations can bridge the aspirations and characteristics associated with business-driven, social and inclusive innovations. Frugal innovations and business models do not only embrace the indigenous innovation potential of emerging economies but also entail a promise of a more inclusive and resource efficient economic growth globally.

Although a relative new phenomenon, frugal innovations have captured the attention of policy makers and a number of schemes for their support have emerged in recent years. Many of the schemes are relevant for SMEs, which are one of the most relevant frugal innovators alongside MNEs and the civil society. To be successful, the schemes need to address the peculiarities of frugal innovation processes of the most important frugal innovators.

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