Intellectual Property Valuation

Practical Application in Negociation Processes

INPI INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL

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SUMMARY

Presentation

This didactic guide was prepared by the National Institute of Industrial Property (INPI) of Brazil with the aim of presenting the main available methods for valuing intangible assets and discussing how to choose and apply these methods objectively, especially in the context of intellectual property asset negotiations. For a better understanding of this practical application, some real cases of asset negotiation and valuation were selected with the support of the Technology Transfer and Innovation Coordination (CTIT) of the Federal University of Minas Gerais (UFMG).

This material is aimed at professionals and technology managers who already possess prior knowledge in intellectual property and technology transfer. However, despite being aimed at professionals, this guide has a simplified character and is not intended to replace internal or external valuation processes, but rather to present some practical applications of the main asset valuation methods in technology transfer processes. Building a broader understanding among all participants in the negotiation process, both suppliers and demanders, is an important step in the maturation of the process in Brazil.

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2. Introduction

Intellectual Property (IP) assets, such as patents, trademarks, copyrights, industrial designs, computer programs, and geographical indications, are types of intangible assets distinguished by their legal protection. Being susceptible to protection, intellectual property becomes a formal right of its owners and, therefore, can be transferred or negotiated. The value of an IP asset stems primarily from its ability to exclude competitors from a specific market. This exclusivity allows companies that own IP to obtain higher profits than their competitors, ensuring the return on investments in research and development (R&D). For their part, trademarks, industrial designs, and geographical indications guarantee product differentiation in the market, reinforcing the identity of companies and generating consumer loyalty.

We know that intangible assets, especially intellectual property, have value. Every time we learn about the sale of certain companies for billions of dollars, we realize that intellectual property, in certain situations, can be worth much more than the sum of all the tangible assets of the company. However, knowing that something has value does not necessarily mean that this value is easy to calculate or identify.

What we often know about the value of intellectual property is its price. But **price is a different concept from value**. Price is the amount actually paid by the consumer to acquire a good or service in a transaction. That is, it arises at the moment of the transaction, when the buyer and the seller agree on the amount for which the deal will be made.

Bearing this in mind, the first step in defining the value of a technology, a trademark or a computer program is to understand that this market does not function like a common market for goods and services. When we buy something physical, there are usually many sellers and many buyers. In this environment, the price and the negotiated quantity are defined at an equilibrium point between buyers and sellers, and similar products have similar values. In contrast, in the commercialization of intellectual property, **the transaction value will not be exactly the same as in transactions of equivalent goods or services**.

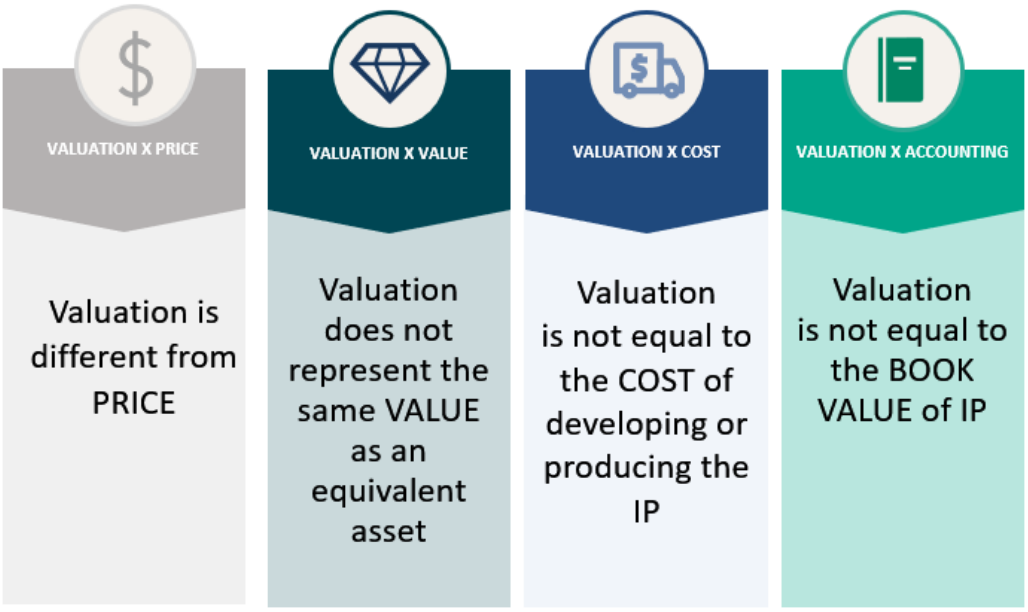
Trademarks, for example, generate differentiation in such a way that we know that a good or service from a certain brand can cost much more than its generic or similar competitors, and yet many buyers will continue to choose that more expensive good or service. Products with geographical indications are also recognized by consumers as higher quality and reputation products, which allows them to be sold at higher prices compared to products without the same seal. All of this means that intellectual property can grant its owners the power to influence market prices and, with it, obtain above-average profits.

When we talk about something unique, with a single offerer, as is the case with patents, everything is even more different from a traditional transaction. We are not in a market where several sellers offer similar goods or services; on the contrary, we are faced with a unique good, so unique that its owner possesses an exclusive right, either through patent ownership or through the preservation of a trade secret or know-how[1], which prevents anyone else from offering that same asset.

[1] When it comes to trade secrets, know-how and technical assistance services, there is no asset in itself protected by an individually negotiable instrument, although these intangible assets can be the subject of negotiation in contracts between the interested parties.

To obtain above-average profits, a marketed good or service must have lower costs than its competitors – for example, through the introduction of a new production process – or be able to be offered at a higher price, as in the case of the differentiation provided by trademarks, industrial designs, or geographical indications. Thus, we can understand that **the value of intellectual property is not equal to the cost of developing it**, but is related to the possibility of guaranteeing higher returns than those of its competitors.

Another important point that can sometimes cause confusion is the value of intellectual property on companies' balance sheets. Contrary to what one might think, the real value of a company's intellectual property portfolio, like other intangible assets, is not reflected in general accounting. In summary, only the historical cost of intangible assets can be represented on balance sheets, which can be either the acquisition value of IP or the effective costs for its development and protection. In this way, **the value of intellectual property is not the same as its book value**.



Adaptated from WIPO (2021)

Now that we have defined what intellectual property valuation is not, we can move towards a better understanding of how intellectual property can be valued. Intellectual property law is just a legal right that, if not adequately developed and incorporated into business activities, will hardly achieve high value. Considering these concepts, this guide will present a view on the valuation of intangible assets that is not solely based on mathematical calculations to define fixed

values, but rather considers it as an integrated and continuous process throughout the life cycle of the product or service.

We will first address the possibilities of value creation from an intellectual property asset. One of the possibilities of value creation occurs when this title is transacted. Intellectual property, like tangible goods, can be negotiated between different agents through licenses or assignments. Commonly, some of these transactions are called technology transfer. Thus, this guide aims to understand how intangible assets can be valued in the intellectual property negotiation process.

There are many other possible objectives for valuing an asset. It can be in financing processes for its use as collateral, it can be used for companies' accounting reasons, for portfolio management and R&D investment decisions, among others. And for each of these objectives, the application of valuation methods can be done differently. It is also important to note that the estimated value is not a fixed value that will remain the same over the years. In the case of patents, for example, the closer it is to the expiration date, the lower its value is likely to be than in previous years. On the other hand, trademarks, if well managed by their owners, tend to have increasingly higher values over time, as they can be extended indefinitely.

This guide will then move towards the practical and simplified application of the main methods for valuing intangible assets, especially in technology transfer processes. The difficulty of defining values for intangible assets has been identified as a significant barrier to technology transfer. In fact, this is one of the most relevant moments for negotiation, as it is a fundamental stage for contracts to be consolidated. It is important to reinforce, as mentioned earlier, that valuation is a stage prior to or even simultaneous with the negotiation process, and that the values defined prior to negotiation will not necessarily be, in fact, the prices defined for the transactions.

We understand that if, at the time of negotiation, both parties already have a maximum and minimum value range for the transaction, the negotiation process will be much simpler. Based on this understanding, this guide will move towards the actual valuation methods. Basically, all assets can be valued based on the costs involved in their development, the market (comparing with similar transactions), or the income (increase in expected profit with the sale). Knowing the theory behind these three approaches, we can move to the most relevant point: given the number of valuation theories available, how can we, in practice, value each particular asset?

The answer to this question will depend on several factors, such as the type of transaction (exclusive licensing, non-exclusive licensing, assignment, or sale), the stage of technology development, the existence or absence of substitutes, and, above all, the perceived value of that good or service. To this end, this didactic guide will show some examples of how traditional valuation methods have been applied in real cases of technology transfer.

This guide will help you, with accessible language, to understand how, despite the existence of various sophisticated theories that are difficult to apply, the determination of the value of an intangible asset can also be estimated in a simpler way, simplifying the application of the methods. Valuation, in the context of the commercialization of intellectual property rights, is an activity prior to and simultaneous with the moment of negotiation, which means that a value calculated with more sophisticated methods is not necessarily more effective than those calculated in a more practical way and following the rules and policies of each institution.

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3. Economic Value of Intangible Assets

For an intellectual property asset to actually become an innovation and drive technological and economic development, its exploitation must involve strategies for value generation. The right of exclusion conferred on the asset holder does not, in itself, possess intrinsic value. The value of the intellectual property right only exists when it is commercially exploited, and therefore, it is necessary to establish intellectual property value creation strategies, as summarized in Figure 1.

Figure 1 – Intellectual Property Value Creation

The most intuitive way to exploit intellectual property is through its direct use in the production and commercialization of goods and services. The incorporation of patents, trademarks, industrial designs, or geographical indications in products and services can create competitive differentials, allowing suppliers to increase their ability to influence demand and prices, within the economic concept of imperfect competition. In an imperfectly competitive market, product differentiation through intellectual property is capable of adding value, generating distinction between products, and creating barriers to entry, moving price formation away from

the perfectly competitive market[2], and leading to a price formation based on consumer perception. By moving away from the perfect competition model, the generation of profits - whether through increased prices or reduced production costs - and the increase in market power, make the environment more conducive to new innovations.

In addition to the direct use of intellectual property by its owner, another form of value extraction comes from the possibility of transferring assets, such as licensing and assignment. Licensing consists of the transfer of rights to use intellectual property to third parties in exchange for remuneration and royalties. Licensing is especially relevant for universities, research centers, and startups that do not have other factors of production necessary to bring innovation to the market. However, it can also be a means for larger companies to expand their business into new markets without the need to make the investments required for direct exploration. Franchising, for example, is a type of license that involves the transfer of a complete business system, including the brand, knowledge, and operating processes. It is an effective way to quickly expand a business and reach new markets.

In the context of value extraction from intellectual property, the concept of Intellectual Property Financing, or intellectual property-backed financing, also arises, an innovative model that considers intangible assets, such as patents, trademarks, or copyrights, for obtaining capital. Instead of resorting to physical assets, such as real estate or equipment, companies can use their intellectual property to attract investment or, in some cases, as collateral for financing.

