Journal of Business and Economics, ISSN 2155-7950, USA
July 2024, Volume 15, No. 7, pp. 393-404
DOI: 10.15341/jbe(2155-7950)/07.15.2024/004

http://www.academicstar.us

Market Driven Fit (MDF): Marketing Evaluation of Technological Innovations

Fernando Zelada Briceño
(Center for Marketing Technology Innovation, Perú)

Abstract: The TRL methodology — Technological Readiness Levels, widely used among the R&D community, is a powerful tool that makes the commercial position of the technology transparent/explicit, facilitating assertive and conscious decision-making among the different actors in the ecosystem. (spin-off, TTO, observatories, intellectual property, consortia, alliances, actors, networks, platforms, ecosystems, etc.) for different transactions that correspond to their nature and/or own interests.

A functional marketing look at the TRL shows us, on the one hand, that it is a static — rigid categorization or classification instrument, and on the other hand, that it is limited to the classification of the offer (technology), culminating in the determination of its greater or lesser level of *readiness*[1] to be commercialization; The TRL acts as a certification of maturity, but does not provide clues about possible target markets, if there is potential.

As a complement, the Market Driven Fit (MDF), is a pre-market tool that has already been validated in more than 32 technologies/inventions/patents, and almost naturally it is being configured as a second moment after the TRL, where through of a system of variables (Goldratt's Theory of Constraints), allows in a short time to identify whether the technology would have a market or not, what these would be and outlines the *restrictions* to be lifted (from its TRL stage, competitive, commercial and transactional) to that unfolds its full potential.

Key words: marketing, innovation, technology, markets, tools
JEL code: M310

1. MDF Introduction and Hypothesis Statement

Market Driven Fit® is a tool that allows, even in the initial stages of the idea or business proposal, to delimit the areas of non-applicability, thus decanting or better outlining the market spaces in which the proposal would have the greatest impact and Therefore, the investment and marketing validation effort would be more likely to generate usable results.

The tool does not work with measurement scales, but rather proposes a system of variables that make up the route to the market and validates the greater or lesser resolution that the technology achieves in each one.

One of the most relevant features found among entrepreneurs and technological innovators is that their close emotional relationship with the idea or project leads them to lose sight of cutting variables or factors that restrict the marketing applicability of their idea, unnecessarily prolonging and making the *lean* process more complex.

Fernando Zelada Briceño, Business Administrator, Center for Marketing Technology Innovation; research areas: technological innovation marketing, technology access to markets, technology commercialization. E-mail: fernando.zelada@mercadeando.com.

(Back and forth, trial – error) validation/adaptation to the market.

In fact, one of the weaknesses of the *lean* market validation process is that it is developed on a Minimum Viable Prototype (MVP) which, from the fact of having been designed/captured, focuses the attention and analysis of both the innovating actor and the consumer potential, in what is shown, being natural that what is lost from sight is much broader than what has been achieved. In fact, one of the weaknesses of the lean market validation process is that it is developed on a Minimum Viable Prototype (MVP) which, from the fact of having been designed/captured, focuses the attention and analysis of both the innovating actor and the potential consumer, being natural that what is lost from sight is much broader than what has been achieved.

On the other hand, in the process of moving from ideas to the minimum viable prototype, entrepreneurs/innovators make decisions — design — and carry out their validations in many cases ineffectively because the questions or cutting variables that would make your proposal work better (or even not work) in certain segments/markets, therefore, focus the validation effort on an area where there are lower margins of commercial risk.

Statement of the Problem: The WIPO world statistics indicate that only 5% of patented inventions worldwide actually reach the market, while global investment in R&D is 2.55% of GDP by 2020 (World Bank), we are talking about an economic volume of 2.17 trillion dollars. The development of tools or instruments that improve the current performance of R&D&I would have an important impact on global economic development and the well-being of humanity.

Work hypothesis:

- The definition of the functionality parameters of any technology defines and delimits its potential market.
- The restrictions on the route to market of any technology are evident in the functionalities and applications of use.