Regarding the process of valuing these assets, it is important to consider that the value of intellectual property is volatile over time and depends on the market context in which it is found. Just as intangible assets can generate value in mergers and acquisitions processes, through the payment of royalties, or as collateral for financing, in each of these situations their value can be

[2] The model of perfect competition, in which prices are equal to marginal cost, does not allow for the reinvestment of profits in innovations.

defined in different ways. This complexity and volatility, added to the uncertainties inherent in innovation processes, make the valuation of these assets not a simple process.

The value of intellectual property is not fixed; it changes over time and depending on the situation in which the asset needs to be valued. This makes the valuation process not straightforward.

On the other hand, intellectual property management can precisely leverage this volatility in the value of intangible assets to benefit the company or institution in the long term. One of the most effective ways to maximize the value of intellectual property is not to rely on a single registration, but to combine various intellectual property assets with the aim of maintaining the value of the good or service over time. Patents, although they constitute one of the main tools for creating barriers to entry for competitors, have a limited duration. Thinking long-term implies developing a comprehensive intellectual property portfolio in which industrial property registrations, together with copyrights, marketing, domain names, and customer databases, among others, contribute to maximizing this value. Furthermore, building a brand associated with a new product or service can generate sustainable value, as brands can be renewed indefinitely.

Figure 2 presents a view of how intellectual property can add value throughout the product lifecycle, considering the possibility of protection for each IP asset according to the maximum term of each right. It highlights the importance of good brand management, the only asset that can be renewed indefinitely, in combination with other forms of IP protection that fulfill functions related to functionality, ornamental or aesthetic form, and authorship, but which have a limited protection time.

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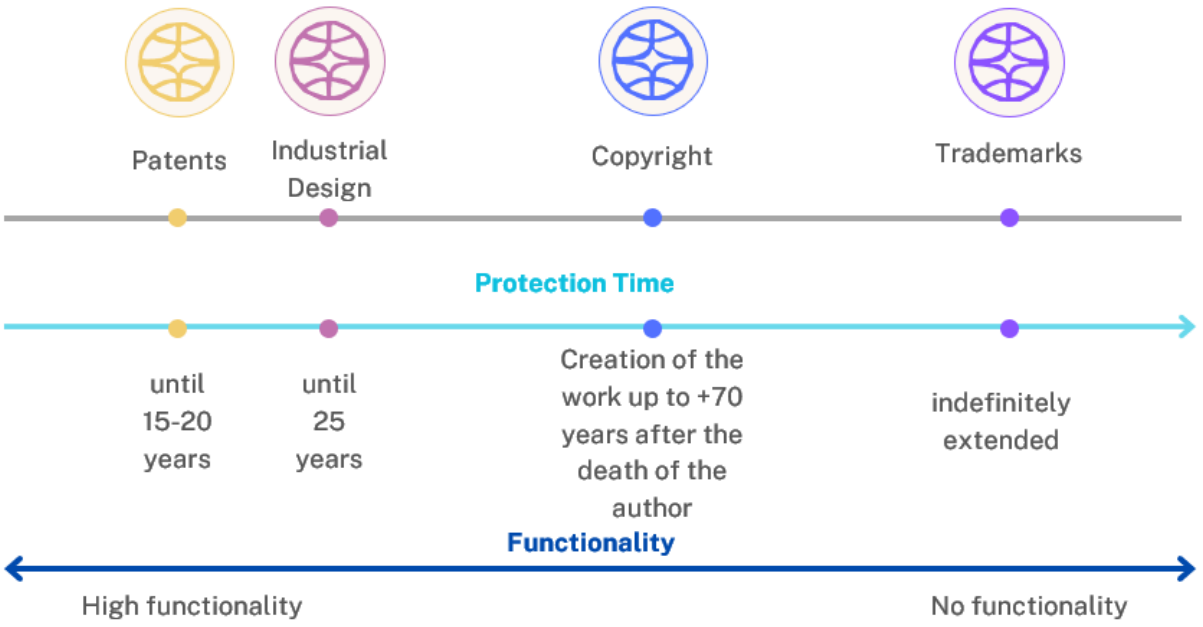
Figure 2 – IP in the Product Lifecycle



Adaptated from Conley and Szoboscan (2001)

Therefore, intellectual property management must consider these distinct forms of value generation to maximize long-term benefits. This management involves protecting, valuing, and exploiting intangible assets, such as patents, trademarks, copyrights, and trade secrets, and, above all, recognizing the strategic value of intellectual property for the activities of the company or institution.

Another relevant aspect is the need to conduct an IP audit before carrying out any valuation. It is essential to identify issues related to availability, the duration of protection, the countries where the intellectual property is registered, among others. These answers are decisive, as they can significantly influence the value of the intellectual property.

For effective management that maximizes the value of the intellectual property portfolio, it is necessary to identify protectable assets, ensure they are properly registered, guarantee monitoring against infringements, and continuously monitor these rights to maintain their validity and avoid litigation. Furthermore, the usage strategy for each right must be well-defined, focusing on maximizing the value of the IP through licensing or direct exploitation. In summary, efficient IP

management, together with well-structured commercialization strategies, can protect and enhance the company's intangible assets, contributing to its long-term growth and success.

4. The Valuation of Intellectual Property in the Context of the Commercialization of Intellectual Property Assets

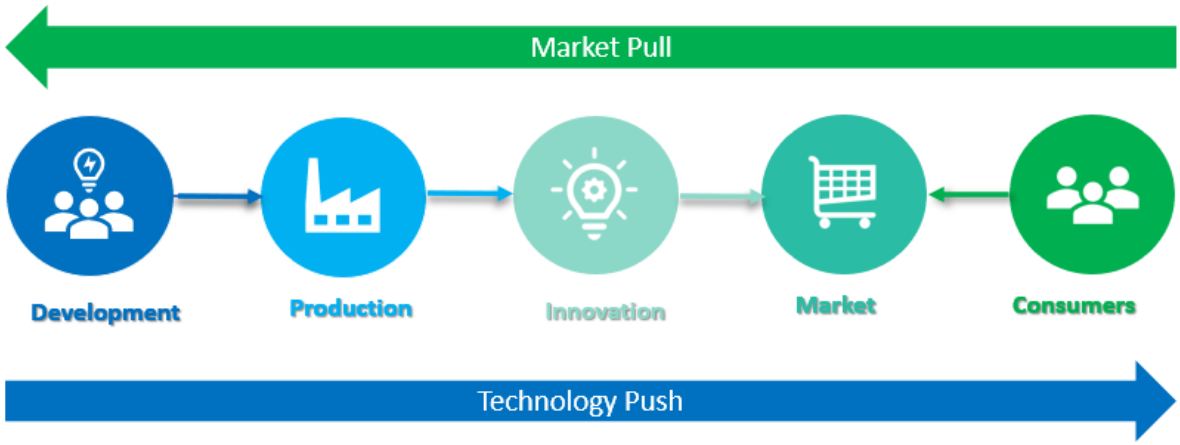
From the granting of an intellectual property right or its expected right, the intangible asset may or may not be commercialized. The holder of the intellectual property right has several options to bring the innovation to market: they can produce and sell the good or service on their own account or, alternatively, transfer the right to third parties through assignment or licensing, through negotiations between the offeror and the applicant.

It is fundamental to recognize that the intellectual property asset, by itself, is only one of the necessary components of the production process. To extract its value, it is essential to combine it with other complementary factors of production, such as marketing, logistics, and distribution. In this sense, it is necessary to establish contractual agreements that allow the integration of intellectual property with these complementary factors, with the aim of facilitating the appropriation of commercial value.

In the case of patents, for example, when the technology developer is a university, a research center, or a micro-enterprise, licensing is often the only way to bring the technology to market. This is because these agents do not have other complementary factors of production and distribution, such as plants, distribution channels, and logistics. Therefore, it is important to understand that, since many patents are generated outside the business environment, there is a bottleneck that must be overcome for innovation to materialize effectively.

Furthermore, it is important to highlight that, for licensing to occur, there must be a real interest from companies in the intellectual property rights being developed. To understand this

dynamic, it is fundamental to refer to the concepts of technology push[3] and market pull. While both coexist in a healthy innovation environment, it is important to consider that, in the case of technology push, companies are often not technically or financially prepared to implement or develop the complementary assets necessary to incorporate IP into their portfolio. This is particularly relevant in the university setting, where high-tech projects are frequently developed, but it is difficult to identify potential interested parties. From a business perspective, companies often demand specific solutions that may not be available in universities. In this context, the conclusion of partnership agreements prior to technology development, such as Research, Development, and Innovation (R&D&I) agreements, becomes particularly important. When these agreements are signed before the creation and protection of intellectual property assets, they can offer advantages in technology transfer, such as exclusive access to patents or differentiated remuneration conditions, depending on the prior investment in development.



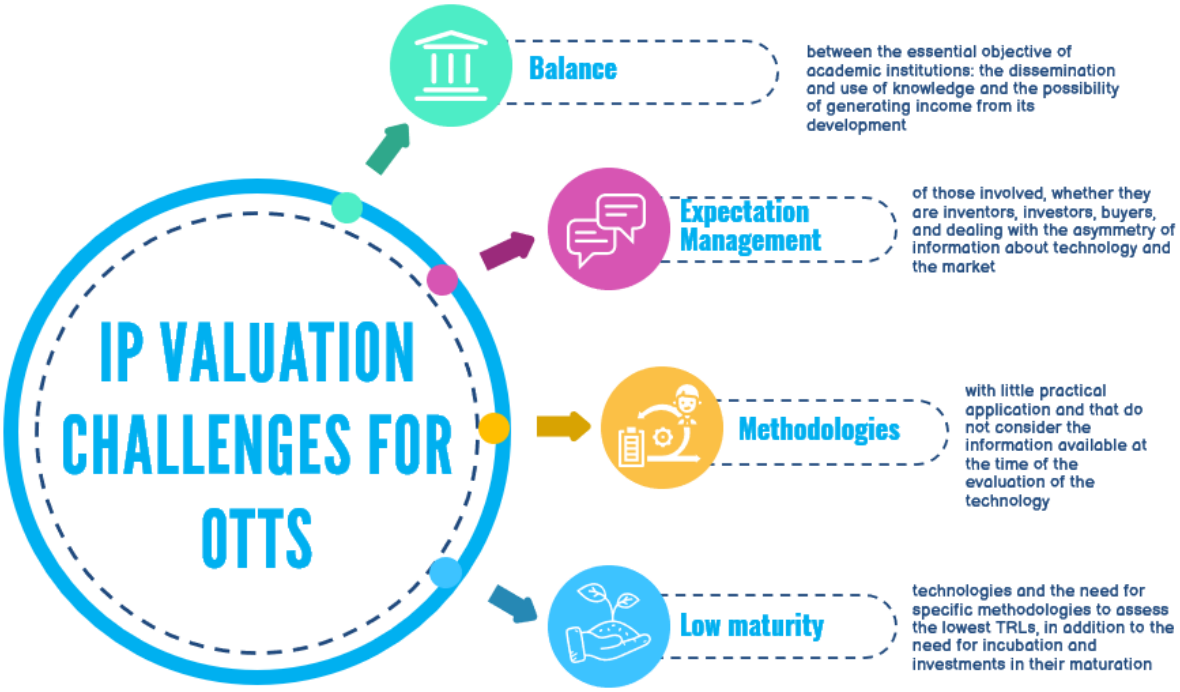
Adaptated from https://www.fostec.com/en/escaping-innovators-dilemma-2

The technology market, as observed, does not operate in the same way as traditional markets. Therefore, technology transfer contracts should not be seen as mere isolated

[3] In summary, technology push is an innovation model in which technologies are developed in research centers and universities without specific market demand. Once mature, these technologies must be transferred to the productive sector.

transactions, but rather as opportunities to build long-term strategic partnerships between agents who possess complementary assets and share mutual interests.