2. Theoretical Framework of Market Driven Fit®:

One of the theoretical bases of MDF® is the Theory of Constraints, from which we copied the excellent development proposed by ATOX[2]:

> "Theory of Constraints, abbreviated TOC, or the theory of constraints in Spanish (also called theory of limitations) is a philosophy of business and supply chain management proposed by doctor of physics **Eliyahu Goldratt** and popularized from his best seller "The Goal" ("The goal" in Spanish) published in 1984, which is based on the fact that a system (a production plant, a supply chain, a company, etc.) is made up of interdependent elements and that, as in a chain, the system can only be as strong as its weakest link, that is, **the constraint or bottleneck**." (News: Atox, 2017).
>
> "The basis of the theory of constraints is to see a system as a whole, being fully aware that a company, a production plant, a warehouse, a supply chain, etc. It is actually a series of links that are strongly dependent on each other. Although this may seem obvious, often in practice the different parts of the system are managed as if they were much more independent" (Noticias: Atox, 2017).

Extrapolating the proposal to the innovation and entrepreneurship sector, Market Driven Fit® provides a systemic reading from the market to a line of thought dominated by short and fast processes (lean) that focus on the tree (product prototype) losing view of the forest (marketing system).

[2] https://atoxgrupo.com/que-es-la-teoria-de-las-restricciones/

> "**The goal** of every company is to obtain greater profits in the present and with sustainability in the future. Frequently, we see how in companies resources are used to optimize processes that do not represent the weakest links, which has little impact on overall performance, that is, on getting closer to our goal. TOC focuses on identifying the weakest links that are the true constraints, because improvements in them will have a great overall impact. For this reason, it is sometimes said that the theory of limitations is not only about doing what you have to do, but, even more importantly, it is about **stopping doing what you don't have to do**. (News: Atox, 2017)

Isn't the final goal of a technological innovation or a venture the same? Probably in the long term yes, but in the short term, the goal of a technological innovation or a venture is not to obtain profits but to ensure the proposal's entry into the market, and regarding this adapted and specific goal, there are variables that condition or they facilitate compliance, and in this context, Market Driven Fit® helps to outline where to look and funnel innovative efforts, and where to stop looking and invest resources.

Considering, on the other hand, the pre-existence of the TRL Technological Readiness Levels methodology, widely used among the R&D community, it is appropriate to establish the differences and complements with the MDF proposal.

The TRL is a powerful tool that makes the commercial position of the technology transparent/explicit, facilitating assertive and conscious decision-making among the different actors in the ecosystem (spin-off, OTT, observatories, intellectual property, consortia, alliances, actors, networks), platforms, ecosystems, etc.) for the different transactions that correspond to their nature and/or own interests.

A functional marketing look at the TRL shows us, on the one hand, that it is a static-rigid categorization or classification instrument, and on the other, that it is limited to the classification of the offer (technology), culminating in the determination of its greater or lesser level of readiness to be marketed; The TRL acts as a certification of maturity, but does not provide clues about possible target markets, if there is potential.

Some differences between the Technology Readiness Level (TRL) and the Market Driven Fit (MDF) can be outlined as follows:

Table 1 Comparative Analysis TRL vs. MDF by Critical Variables

	Comparative variables	TRL	MDF
1	Scope of analysis	It focuses on weighing the level of maturity of the technology itself, as technological development.	Weighs the level of commercial maturity of the technology based on its own market context It is a broad and heterogeneous weighting instrument with unpredictable and individualized results.
2	Nature of analysis	It is a finite measuring instrument with pre-established results.	It is a broad and heterogeneous weighting instrument with unpredictable and individualized results.
3	Measurement variables	It is a one-dimensional measurement	It is a multidimensional measurement
4	Contribution to the link between actors	Explicit/transparent the state of technology development, facilitating understanding and transactions	Explains the best commercial spaces for technology and the tasks to be carried out to reach the market, facilitating understanding and transactions
5	Contribution to the entrepreneur/innovator	Returns information about the development status of your technology	Returns information about the development status of your technology

Source: CITE Marketing

Finally, the TRL and MDF measurement scales can help us better visualize the differences and possibilities of complementarity between both proposals. For the analysis of the TRL we rely on Juan Miguel Ibañez from Aldecoa Quintana:

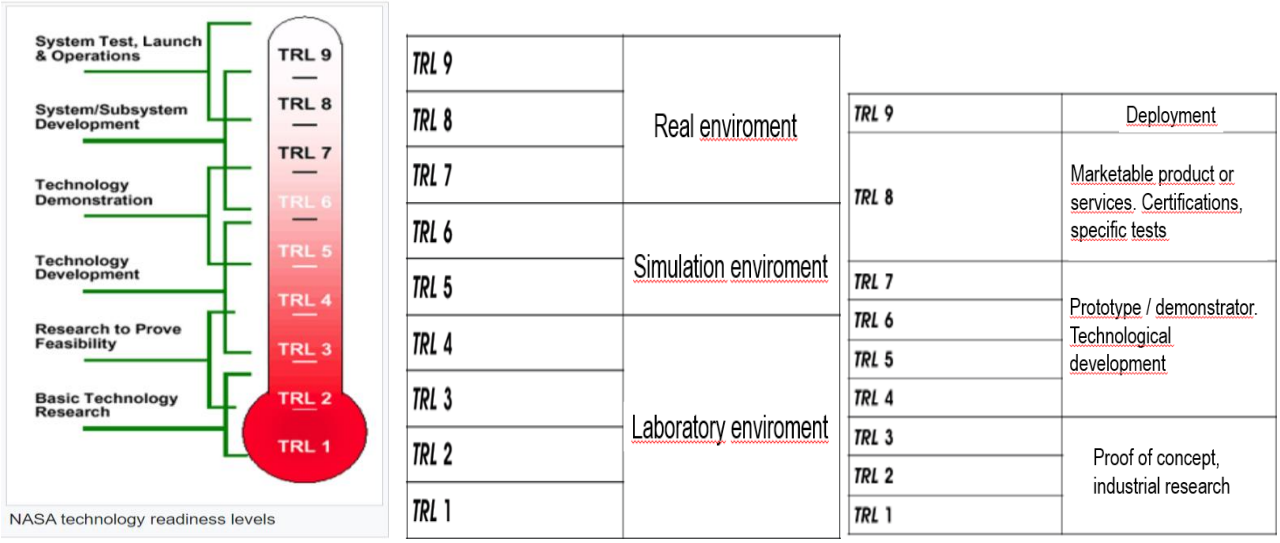

Figure 1 TRL Measurement Scales

Source: De Aldecoa Quintana.

Table 2 MDF Measurement Scales

MDF measuring scale	Under 30%	Between 31% and 50%	Between 51% and 70%	Between 71% and 90%	Between 91% and 100%
Commercial potential of the technology	Very low, reconsider	Low with urgency of complementation	Medium with complementation space	Alto with tuning room	Very high intrinsic commercial potential
	Rethink, discard	*Evaluate cost/benefit of adjustment*			*Market Study*

Source: CITE Marketing

3. Development of Market Driven Fit 1.1®

3.1 General Objective

Facilitate the rapprochement between the supply and demand of technological innovation by marketingly validating the proposals so that they face their possible access to the market with greater efficiency and focus.

3.2 Specific Objectives:

- Determine the level of commercial maturity of the technological innovation evaluated, identifying the bottlenecks that limit its access to the market, outlining a roadmap at different levels of work that articulates different interested actors.
- Guide the entrepreneur/innovator under a sequence of structured questions to narrow down their idea or innovation by reducing/focusing the market spectrum so that the following stages of the entrepreneurial investment have a clearer direction from the market.
- Give greater consistency to the entrepreneurial/innovative effort by delimiting the market spaces where its exploration has lower margins of error in generating relevant information and ensuring market entry.