While technology transfer is a fundamental process in the value creation chain of innovations developed outside large corporate environments, it still faces multiple challenges that must be overcome to enable its full effectiveness. In this context, it is essential to identify the main observed obstacles, whether in terms of risk aversion, lack of an innovation culture in institutions, complex bureaucratic processes, scarcity of financial resources, difficulty in establishing alliances, or problems in technology valuation



Adaptated from WIPO (2021)

For licensing agreements to be successful, it's crucial to precisely define the scope of the license, the obligations of the parties, the protection clauses, and especially the value of the considerations. In this regard, fostering a favorable environment for licensing by reducing information asymmetry between parties and promoting good practices in license negotiation can be a key factor for the success of these agreements. Likewise, it's important to remember that

licensing develops within the framework of dynamic commercial relationships, where the possibility of establishing new agreements and alliances is not only relevant but also expected.

4.1. Most common types of contracts negotiated

Once the strategic aspects of the negotiation process are addressed, we can move on to analyzing the main types of technology transfer contracts.

Among these, the most common are licensing agreements, which grant a third party temporary permission to use an intellectual property right for commercial exploitation purposes. Licenses can be exclusive, meaning only one company is authorized to use the right, or non-exclusive, allowing the right to be used by one or more companies. In the case of non-exclusive licenses, the initial licensing agreement usually sets minimum compensation parameters, which means a second licensee will pay higher fees to the technology holder as the business risk will be lower.

Another key point in negotiation is sublicensing, which allows the licensee to grant a new license agreement to third parties. When this is stipulated in the contract, the original right holder generally receives a percentage of the income generated by such sublicense. Furthermore, a fundamental aspect of licensing agreements is that their validity cannot exceed the protection period of the registered assets being licensed.

Another type of contract is assignment, which involves the permanent transfer of intellectual property rights (such as patents, software, trademarks, or industrial designs) for an agreed consideration. By assigning ownership, the original holder transfers all rights to the asset to the new owner, including the responsibility for its maintenance. Remuneration in assignment contracts is usually established through a single payment, based on the negotiation between the parties.

Finally, technology transfer contracts that do not involve formally registered intellectual property rights are divided into two categories:

1. Technology Supply Contract (ST): This aims at the acquisition of knowledge and techniques not protected by industrial property rights, known as know-how, which includes the set of information and technical data necessary to enable the manufacturing of products and/or processes.

2. Technical Assistance Services Contract (SAT): This involves the provision of specialized services and establishes the conditions for obtaining techniques, planning, and programming methods, as well as research, studies, and projects aimed at the execution or provision of specialized services linked to the company's main activity.

4.2. Forms of remuneration

So, how is remuneration handled in a technology transfer? There are various payment methods, often combining one or more strategies.

One of the most common forms is the payment of a percentage on the sales of products or services that utilize the licensed technology. This percentage is called a royalty and is widely used in licensing agreements. In assignment contracts, however, royalties are not paid, as the original holder loses the rights to the intellectual property. It's also possible to negotiate the use of tiered or variable royalties, where the royalty percentage decreases as sales increase, aiming to incentivize the commercialization of the technology without harming the absolute value received by the developer.

Another type of remuneration is the access fee, which consists of an initial payment to compensate for costs incurred by the technology's developing party. This fee is especially relevant in cases where there were no prior R&D&I (Research, Development, and Innovation) agreements or in public offerings. Unlike royalties, the access fee is a fixed value, independent of the technology's future success or use. In the case of assignment contracts, this same fee is called an assignment fee and is generally the only value charged in definitive title transfers.

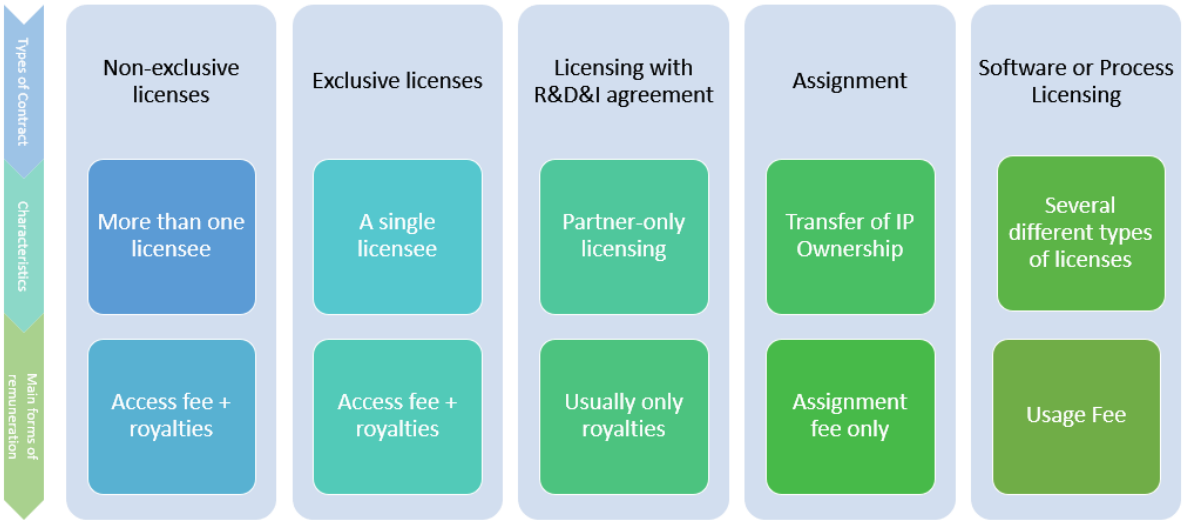
For software or process licensing contracts, another form of remuneration exists: the usage fee. In this model, payment is based on the actual utilization of the service, and can depend on factors such as the number of transactions processed, the amount of data stored, or the number

of users accessing the software. This model differs from traditional licensing models, where a single fee is paid to access the software in its entirety. Additionally, the usage fee can be applied in cases where the negotiation is not related to products or services, but to processes, which makes remuneration through royalties impossible.

Another remuneration alternative occurs when the company interested in the technology acquires an equity stake in the company that owns the technology, thereby gaining a right to a portion of the generated profits.

In summary, Figure 3 presents the main types of contracts and their most commonly used forms of remuneration. It's important to note that this scheme is a simplification of the negotiation process, and the determination of the best form of remuneration will depend on the specifics of each agreement and the strategies defined between the involved parties.

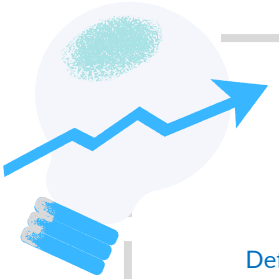
Figura 3 – Types of contracts and forms of remuneration - simplified



In Brazil, the Attorney General's Office (AGU) has established standardized contract templates for all Scientific, Technological, and Innovation Institutions (ICTs) across the country. This initiative aims to ensure uniformity and legal certainty in instruments for technology transfer, research and development collaboration, and intellectual property protection. By standardizing these contracts, the goal is to facilitate the innovation process and strengthen cooperation between ICTs and the private sector. Adopting these templates contributes to optimizing

contractual practices, ensuring compliance with current legislation, particularly the Innovation Law and other applicable regulations in the sector.

The creation of standardized templates for various types of technology contracts significantly streamlines the negotiation process, leaving valuation as the primary point of discussion in agreements. The process becomes even more agile if the interested party presents a counter-proposal for valuation. The involvement of valuation teams from both the licensor and licensee during negotiations allows for real-time calculation revisions, establishing beforehand which aspects can be analyzed and adjusted, as well as defining pre-established maximum and minimum values. In other words, prior valuation by both the offering and demanding parties should establish a negotiable range of values, in addition to identifying flexible and non-negotiable aspects. Therefore, it is crucial to promote greater dissemination of the valuation process among companies, which contributes to smoother and more effective negotiations.



How to get help?

Defining the objectives and context of IP valuation is an essential step, as it guides the choice of the most appropriate strategy and methods. IP asset valuation can be carried out internally or by specialized entities. For internal evaluations, it's important for organizations to understand that this process requires a collaborative approach, involving professionals with legal, technical, financial, marketing, and strategic expertise. In the European Union, for example, various national IP offices and public organizations offer free tools to help small and medium-sized enterprises conduct basic valuations. Notable among these tools are IPscore and IP Panorama 2.0.

In Mexico, the National Autonomous University of Mexico (UNAM) offers a guide outlining the key factors to consider in financing research projects, technology transfer agreements, and academic collaboration initiatives between the public and private sectors.

If your institution is negotiating a technology transfer, you can access a series of checklists and contract templates on the website of Brazil's Attorney General's Office (AGU). These serve as practical guides for formalizing intellectual property agreements within ICTs. Among the available documents are the Checklist for Patent Assignment, the Checklist for Patent Licensing, and the Checklist for Unpatented Technology Transfer. Additionally, there are contract templates for the assignment, licensing, and transfer of technological assets, ensuring that managers can conduct negotiations with greater security and legal foundation in Brazil. These resources are essential for standardizing processes and ensuring all agreements comply with legal requirements and protect the interests of the involved parties.

Furthermore, the IP Audit form available on the Brazil Export (*Brasil Exportação*) portal, based on a WIPO (World Intellectual Property Organization) model, assists small and medium-sized enterprises with IP-related issues in export processes.

In the next chapter, we'll introduce some of the main valuation methods. Afterward, we'll revisit the context of valuation in the technology transfer process, especially those involving university-industry relationships.

Summary: Stages of Technology Transfer Contract Negotiation

What is it?

To share intellectual property rights and technical knowledge between people, universities, research centres or companies.

Types of contracts

There are different types of contracts for technology transfer, such as exclusive licensing, non-exclusive licensing, assignment, or even transfer without formal intellectual property rights.

Parties

Two main parties: the transferor or licensor (owner of the technology) and the assignee or licensee.