4. MDF Content

Market Driven Fit ® develops its decantation analysis working with no less than 21 variables -depending on the type of product/market- that collect information on the following aspects:

a) Framing
b) Differentiation
c) Expected results
d) Absolute Restrictions
e) Restrictions relating to adoption risk
f) Restrictions relating to the perception of commercial

In the following MDF® Structure Map you can visualize the scope of the proposal in its different components and some application examples to clarify its usefulness:

Table 3 Functional Map of Market Driven Fit 1.1®

	MDF Analysis Areas	Functionality	Utility
1	Framing	Establish background, conceptualize, delimit.	Explain the proposal of technological innovation
2	Differentiation		
3	Absolut Restrictions	Define market spaces where validation of the technology is useless and has a lower probability of success	Discard market spaces and focus validation on terrain with the highest probability of success
4	Conditioning Restrictions		
5	Restrictions Related to Adoption Risk	Delimits factors that may restrict the adoption of technology from the market point of view.	Identify space for improvement in the commercial management of technological innovation
6	Restrictions Related to the perception of commercial risk		
7	Expected Results	Outlines the raw value proposition, subject to validation	Establish the validation parameters of technological innovation

Source: CITE Marketing

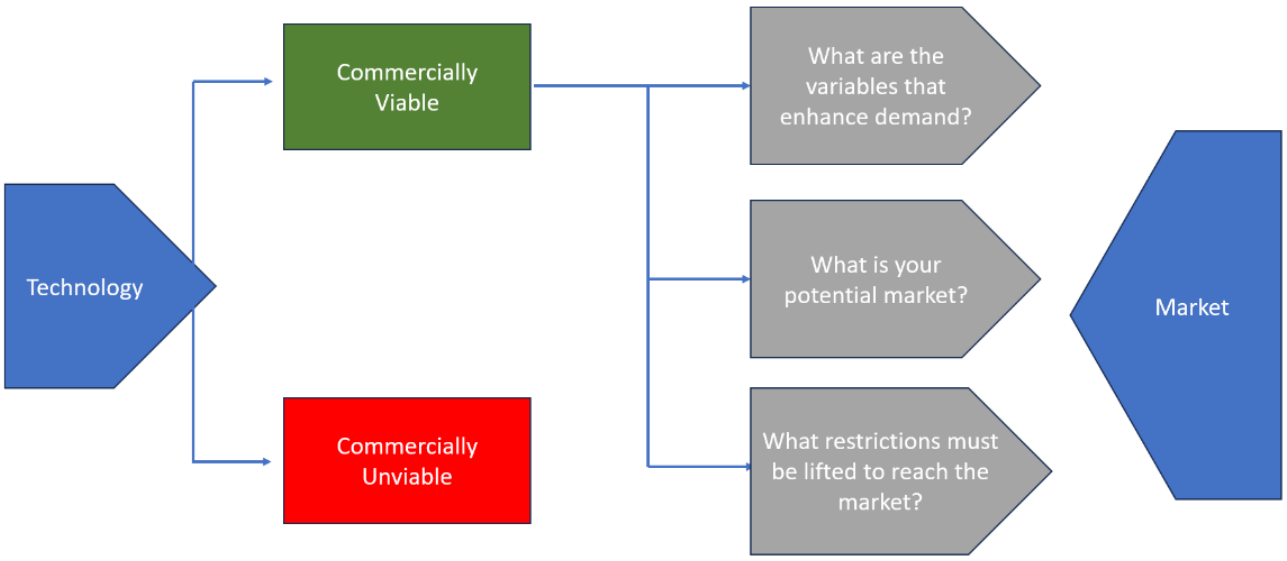

Figure 2 MDF Process From Its Partial and Final Results

Source: CITE Marketing

5. Decantation of Markets in MDF 1.1®

The value proposition of the MDF® is to reduce the uncertainty of the technological innovation process through a structured analysis process interactively with entrepreneurs / innovators that allows them to better focus their efforts on validating their proposal.

In this context, at moment "0" the technological innovator estimates that his market may be composed, for example, of up to 6 segments, but the analysis must result in which of them are the ones that a priori present the greatest potential in working. on the proposal itself, from the own knowledge of the promoters of technological innovation, without the need to invest in further market research.

This would open a process of selection and discarding, of filtering the potential markets until finding the one that, according to the nature of the technological innovation, presents the greatest probability of success; The holistic reading of the process is presented in the following table:

Table 4 Market Decantation Diagram in Market Driven Fit 1.1®

	MDF Analysis Areas	Timing	Market Segment 1	Market Segment 2	Market Segment 3	Market Segment 4	Market Segment 5	Market Segment 6
1	Framing	Moment 0						
2	Differentiation							
3	Absolut Restrictions (a)	Moment 1						
4	Conditioning Restrictions							
5	Restrictions Related to Adoption Risk (b)	Moment 2						
6	Restrictions Related to the perception of commercial risk (b)							
7	Expected Results (c)	Moment 3						

a) Red box closes the process

b) Yellow box marks high restrictions/green box marks minor restrictions

c) Purple box marks the market segments with the greatest potential for the proposed innovation

Source: CITE Marketing

6. Market Driven Fit Results®:

As has been established throughout the document, the MDF is applicable to any technology in any sector or sub-sector of knowledge. Below we present, in a very schematic but graphic way at the same time, the contribution from the results of the MDF in different technologies evaluated.

Next, we schematically present the results of the application of the SDM in a sample of 10 technologies randomly chosen from an institutional sample of 04 technological innovation actors (research institutes and universities); The 10 technologies analyzed are framed in 10 different productive sub-sectors. The following table allows us to visualize the existence and distribution of the key analysis areas of the MDF for the different technologies evaluated.

Table 5 Map of Areas of Incidence of the Market Driven Fit® in the Presented Sample

	Technology	Sub-sector	Absolute Restrictions	Conditioning Restrictions	Adoption risk restrictions	Commercial risk restrictions
1	Pomegranate aril separator electric tool	small appliances	■			
2	Texture improvement process for canned small pelagic fish	Fishery			■	
3	Improved Gravity Irrigation System for Cocoa	Agroindustry		■		
4	Fuel efficiency booster device for automobiles	Hidrocarburos		■		
5	Automobile Fuel Efficiency Enhancer Device	Hydrocarbons				■
6	E-commerce Platform for the Articulation of Rural Supply and Urban Demand for Fresh Fish Meat	TICs	■			
7	Native Microbial Consortia that Favor the Recovery of Mining Landscapes and Prevent the Formation of Acidic Waters.	Biotechnology		■		
8	Obtaining Organic Astaxanthin (fish meat coloring) with Supercritical Fluids from Munida	Fishing and aquaculture	■			
9	Hot Chambers for Rural Homes	Rural housing			■	
10	COVID Preventive Multi-User Handwashing Station	COVID	■			
	Totals Found		**4**	**4**	**2**	**1**

Source: CITE Marketing

7. Discussion and Analysis Topics of Market Driven Fit®

The methodology has been validated in a series of applications transversally to a wide range of technologies, as previously reviewed, demonstrating its high level of applicability for any innovative proposal, although it remains to continue reflecting, learning and systematizing its execution.

A topic currently under discussion is the coverage of the applicability of MDF technology, with practitioners' perception that in its current stage it works well and provides value, but they can think about a second generation of more specialized and specific MDFs based on basic marketing parameters in which technological innovations could be classified.

For example, we estimate that the current version of the MDF® is preferably applied to technological innovations in production or industrial processes whose market is extractive and/or manufacturing companies. Its application for technological innovations whose market is consumers or individuals is feasible with certain adjustments to the questions/variables involved, but we estimate that in the future a special version could be decided for this segment. In the following figure we schematize this idea.