Forms of remuneration

Royalties, access fee, usage fee, assignment fee, profit sharing.

Benefits

It accelerates innovation, expands the market, reduces research and development costs, access to new technologies, and risk sharing.

Recommendations

Proper assessment, clear definition of rights and obligations, confidentiality.

Images generated by Artificial Intelligence algorithm

5. Valuation Methods

Different approaches, both quantitative and qualitative, can be used to value IP. Quantitative methods rely on numerical and measurable data to estimate the economic value of IP, while qualitative methods analyze characteristics such as the legal robustness of a patent and its potential for use, generally applied through ranking methods. In the field of quantitative evaluation, three main approaches are used: cost-based, market-based, and income-based.

Cost-based

Assess the cost of IP development

Market-based

Compare the value of the asset with potential substitutes in the market

Income-based

Estimate the benefits derived from the explotation of IP

The aim of this guide isn't to delve deeply into each of these approaches, but rather to present the main ways of valuing technology, highlighting their advantages and disadvantages. In addition to the primary methods, other valuation methods exist and will be briefly introduced throughout this chapter.

It's also important to remember that valuation isn't about choosing a single, definitive method for each asset. Quantitative methods are often calculated by considering different approaches, while qualitative methods will apply some type of scoring to each factor influencing the asset's value.

5.1. Cost-based approach

Evaluating the expenses incurred to produce a good or service is always a method to consider when determining value. Tangible assets, in general, consider both fixed and variable production costs, from which a profit margin will be established to ultimately determine the price.

In the case of intangible assets, it's natural that this cost is also considered in some way when determining value. When thinking about the establishment of the Intellectual Property System, the main objective is precisely to remunerate the developer to compensate for the expenses incurred in developing this asset, thereby providing the necessary incentive to innovate.

For the application of the cost-based approach, there are three commonly used possibilities: the historical cost method, the reproduction cost method, and the replacement cost method.

a) Historical Cost Method

The historical cost method involves calculating all the actual costs involved in the creation and development of the intellectual property, such as research and development, marketing, and labor[4]. While historical cost is important for determining minimum return values, it's likely that, on its own, it won't guarantee a good valuation of intellectual property. Just as the return can be much higher than historical development costs, it's also possible that a product or process may never reach the market due to technical or commercial reasons. It's important to note that wasted costs—that is, amounts invested in projects that didn't generate benefits—should not be included in this calculation.

[4] For example, if developers spent $30,000 per year for a project that lasted 2 years, the historical cost would be $60,000 plus monetary correction for those two years.

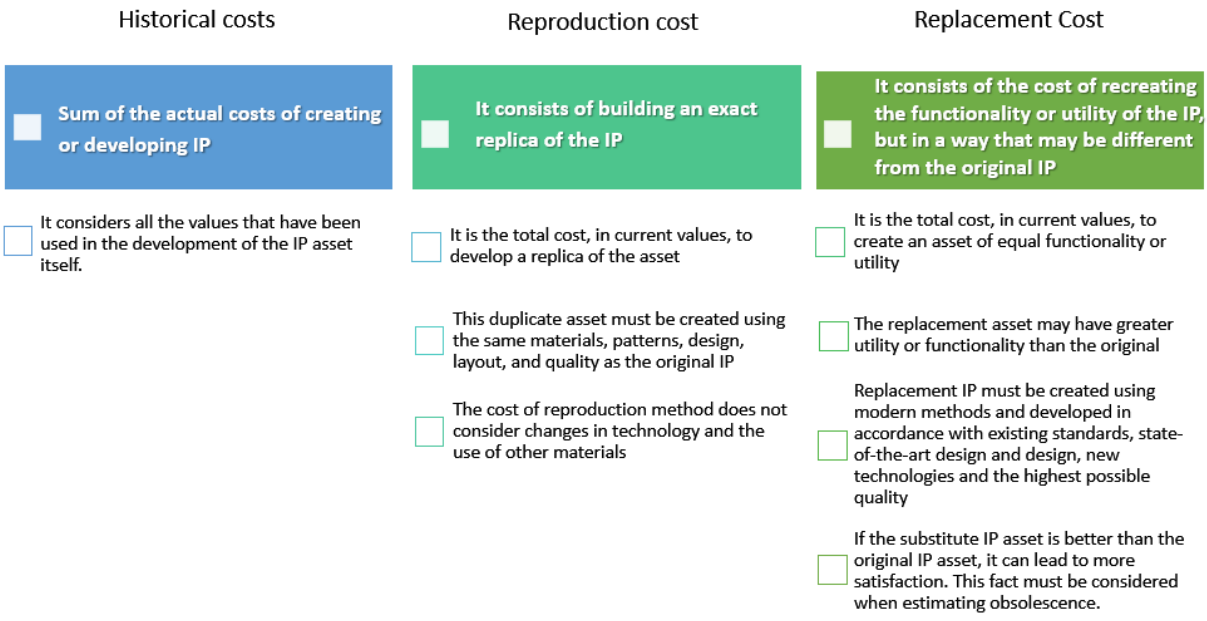
b) Reproduction Cost Method

The reproduction cost method involves calculating, at present value, the cost of developing an exact replica of the intellectual property. That is, it seeks to determine what the cost would be to reproduce the intellectual property using the same inputs, standards, and quality level as the original.

c) Replacement Cost Method

On the other hand, the replacement cost method is based on recreating the functionality or utility of the intellectual property. In this valuation method, the replacement value can consider better standards and materials, meaning the IP can be comparable to another of equal or superior quality to the original.

Figure 4 – Comparison between cost methods

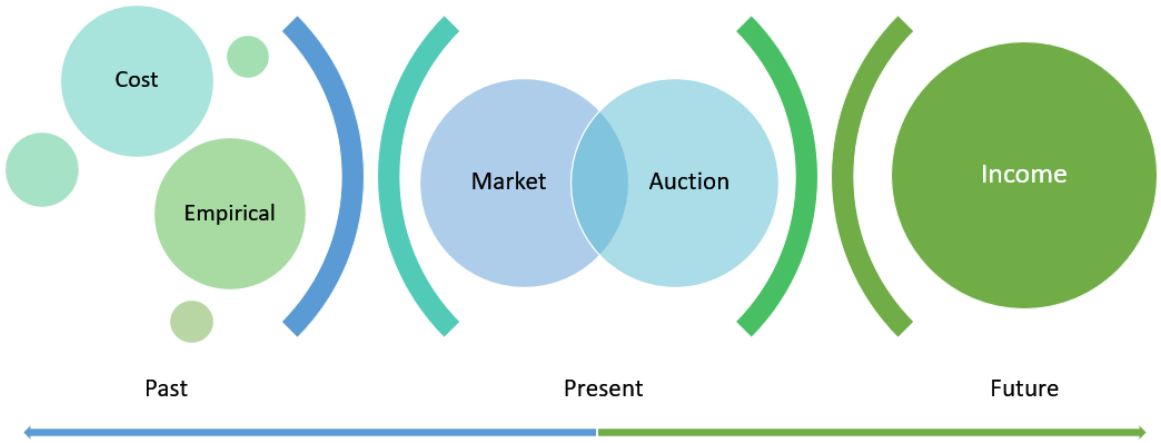


Adaptated from WIPO (2004)[5]

[5] https://www.wipo.int/export/sites/www/sme/en/documents/pdf/ip_panorama_11_learning_points.pdf

Cost methods are typically used in specific cases, such as when IP assets can be easily reproduced or when market-based and income-based methods lack sufficient data. They are also applied to early-stage technologies that don't yet have the potential to generate income. While any valuation expects incurred costs to be recouped, this method isn't usually the most suitable when there's an economic activity under analysis.

This is because by only considering costs—even if they include future maintenance expenses for the right—the focus remains limited to the past, meaning what has already been invested in the innovation's development. Consequently, this method doesn't account for the future benefits the asset can generate nor the consumers' perception of its present value. For this reason, although creation and protection costs are important criteria for evaluating return on investment, an argument based exclusively on cost isn't considered strong in a negotiation.



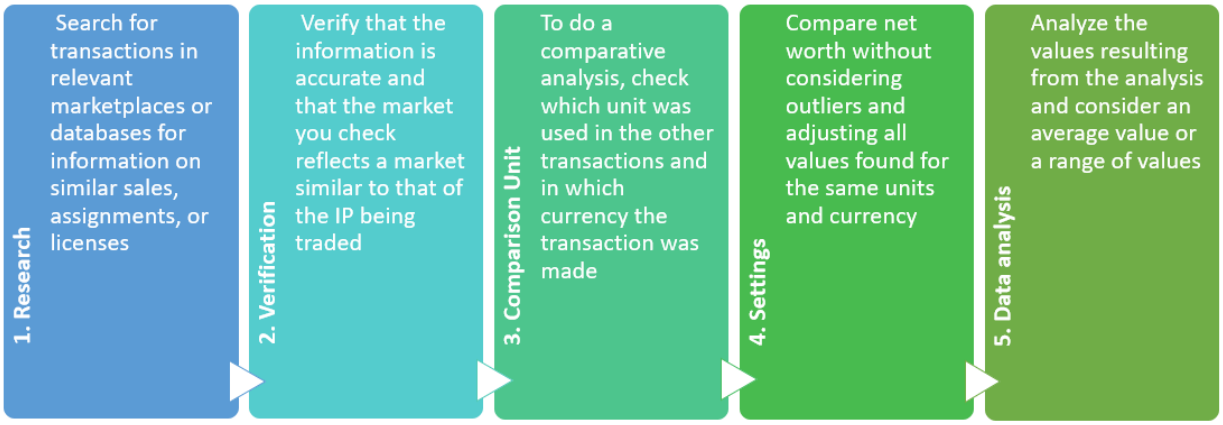
5.2. Market-based approach

Another very common method for valuing assets, including intangibles as well as most goods and services offered, is comparison with the price of similar transactions. This method is usually straightforward to apply, as it only requires information and observation of the current market. For goods and services with close substitutes, identifying this value is almost immediate. However, when it comes to intellectual property, it's necessary to identify the actual price paid in negotiations for similar or comparable intellectual property rights. To do this, there are databases

that collect information on numerous IP-related transactions, especially concerning royalty percentages.

In general, market-based valuation involves researching comparable assets, both in terms of the technology itself and market demand. The more information available—such as prices, conditions, license types, and details about the asset itself—the more accurate the valuation will be. Figure 5 illustrates the suggested steps for valuation based on the market approach.

Figure 5 – Suggested steps for market-based valuation



Adaptated from WIPO (2004, p. 20)

One of the main advantages of this approach is that, by analyzing the real market and supply and demand conditions, it gets closer to ordinary asset transactions, that is, market equilibrium. Another advantage is its relative ease of application, as it doesn't rely on complex mathematical methods. Despite these advantages, this method is often combined with other approaches, especially income-based methods, when data is available. The primary disadvantage of this method is that it cannot be applied in cases where comparable transactions don't exist, such as with unique assets or unprecedented innovations. In these situations, it can be difficult to find sufficiently close substitutes to justify its use.