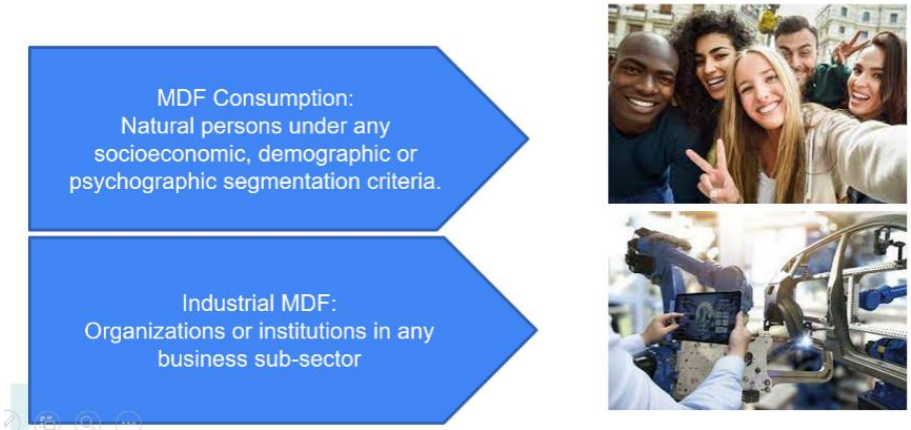

Figure 3 MDF Application Approaches by Type of Technological Adopter

Source: CITE Marketing

From another commercial angle, the MDF recognizes the existence of 02 types of technology by functionality, understood as the degree to which the technology is not only ready to use, but requires greater or lesser collateral investments for its adoption by the market, generating transaction costs that ultimately constitute barriers to entry. In the following figure we schematize this idea.

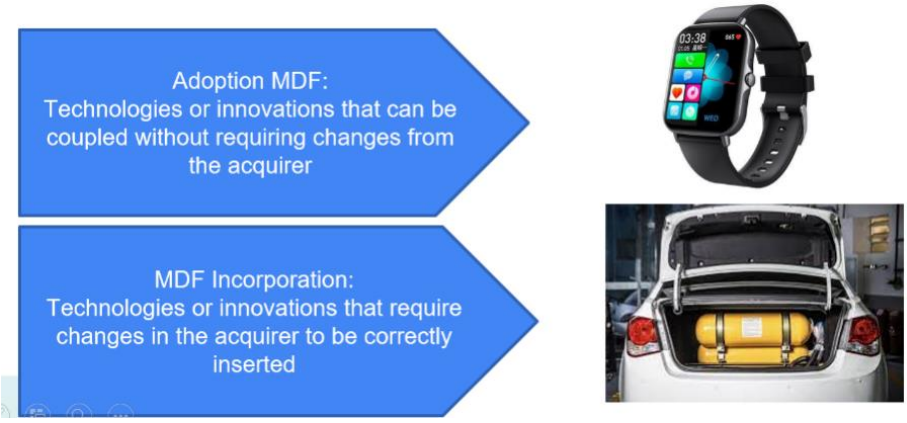

Figure 4

Source: CITE Marketing

8. Conclusions About Market Driven Fit®

1) The review of the state of the art shows that the MDF is the first methodology for marketing evaluation of technological innovations in the world, having reached a first level of validation that profiles it as a powerful instrument that generates results. In this paper, 10 applications have been presented, but MDF currently has more than 24.
2) The presence of the restrictions (absolute/conditions/adoption risk and commercial risk) has been validated in the sample of 10 technologies found, with the restrictions and conditions being those with the greatest presence, while those of adoption risk and commercial risk , have a significantly lower presence.
3) The majority presence of absolute restrictions and conditions in the sample of 10 technologies found as

a result of the application of the MDF, show that the R&D processes from which they come are very far from a market approach.

4) The results of the sample do not allow us to find correlations between the 04 types of restrictions that the MDF evaluates and the types of technology and/or the productive sub-sectors in which they operate. It is planned to add larger samples to evaluate these possible correlations.
5) The structure of the sample does not allow finding correlations between the actors promoting technological innovation and the 04 types of restrictions evaluated by the MDF. It is planned to incorporate this typing variable in larger samples to evaluate possible correlations.
6) The application of the MDF for now is at an intermediate level of systematization, meaning that it can be applied universally by those who know the instrument closely and have basic marketing training, but it is still far from being an autonomous body of knowledge and instruments. and transferable for mass adoption by other practitioners.
7) The validation of the presence of the MDF restrictions in the sample of technologies evaluated demonstrates that the instrument is sufficiently flexible and adaptable to any type of technology or technological innovation, patented or not, becoming a key instrument to boost the innovation ecosystem. .
8) The MDF has managed to amalgamate the classic marketing theory whose literature is saturated with cases of mass consumption companies, and adapt these theoretical frameworks to the commercial reality faced by technological innovations, developing the state of the art in this line.
9) The results produced by the MDF are unique and personalized for each technology or innovation evaluated, although it is based on a common and standardized framework of variables, and this is largely explained by the multidimensionality and multivariability of industrial or consumer markets. , since each technology has its own reference market and very few converge in the same functionality/market binomial.