Valuation by Auction

Auction is one of the oldest methods for asset valuation and can also be applied to the valuation of intellectual property, including both trademarks and patents. For patents, when a public technology offering is made, the valuation is usually carried out through the auction method, based on the evaluation of the proposals submitted. For trademarks, valuation through auction is more common in mergers and acquisitions processes or in situations involving guarantees and pledges.

5.3. Income-based approach

A third approach to asset valuation is based on the amount of income an asset is expected to generate over time. Approaches related to the possibility of future income are widely used to value IP assets, but their use requires the IP to be mature enough to have market data available. In this approach, the most common methods are those already well-known in tangible asset valuation, especially Discounted Cash Flow (DCF) and Net Present Value (NPV).

To calculate DCF, it's first necessary to project the stream of income or cost savings generated by the intellectual property asset over its useful protection life. From this income stream, any costs related to that intellectual property — such as materials, investments, specialized labor, among others — must be deducted. This yields the "projected net income," i.e., the income flow minus the costs.

From these estimations, this cash flow must be brought to present value using a discount rate, which represents an expected rate of return to compensate for the time until the income materializes and the risks associated with that flow. To define this rate, reference can be made to rates used for comparable IP assets.

One of the main advantages of the income approach, especially DCF, is that, when data is available, it's relatively easy to apply and allows future information to be incorporated into the value estimation. Furthermore, although it doesn't capture all business risks, the use of a discount rate helps mitigate some of the uncertainty.

DCF = revenue projections / (1 + discount rate) raised to the power of the number of periods

Example:

Year 1	Net Economic Benefits: $ 100.000
Year 2	Net Economic Benefits: $ 150.000
Year 3	Net Economic Benefits: $ 200.000

10% discount rate

	Year 1	Year 2	Year 3	Total
Projected Net Income	100.000	150.000	200.000	
Discount Rate	**10%**	**10%**	**10%**	
Discountes Flow	90.909,09	123.966,94	150.262,96	**365.138,99**

Year 1	100.000 / (1+10%) = 90.909,09
Year 2	150.000 / $(1+10\%)^2$ = 123.966,94
Año 3	200.000 / $(1+10\%)^3$ = 150.262,96

In this case, the value of the expected result for the first three years would be: $365,138.99.

Other Methods Using the Income Approach: Real Options and Monte Carlo

The Real Options method is derived from the Discounted Cash Flow (DCF) method. Simply put, it can be defined as a traditional Net Present Value (NPV) calculated using DCF, combined with a flexible NPV that accounts for the project's Real Options, such as the option to abandon the project. This approach allows for the incorporation of uncertainty and flexibility into investment decisions, although it is a mathematically complex method.

The Monte Carlo method, also based on the DCF method, involves a computational simulation that calculates a series of values and different possible distributions of these values for each variable involved. This technique projects thousands of scenarios and NPV values, organizing them within a frequency framework that provides a clearer visualization of the probabilities of each NPV occurring. This yields a more precise probabilistic view of the intellectual property asset's potential value outcomes

5.4. Empirical methods

In addition to quantitative approaches for determining value, there's also the possibility of following established and commonly used standards[6], known as Thumb Rules. This type of analysis is based, for example, on standard industry royalty rates, such as those presented in Figure 6.

[6] For a list of historical average royalty rates, Kaptisa and Aralova (2015) updated some of the most relevant studies on the subject. Available at https://nasu-periodicals.org.ua/index.php/science/article/view/6039/5365.

Figure 6 – Royalties for Licenses (1980-2000)

Industrial sector	Number of Licences Analyzed	Minimum Royalty rate	Maximum Royalty rate	Median Royalty rates in the setor
Automotive	35	1,0%	15,0%	4,0%
Chemical	72	0,5%	25,0%	3,6%
Computer	68	0,2%	15,0%	4,0%
Consumer Goods	90	0,0%	17,0%	5,0%
Electronic	132	0,5%	15,0%	4,0%
Energy	86	0,5%	20,0%	5,0%
Foods	32	0,3%	7,0%	2,8%
Health Products	280	0,1%	77,0%	4,8%
Internet	47	0,3%	40,0%	7,5%
Machines and tools	84	0,5%	25,0%	4,5%
Media & Entertainment	19	2,0%	50,0%	8,0%
Pharmaceuticals & Biotechnology	328	0,1%	40,0%	5,1%
Semiconductor	78	0,0%	30,0%	3,2%
Softwares	119	0,0%	70,0%	6,8%
Telecommunications	63	0,4%	25,0%	4,7%
Total	**1.533**	**0,0%**	**77,0%**	**4,5%**

Source: Parr (2007)

One of the most frequently used rules in valuing intangible assets is the 25% Rule. While not based on a rigorous calculation methodology, it has been widely adopted in technology transfer transactions. According to this rule, the benefits obtained from licensing—whether through increased revenue or reduced costs—are typically distributed with 25% going to the technology owner (licensor) and 75% to the licensee.

For a determined expected rate of return, a royalty amount is calculated that makes the anticipated effective cash flow from using the licensed technology equal to zero. Once the NPV and cash flows are defined, royalty rates are often calculated based on this rule.

In the case of cost reduction, the technology owner would receive 25% of the value of the costs saved, proportional to the income generated. Similarly, if the technology increases profits, the royalty rate would be calculated as 25% of the additional operating profit generated by the sale of the product or service, divided by total revenue:

Cost reduction

Royalties = 25% cost savings / revenue

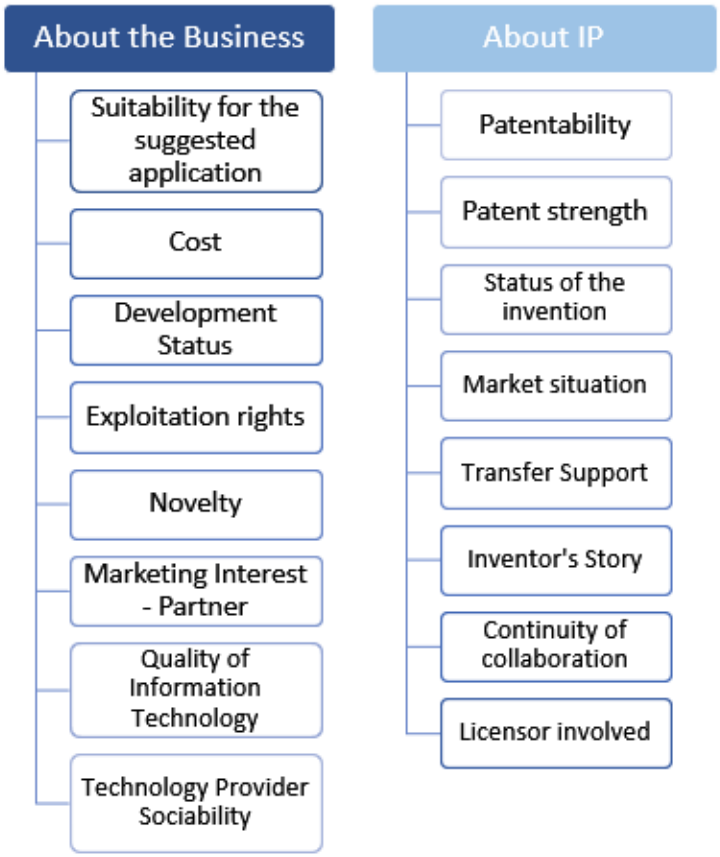
Increased profits

Royalties = 25% operating profit / revenue

5.5. Qualitative Methods

In addition to quantitative methods used to determine the value of intellectual property assets, it's also possible to apply qualitative factors that influence the estimation of their value. For these qualitative methods, an institution usually defines evaluation criteria, assigns them a score, and establishes a ranking among them. Figure 7 presents examples of possible criteria to consider in a qualitative approach.

Figure 7 – Examples of qualitative prioritization criteria for Technology Transfer



Source: WIPO (2021, p. 14)

Based on the institution's survey of these criteria, a hierarchical structure should be established so that the qualitative aspects also become part of the value to be determined for the intellectual property.

Choosing the most appropriate valuation method is a complex task that requires considering various factors, such as the type of IP, the technology's development stage, and the valuation's objective. Furthermore, it's crucial to evaluate the advantages and limitations of each methodology. In the next chapter, simplified ways to apply these methods will be presented to exemplify the methodologies discussed in this chapter

.

6. Practical application of valuation methods

Now that the main valuation methods are known, it's necessary to define how to select the most appropriate method or the ideal combination of methods, and how to weigh them to arrive at a range of possible values for negotiation. As seen in the previous chapter, theories on valuation methodologies are extensive, with multiple possibilities for calculating the value of a technology. Knowing how to choose and apply these methods is fundamental to the success of the valuation and, consequently, to the negotiation of technology transfer agreements.

Typically, a single valuation method is not used, but rather a weighted combination of different approaches

The ideal combination of valuation methods will depend on factors such as: (i) The stage of technological maturity; (ii) The type of contract to be developed: Whether it's an exclusive license, a non-exclusive license, or an assignment; (iii) The existence of a partnership agreement with the licensing company: For example, an R&D&I (Research, Development, and Innovation) agreement; (iv) Data availability for calculations; (v) Legal/judicial factors: Such as the obligation to conduct a public offering; and (vi) The existence of co-ownership of the technology between the parties.

Another relevant dimension for valuation is the strength and scope of intellectual property protection. For example, granted patents tend to have a higher value than those still pending, due to reduced uncertainty. Trade secrets can also be valued based on the risk of disclosure by sellers or buyers.

Regarding the degree of technological maturity, the Technology Readiness Level (TRL) is the most widely used methodology for its identification. The TRL is a scale developed by NASA to assess the development status of a specific technology. Figure 8 presents the stratification of the technology development maturity level.

Figure 8 – Technology Readiness Level (TRL)

Source: https://www.embrapa.br/escala-dos-niveis-de-maturidade-tecnologica-trl-mrl

In the context of a valuation, it's expected that as technology maturity increases, its value also grows, as business risk decreases and the technology approaches commercialization, at which point the return on investment will truly begin. There are several free calculators to identify the TRL of a technology, such as the Ministry of Education[7], and the University of Sergipe[8], among others.

Technologies in early stages of maturity, i.e., with TRLs 1, 2, and 3, are often not at the ideal moment for transactions. However, there are situations in which this can occur. The most common cases arise in joint development projects, when the company involved in the research needs technology transfer to advance to the next stages, such as validation in relevant environments, or even in contexts where the university or research center lacks the installed capacity to continue with the development.

In this initial phase, it's not common to use the income-based valuation method, as any inference about future cash flow would be unreliable. Market-based valuation—i.e., comparison with similar technologies—is possible, but not the most suitable due to the limited number of comparable transactions.

In these cases, cost-based valuation is usually the most frequently used, as it allows for more precise data. However, this method has been used less and less, as it doesn't necessarily represent the true value of the technology, potentially yielding estimates much lower or, in some cases, excessively higher than what would be feasible to negotiate.

For cost valuation, the main source of data is usually the university or technology development center itself, unless the research is carried out collaboratively, which also requires information from the company. Section 6.1 will present some considerations on the application of this method.

[7] https://vitrinetecnologica.mec.gov.br/37-uncategorised/176-calcule-a-maturidade-da-tecnologia

[8] https://avalchek.netlify.app

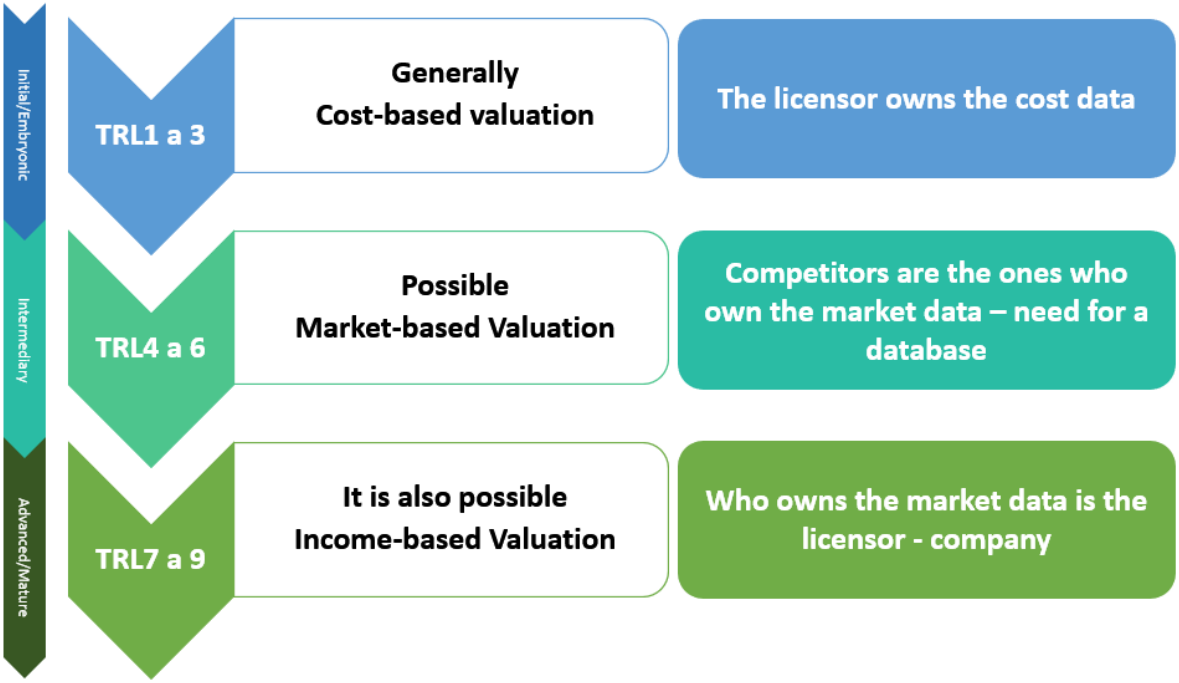
At intermediate maturity levels — generally technologies with TRLs 4, 5, or 6 — the Market-based method becomes more recommendable. At these stages, although it may still be difficult to collect sufficient data for an income valuation, market databases begin to offer more information and allow for the identification of comparable technologies. The main source of information for this type of valuation is specialized databases, as will be seen in more detail in Section 6.2.

These intermediate stages of technological maturity are often the most common in universities, as they correspond to the so-called "Technological Death Valley", characterized by a scarcity of funding. Therefore, it is in this phase that a greater number of licenses are usually granted. Although various risks are still associated, transaction values are not usually high, which partly explains the abundance of data on technology transfer available in databases.

For more advanced stages (TRLs 7, 8, and 9), with the reduction of risk and the technology's proximity to the market, negotiated values tend to be higher. At this point, in addition to the cost and market methods, income-based valuation can be applied with greater certainty. In this phase, the company interested in the technology may already have more reliable information on demand, costs, and resale value, allowing for the application of a Discounted Cash Flow and a more precise analysis of the Internal Rate of Return (IRR). That is, for the application of the Income method, the company is usually responsible for providing the main data, as indicated in Section 6.3.

Figure 9 presents a simplified model with the most commonly used methods at each stage of technological maturity, as well as the main data supply source.

Figure 9 – Simplified model of the possibility of using the main valuation methods by technological readiness level



The nature of technology transfer significantly influences the choice of valuation method. However, many universities and research centers still don't clearly recognize the importance of the transfer type in properly defining a technology's value. The type of contract—whether an exclusive license, a non-exclusive license, or an assignment—implies different methodologies and outcomes, so it should be considered one of the first aspects when initiating a negotiation, including an analysis of market potential.

Assigning a patent offers the advantage of generating a single payment, which can be useful for recovering research investments, resolving specific financial issues, or eliminating patent maintenance costs once the buyer assumes ownership. Nevertheless, it also entails losing the right to continue developing or exploiting the invention, as well as the risk of undervaluation of its true economic potential.

Licensing, on the other hand, allows for income generation without assuming the inherent risks of product production and commercialization. Furthermore, it offers the possibility of maintaining some control over the terms of use, such as the term, territory, and authorized users. In this model, the licensor retains the right to exploit the patent, and depending on the license type, can grant new licenses to third parties. However, financial recovery is typically more gradual,

and patent management — including the payment of maintenance fees — remains the responsibility of the holder.

When deciding to grant licenses, it's relevant to consider that exclusive licenses tend to offer a faster return on investment and are generally more attractive to licensees seeking competitive advantages through exclusivity. However, in certain sectors, non-exclusive licenses can be equally profitable, as granting licenses to multiple licensees can compensate for the lower value of each individual transaction.

Although less frequent, technology assignment can also be the most suitable option in certain contexts, especially for technologies in early stages of research, development, and innovation (R&D&I). In these cases, it's important to note that assignments do not involve royalty payments, as remuneration is established solely through an initial payment or assignment fee.

Finally, in R&D&I agreements, their effects on technology valuation must also be considered. This is mainly because, in this type of partnership, the participating company is often the only possible licensee and, frequently, a co-owner of the results. Consequently, the technology's value under these conditions tends to be lower than that of a license offered in the open market to third parties.

6.1. Application of the cost-based approach

For applying the cost-based valuation method, the necessary data is usually available from the technology developers themselves. This simplifies the calculation for licensors, both for estimating reproduction and replacement costs. As noted in the previous chapter, while not the most precise method for defining value, it remains a valid methodology, especially when there isn't enough data for Market-based or Income-based methods.

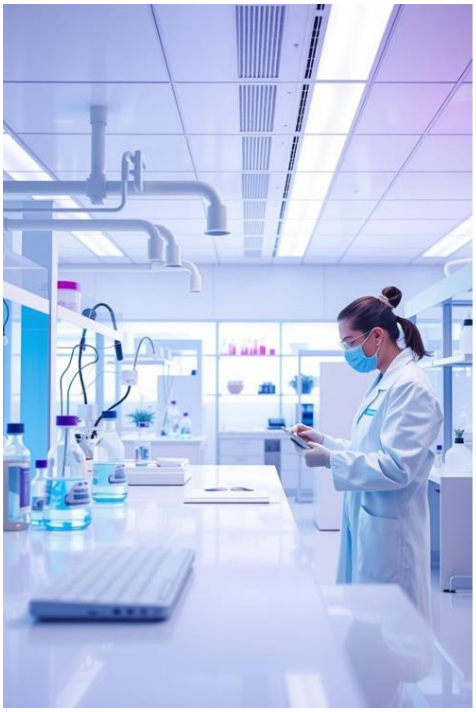
A recent evolution in the application of the Cost approach has been the incorporation of valuing the intellectual capital of the academic groups involved in technology development. The

National Autonomous University of Mexico (UNAM),[9] for example, developed a specific four-stage methodology based on identifying Specific Value Points (SVP), which allows for valuing this intellectual capital. These points include equipment, software, research and development processes, and the existence of external funding — elements often not considered in cost calculations. This methodology is particularly relevant in R&D&I contracts, as it allows the university to more accurately identify its contribution in terms of prior intellectual capital compared to the corporate counterpart.

In the case of an assignment to a co-owning company, for example, this type of valuation can be key, as no royalty payments are involved. While it's important to recognize the university's prior intellectual capital, it's also necessary to consider that this shouldn't significantly inflate the remuneration corresponding to the assignment fee. This is because, within an R&D&I agreement, the commercialization of the technology will only be possible through the co-owner, who can also continue to foster new joint projects in the future.

The following example illustrates the application of the cost-based approach in a technology transfer between a pharmaceutical company, an ICT, and a research foundation, within an R&D&I agreement for a technology still at TRL 3 maturity. The technology was developed collaboratively among the ICT, two foundations, and the company interested in its commercial exploitation. Given the long development process still required, as well as the necessary regulatory stages before market launch — which demand significant investment — the company chose to acquire the technology via assignment. A remuneration proposal for the assignment of intellectual property rights was formalized. The ICT, together with the other partners, analyzed the proposal and presented a counter-proposal based on a cost-based valuation, which was accepted. Currently, the licensee company continues to develop the technology, which has not yet generated products or services available in the market.

9 https://jart.icat.unam.mx/index.php/jart/article/view/470/466



Assignment of Technology in the Pharmaceutical Area

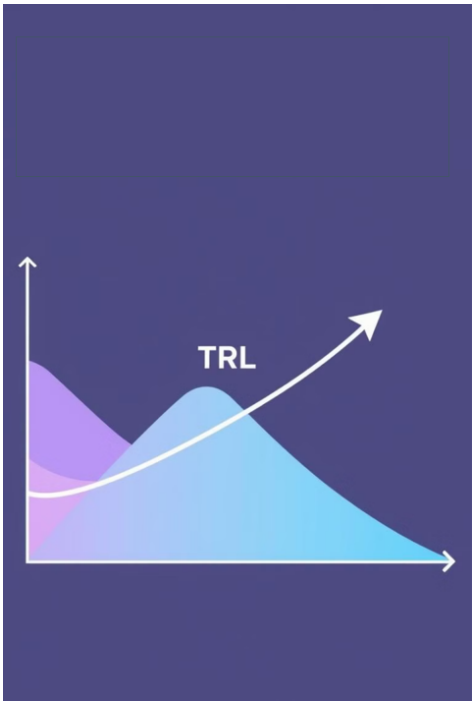
Knowledge Area: Pharmacy

Application: Drug Development

Development: The technology was developed in collaboration between ICT, two foundations, and the company interested in its commercial exploitation, via an RD&I agreement.