References

Agiakloglou C., Drivas K. and Karamanis D. (2014). Individual Inventors and Market Potentials: Evidence from US Patents.

Chrisomalis S. (1996). “Independent invention in anthropological context”, unpublished manuscript, available online at: https://www.academia.edu/5622705/independent_invention_in_anthropological_context.

Dahlina K., Taylorb M. and Fichman M. (2004). “Today’s Edisons or weekend hobbyists: Technical merit and success of inventions by independent inventors”, Research Policy, Vol. 33, No. 8, pp. 1167-1183.

Kotler P. and Armstrong G. (1997). *Principios de Mercadotecnia*, México: Prentice – Hall Hispanoamericana S.A.

Levitt T. (1997). *Comercialización Creativa*, Editorial Continental S.A.

Llamas Fernández F. J. (2018). *La metodología Lean Startup: desarrollo y aplicación para el emprendimiento*, Revista EAN.

Montesinos Carbajal J. (2016). “Cómo aplicar el Marketing en el Perú?”, Instituto Peruano de Marketing.

Noticias: Atox (6 de abril de 2017). Available online at: https://atoxgrupo.com/que-es-la-teoria-de-las-restricciones/#:~:text=La%20teor%C3%ADa%20de%20las%20restricciones%20es%20una%20filosof%C3%ADa%20de%20mejora,a%20estar%20en%20otra%20parte.

O'Connor M. and Hewitt-Dundas N. (2013). “From exploration to exploitation: A pilot investigation of individual inventors in Ireland”, DRUID Academy.

Osterwalder A. and Yves P. (2011). *Generación de modelos de negocio*, Deusto S.A.

Pendsey N. and Agarrwal S. (2012). “Taking an independent inventor’s inventions to the market — Challenges and issues”, *Journal of Intellectual Property Rights*, Vol. 17, pp. 400-405.

Porter M. (1980). *Competitive Strategy*, New York: Free Press.

Pujol Bengoechea, B. (1999). *Diccionario de Marketing*, Cultural S.A.

Ries E. (2012). *El método Lean Startup*, Deusto.

Rorke M. (2000). "From invention to innovation", National Renewable Energy Lab.

Smid S., Moraru V. and Varzari V. (205). *Technology Transfer Handbook*, Moldovan-Estonian Cooperation in Technology Transfer.

Stephany Filho L., Fontinele Tahim E., Maria Serafim V. and Barros de Moraes C. (2017). "From invention to Innovation — Challenges and opportunities: A multiple case study of independent inventors in Brazil and Peru", *RAI Revista de Administração e Inovação*, Vol. 14, No. 3, pp. 180-187.

The NC State Office of technology Transfer (2011). "An inventor`s guide to technology transfer", NC State University.

United Nations New York and Geneva (2011). "Intellectual property commercialization policy options and practical instruments", United Nations Publications.

University of Calgary's (s.f.). *Inventor's Handbook*, University of Calgary.

Wagner Weick C. and F. Eakin C. (2005). "Independent inventors and innovation: An empirical study", *The International Journal of Entrepreneurship and Innovation*, Vol. 6, No. 1, pp. 5-15, doi: 10.5367/0000000053026400, available online at: https://scholarlycommons.pacific.edu/esob-facarticles/163.

Zelada F. (2014). *Peruvian Marketing: Práctica vs. Teoría*, Mercadeando. S.A.

Zelada F. (2017). *Este no es un Libro de Marketing*, Paidós Empresa.

Zúñiga Zapata A. C., Dornberger U., González Alcalá A. I. and Sánchez González A. M. (2014). *Guía práctica para la comercialización y transferencia de tecnologías*, Lasallista.