Development & Partners

1. **ICT**
   Science and Technology Institution
2. **Funding Foundation**
   Research funding and support
3. **Company**
   Commercial exploitation of the medicine



Technology Maturity

1 **TRL 3**
Early stage of development

2 **Significant Investment needed**
Given the extensive development process still required, as well as the regulatory steps that the technology must go through before it can be launched on the market — all of which require a significant investment of resources — the company chose to transfer the technology through **assignment**.

Technology Transfer Mode

Assignment of Ownership

Full transfer of intellectual property rights.

Remuneration

Assignment Fee

Remuneration for the transfer of intellectual property.

Technology Valuation – Cost-Based Method

Analysis of Incurred Costs and Replacement

Determines the costs already invested in the development of the technology.

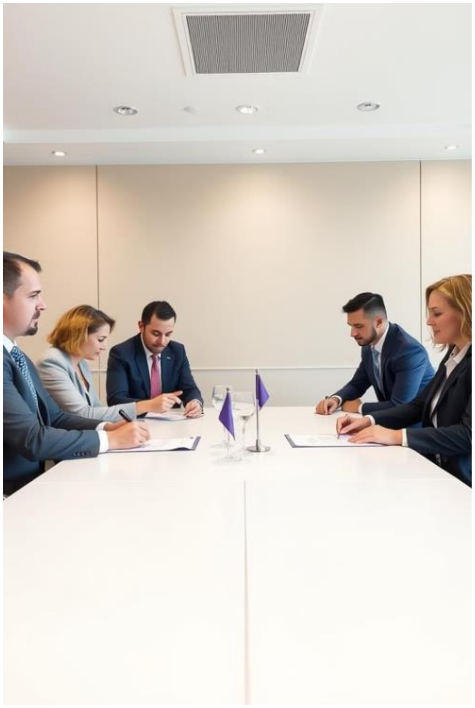
Prior Intellectual Capital Analysis

Valuation of the intellectual capital of the academic groups involved in the project.

Impossibility of Other Methods

There is no market database for the assignment modality, and it is not possible to opt for valuation by market comparison.

Due to the early stage of the technology, there is not enough data for income-based valuation.



Negotiation and Contract

1

Company Proposal
The company formalized a proposal for remuneration for the assignment of intellectual property rights.

2

Counterproposal
ICT, together with the investing foundations, analyzed the proposal and presented a counterproposal, based on the valuation of the technology by the cost method.

3

Final Agreement
The company accepted the adjusted terms proposed by the ICT and the foundations. The licensed company continues to develop the technology, which has not yet generated solutions available on the market.

Source: CTIT/UFMG, 2024. Images generated by artificial intelligence algorithm

6.2. Application of the Market-based Approach

As mentioned, much of the technology developed by universities and research centers is still in an intermediate stage of technological maturity, usually corresponding to TRLs 4 or 5. At this stage—often known as the "Valley of Death" of innovation—it's common for the technology to still be several years away from market introduction. For this reason, income-based valuation methods are difficult to apply, making market-based methods more suitable.

To effectively apply the market method, it's crucial to have access to reliable and extensive databases on technology transfer and valuation contracts, enabling comparative analysis. The more data available on previous technology transfers, the better the quality of the references used in the comparison.

A prominent example of a database with extensive information is Transactional Academic Comparables Tracking (TransACT), developed by the Association of University Technology Managers (AUTM).[10] AUTM is an association of Technology Transfer Offices (TTOs) in the United States, analogous to Brazil's National Forum of Innovation and Technology Transfer Managers (FORTEC). This database is particularly useful for identifying similar technologies, although the fact that values are expressed in dollars can make it challenging to adapt to other national realities. A significant advantage of TransACT is that institutions can actively feed the database with information from their own negotiations, continuously enriching its content. Furthermore, since it's a platform built and used by universities, it's an especially suitable source for ICTs to use the market method.

The main goal of searching these databases is to identify a range of minimum and maximum values for both access fees and royalties, excluding outliers to obtain more consistent and realistic references.

Another relevant source for applying the market method is the Royalty Range database, of European origin. This is a very robust platform that offers access to a considerable amount of data,

10 https://autm.net/transact

often including direct access to license contract texts. This feature provides a particularly useful level of detail for comparative analysis. However, precisely because of its depth and stricter disclosure requirements, the number of contracts available in Royalty Range is usually smaller than in databases like TransACT, which presents data in a more anonymized way. This difference can be a limitation in certain analyses, especially when seeking a greater diversity of samples.

It's important to note that for a more reliable application of the Market-based method, it's recommended to use more than one database as a reference source. Additionally, it's highly advisable for developing institutions to systematically maintain and update their own internal databases of technology valuation information. This systematic record-keeping not only helps improve the use of the market method in future negotiations but also consolidates good practices in strategic intellectual property management.

6.2.1. Auction Valuation

Public auction is a relevant form of technology valuation. In certain situations, especially for exclusive licenses not tied to joint research agreements or R&D&I projects, it's advisable to grant licenses through a public technology offering. In such cases, where the licensee has not participated in the invention's development, it's also suggested to establish an access fee to compensate for resources already invested by the developing institution. This fee can be structured in staggered payments: an initial one, another upon license granting, and a third at the market entry phase.

Within a Public Technology Offering, objective criteria are defined for evaluating proposals, considering both the royalty percentages offered and the proposed values for the access fee. To establish minimum acceptable values, the Market method is commonly used, lending greater transparency and fairness to the licensing process.

An illustrative case involves a pharmaceutical technology with cosmetic application, classified at TRL 4 maturity level, which was subjected to a public offering after being developed exclusively by an ICT, without corporate co-participation. A company expressed interest in obtaining exclusive IP licenses. Following this expression of interest, the ICT conducted a feasibility and opportunity analysis that was favorable. Based on this decision, direct contact with the company ceased, and a Public Technology Offering Abstract was published. The valuation was

performed using the market-based method, taking into account both the invention's competitive potential and the risks associated with its early development stage. It's important to highlight that in licensing processes through public offerings, the primary goal of valuation is to define the minimum remuneration parameters for technology transfer. At the end of the process, the highest-rated proposal was submitted by the company that had initially expressed interest. Currently, the company continues to develop the technology, which has not yet been launched to the market.

Pharmaceutical Technology for Cosmetics

Knowledge Area: Pharmacy

Application: Cosmetics

Development: Technology developed by the University for cosmetic applications

Technological maturity

TRL 4

Technology in its early stages of development.

Demonstration of functionality in a controlled environment.

Transfer Mode

1 **Exclusive License**

The licensee company obtains the exclusive right to use the technology.

2 **Public Offering**

A transparent and competitive process for the selection of licensees, used when there is no prior R&D&I agreement.

Remuneration

Access Fee	Initial payment for the right to use the technology
Royalties	Periodic payments based on sales of the product or service.
Sublicensing	Payment for authorizing other companies to use the technology.

Process Overview

1. **Development**
   The university developed the technology independently
2. **Interest**
   A company expressed interest in an exclusive license
3. **Feasibility and Opportunity Analysis**
   The university evaluated the feasibility of an exclusive transfer, which resulted in a positive evaluation
4. **Publication of the Offer**
   A Public Offering was published by the university
5. **Technology Valuation**
   The university determined the minimum access fee and royalties based on market analysis
6. **Licensing**
   The initially interested company submitted a proposal that was evaluated as the best in the public offering. The license was granted, and the company is continuing to develop the technology, although no solutions have yet been become available.

Valuation Approach – Market-based

Risk analysis

Assessment of the risks related to the continued development of the technology, given that its level of maturity was classified as early stage.

Database Search

Research in databases for information on transfers of similar technologies.

Differential Market Analysis
Identification of the technology's competitive advantages in relation to competitors.

Minimum Remuneration Amount
Since the objective was a public offering, the assessment focused on determining only the minimum remuneration values (royalties and access fee).

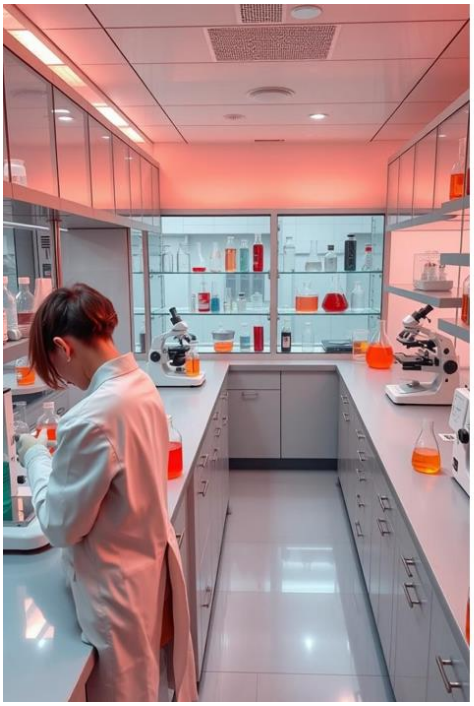
Source: CTIT/UFMG, 2024. Images generated by artificial intelligence algorithm

6.3. Application of the Income-based method

As a technology nears its final development stages, using income-based valuation methods becomes more feasible. To apply this methodology effectively, it's essential to have data, which, in this case, is held by the company interested in commercially exploiting the technology.

Therefore, a recommended practice is to request a series of financial projections from the company for a time horizon of 5 to 10 years. The data that should be requested includes: estimates of future sales per unit of measure; selling price and production cost per unit; fixed production setup costs; variable costs; and relevant tax details. The quality of this information must be carefully evaluated by the licensor, as only a robust technical basis will allow for the application of methods like Discounted Cash Flow (DCF), Net Present Value (NPV), and other techniques specific to the income approach. In this type of analysis, a key variable is defining the Internal Rate of Return (IRR). The perception of value for the technology is decisive here: disruptive technologies, for example, tend to demand higher IRRs, while incremental improvements usually justify lower rates. Likewise, technological risk analysis plays a crucial role in validating the method. The greater the degree of uncertainty associated with the technology, the less valid the application of the income model will be.

An illustrative case of this approach in practice involves a patent licensed after being jointly developed by an ICT and a company interested in its commercialization. Given the advanced level of technological maturity (TRL 8) and the product's registration with the corresponding regulatory body, the necessary data for applying the income-based approach was collected in conjunction with the associated company. Additionally, a complementary valuation was performed using the **market method** to reflect competitive environment conditions. The results obtained from both approaches were technically weighted, and the ICT's remuneration proposal was formulated on this basis. The proposal was accepted by the associated company, and the developed solution is currently available on the market.



Veterinary Vaccine Licensing

Knowledge Area: Veterinary Medicine

Application: Vaccine

Development: The technology was developed through a partnership between an ICT and a company interested in its commercial exploitation, via an R&D&I agreement

Type of Contract

Exclusive License
Exclusive to the R&D&I partner company

ICT Remuneration

Royalties
Royalty based on a percentage of product sales.

Sublicensing
50% share of sublicensing revenue

Valuation Process

1. **Step 1**
   Technology maturity analysis: TRL 8
2. **Step 2**
   Valuation using an income-based methodology (Discounted Cash Flow): utilizing data provided by the company
3. **Step 3**
   Market-based valuation (Differential market analysis)
4. **Step 4**
   Weighting of results based on technical criteria

Valuation Approaches

Income-based

Application of the Discounted cash flow method, considering projected revenues and costs.