Annex

Table 6 Qualitative Deployment of Contributions and Results of the Market Driven Fit®

	Technology	Sub-sector	Technological Promoter	MDF contribution
1	Pomegranate aril separator electric tool	Small Appliances	Technology Promotion Institute	MDF validated the existence of a broad and heterogeneous indirect competition for patents and similar instruments with complete commercial development at very low prices. MDF validated that the proposal was excessively complex in its use and functionality, requiring, for example, electrical connection compared to many manual options. It was suggested that the technology be discarded due to low intrinsic commercial potential.
2	Texture improvement process for canned small pelagic fish	Fishery	Technology Promotion Institute	MDF validated that the procedure held TRL 8, but its technological adoption by canning companies required the pre-existence of machinery and equipment that executes the patented procedure in an automated production line. Since there is no such technological offer to facilitate the implementation of the patented technology, its adoption is unfeasible in the short term. It was suggested to temporarily archive the technology until investing in the development of machinery and equipment to apply the patented process.
3	Improved Gravity Irrigation System for Cocoa	Agroindustry	International Cooperation Agency	MDF, through the market decantation process, established that the profile of territories in which the technology generates value must have minimum slopes of 15 degrees, discarding the rest of the territories and thus delimiting the potential market. Attention was focused on plots with these characteristics that act as demonstrations to accelerate the Rodgers curve.
4	Automobile Fuel Efficiency Enhancer Device	Hydrocarbons	Independent inventor	The MDF, through the process of market decanting, established that the potential market was not the total vehicle fleet on the market, but rather those no older than 10 years, which consume gasoline (not diesel) with an octane rating higher than 90. Attention was focused on this market segment by shortening the Rodgers curve and positioning the product more easily.
5	Alignment device for objects with imperfect orthogonality for calibration of durometers	Scientific equipment	Center for Productive Innovation and Technology Transfer	MDF validated the existence of entry barriers created by the durometer suppliers themselves through their equipment warranty systems. Likewise, MDF validated that the size of the market was very small, a niche, not only due to the type of adaptable durometer (open post) but also due to the quantity of said equipment on the market. The strategy was redefined by targeting durometer manufacturers through a licensing mechanism.
6	E-commerce Platform for the Articulation of Rural Supply and Urban Demand for Fresh Fish Meat	TICs	Center for Productive Innovation and Technology Transfer	MDF validated that the operation of the virtual environment was 100% designed and very functional, but the link between a rural reality and an urban one requires the existence of a support logistics platform that operationalizes transactions of a particularly perishable product. It was suggested to adjust the technology focus towards link operations between urban and peri-urban areas as a maximum limit, to reduce the margin of error and prevent logistics costs from being more than double the value of the products themselves.

(To be continued)

(Table 6 continued)

7	Native Microbial Consortia that Favor the Recovery of Mining Landscapes and Prevent the Formation of Acidic Waters.	Biotechnology	Enterprise	MDF, through the market decantation process, established that the potential market was not all mining operations, but rather those open pit, located below 4,000 meters above sea level, in the process of mine closure and operating in territories with a greater presence of vegetation that are generally located further north, near the equator. Attention was focused on this market segment by shortening the Rodgers curve to position the product more easily.
8	Obtaining Organic Astaxanthin (fish meat coloring) with Supercritical Fluids from Munida	Fishing and aquaculture	University	MDF validated that the technology contradicted its value proposition since the munidid (crustacean) from which Astaxanthin would be obtained came from capture in the open sea, therefore it is not traceable or certifiable under global organic production standards. It was suggested to rethink the market approach until own aquaculture production of munidid is achieved in sufficient quantities.
9	Hot Chambers for Rural Homes	Rural housing	University	MDF validated that the technology was not functional since its implementation required a maintenance operation of the plastic layer that concentrates and transfers heat from the chamber to the rural home. It had to be moistened every 4 hours so that the heat did not crack it, generating a very high transaction and opportunity cost for rural households since it implied reducing the labor force available for agricultural work. It was suggested to redesign the technology by evaluating the possibilities of changing the materials indicated for others that require less daily maintenance.
10	COVID Preventive Multi-User Handwashing Station	COVID	Independent Inventor	MDF validated that the proposed technology generated a series of unforeseen adoption and transaction costs (connection to drinking water, tank replacement, etc.) in addition to its design requiring the use of hands to operate, directly contradicting its value proposition. Additionally, the presence of competitors at commercial levels was another factor against it. It was suggested that the technology be discarded because it had very low intrinsic commercial potential.

Source: CITE Marketing