Considering the technology's high degree of maturity and product registration with the relevant regulatory agency responsible, the necessary data for the income-based valuation method was compiled in collaboration with the partner company.

Market-based

Analysis of market conditions and competitive differentiators.

To reflect the technology's market scenario, a market-based valuation was also carried out.

Valuation Results

The results from both approaches (market and income) were weighted based on technical criteria, and the proposal for the ICT's remuneration was defined. The partner company accepted the ICT's initial proposal. The solution developed by the company using the licensed technology is now available on the market.

Positive points

1 Technology

The advanced maturity stage, granted patent, progression through advanced testing stages, and secured access to genetic heritage collectively increase the technology's value.

2 Partnership

The pre-existing R&D&I partnership facilitated the negotiation process.

3 Impact

Successful partnerships make enable long-term relationships, potentially leading to collaborations on future technologies.

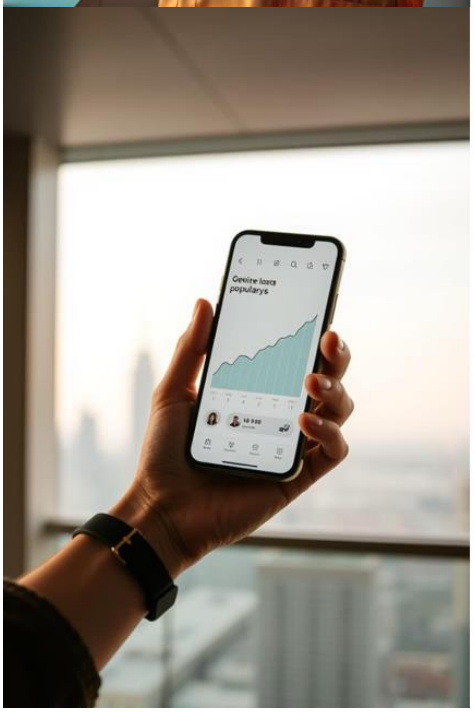
Source: CTIT/UFMG, 2024. Images generated by artificial intelligence algorithm

6.4. Using More Than One Method: Value Weighting

As mentioned previously, none of the commonly used valuation methods are infallible. Each presents advantages and limitations, depending on the context of application. Therefore, it's most advisable to use at least two different methodologies and, based on the values obtained, perform a weighting that best reflects the specific case's characteristics.

For example, for technologies in early stages of development, where applying the Income-based method isn't feasible, a combination of Cost-based and Market-based approaches can be used. For more mature technologies, Income-based and Market-based methods can be used together. When both methods are considered appropriate, the weighting can be done using a simple average. However, if one approach is clearly more suitable for the case in question, an unequal weighting may be chosen, such as 80/20 or even 90/10, favoring the more representative method.

Below is a practical case illustrating this combined valuation strategy. A company expressed interest in obtaining a non-exclusive license for a technology developed independently by an ICT. Initially, there wasn't sufficient data to apply the Income-based method, so a preliminary valuation was performed using the Market-based method, comparing similar technologies in reference databases. Subsequently, during negotiations, the company provided relevant financial information, allowing for a second valuation using the Income-based approach. Based on this new analysis, which weighted the results of both methods, the ICT found the company's proposal feasible and accepted its terms. Currently, the solution resulting from this technology is available in the market.



Software Licensing

Knowledge Area: Mathematics

Application: Mobile App

Developer: University

Process Overview

1

Development

The technology was developed independently by the university.

2

Company

A company expressed interest in licensing the software on a non-exclusive basis.

Type of Contract

Non-Exclusive License

Non-exclusive license for a Startup.

University Remuneration

Royalties

While not always common for software, this license included monthly subscriptions (paid access).

Usage Fee

Usually, the software licensing involves only a use/licensing fee.

Valuation

The maturity of the technology reached TRL 5. In the case of software, this development is usually faster. With this level of maturity, it was already possible to attempt a revenue valuation, as it was closer to market readiness/commercialization.

1. **Market-based approach**
   Determination of Remuneration.

2. **Income-based approach**
   Discounted cash flow was used, based on the company's financial data.

Negotiation Process

1. **University**
   The University presented an initial valuation using a market-based approach.
2. **Company**
   The company submitted a counteroffer based on an income approach and its own financial data that the university did not have previously.
3. **University**
   The University analyzed the revenue data and accepted the proposed terms.

Results of Technology Transfer

Successful transfer, benefiting both parties.

University	Receives subscription royalty income from the Software.
Company	The solution was developed by the licensee company and the technology is available on the market.

Source: CTIT/UFMG, 2024. Images generated by artificial intelligence algorithm

6.5. Sublicense Fee

In some cases, a partner interested in licensing a technology aims to perform additional development stages (TRL) and subsequently sublicense it to third parties. In these situations, it's crucial for the license agreement to include a percentage of the royalties obtained from sublicenses. It's highly recommended that all contracts include a clause stipulating participation in sublicense income, except where this practice is expressly prohibited, such as with know-how transfer or software programs, where sublicensing is typically not allowed. In the Brazilian context, it's common for ICTs to expect approximately 50% participation in sublicense income. For example, if a sublicense agreement negotiates a 4% royalty, the ICT would receive the equivalent of 2%.

6.6. Shareholder remuneration

As discussed in Chapter 4, one possible form of remuneration is for a company interested in intellectual property to acquire a share in the capital of the company in order to be entitled to a share of the profits. Below is a real-world example.

University spin-off remunerated through usufruct of shares

Knowledge Area: Artificial Intelligence

Application: Development of an artificial neural network platform

Origin: spin-off derived from a university research group with institutional participation in the company's capital

Type of Contract

Technology Assignment

The University transferred ownership of the technologies to the spin-off, instead of licensing them, while maintaining profit-sharing rights.

Remuneration

Shareholder remuneration

This innovative mechanism guarantees the University participation in distributed profits and economic rights from future sales of the company, without voting rights.

Valuation

External Consulting and OTT

The company's value was assessed by an external consultant hired by the spin-off, and the IP was valued by the OTT.

An unprecedented model in Brazil

1 Paper to GDP Model

Aims to transform academic research into wealth-generating products and services, inspired by international models.

2 Progress in the legal framework

The model is based on the 2016 Legal Framework for Science, Technology and Innovation, which allows universities to participate in innovative companies.

3 University Compensation

Kunumi's model serves as a reference for other universities and research institutes interested in applying the shareholder remuneration model.

Operational independence and focus on R&D

Culture and Investment

Kunumi maintains its CNPJ, its culture, and its investment in research and development, even after an acquisition.

AI Leadership

The company aims to raise the standard of AI in Brazil, participating in the global conversation as a proponent of solutions.

Benefits for Bradesco Bank

The acquisition of Kunumi will allow Bradesco to advance in AI, boosting the group.

Source: CTIT /UFMG, 2024. Images generated by artificial intelligence algorithm

6.7. Steps for the application of valuation methods

The cases presented have objectively demonstrated that the choice and application of the best combination of methods will depend, fundamentally, on the type of relationship between the developer and the company – in terms of partnership – the type of license (exclusive or non-exclusive) or assignment, as well as the degree of technological maturity. As can be seen, the valuation of intangible assets can be objectively simplified if it is based on specific criteria previously defined by the development institutions, without this implying the necessary rigour in the application of complex methodologies. This structuring helps to adapt the methods more appropriately to each situation. From this understanding, it is possible to synthesize the key stages of the valuation process in the context of technology transfer, as illustrated in Figure 10, which presents the steps from expression of interest to the eventual payment of royalties derived from market entry. Once the negotiation has begun, the first step is to define the type of contract and the form of remuneration for the intellectual property (step 1), as presented in Chapter 4 and summarized in Figure 3. Then, the contractual clauses must be established (step 2). In the case of Brazil, as mentioned, the AGU has suitable contract models for different types of remuneration.

With the initial definition of the contractual clauses, the valuation process itself begins. To do this, all relevant data is gathered in order to make the most complete assessment possible. The process begins with the collection by developers of information regarding IP development costs (step 3). Next, the analysis of contract databases is carried out, with the aim of identifying comparable values of similar technologies (step 4). If the interested company already has sufficient market projections, the Revenue method may be applied, through the analysis of Discounted Cash Flow and Net Present Value (step 5). Based on the data collected, a range of minimum and maximum values is determined, based on a weighting between the methods applied (step 6). In this way, progress is made towards the moment of negotiation, where the final clauses and the remuneration values to be effectively adopted are defined (step 7). Once the contract is signed, the intellectual property is formally transferred to the company (step 8), which then prepares for the introduction of the technology into the market (step 9). Finally, the last step is reached: the commercialization of the technology (step 10).

Figure 10 – Summary: Stages of technology valuation

7. Summary

This guide presents, in a simplified way, the main aspects of the valuation of intellectual property in commercial transactions, covering the following topics:

1. Intellectual property, on its own, may not generate value if it is not effectively brought to market. To turn it into a valuable asset, there are various strategies aimed at extracting value from its exploitation. The main forms of value generation include:

    a) direct use by the developer, which introduces innovation to the market, thus achieving greater benefits or reductions in production costs;

    b) negotiation with third parties through licensing or assignment agreements, mergers, acquisitions, joint ventures or strategic partnerships;

    c) obtaining financing, using the IP portfolio as a credit instrument or as collateral in financial transactions.

2. There are multiple reasons to carry out an intellectual property valuation, one of the main ones being its use in the context of commercial transactions. Among the most frequent are licensing or assignment agreements.

3. In addition to transactions, valuation can also be linked to purposes such as resource allocation, fundraising, investor relations, R+D decision-making or dispute resolution.

4. During contract negotiation, the parties must decide on the type of agreement to be established – whether it is an exclusive license, non-exclusive license or assignment – as well as on the possibility of sublicensing. Based on these definitions, the forms of remuneration are established: access fee, assignment fee, use fee, royalties and, where appropriate, sublicense fee.

5 With these parameters defined, the parties involved must proceed with the valuation of the intellectual property to establish a range of values that facilitates contractual negotiations.

6 The main valuation methodologies are grouped into three quantitative approaches: Cost, Market and Revenue method. There are also qualitative methods, based on criteria established by the developing institution, which allow assets to be classified according to previously defined characteristics.

7 In practice, a single method is rarely used. Most commonly, a strategic combination of different approaches is applied.

8 The choice of the most appropriate method depends to a large extent on the availability of data. In general, the more mature the technology, the more relevant information is available. For technological assets such as patents and software, the TRL (Technology Readiness Level) scale is used, which measures the degree of technological maturity on a nine-level scale.

9 Deal negotiation should be understood as building a long-term collaborative relationship between developers and companies. Therefore, it is essential that both parties understand the needs, costs, and risks involved in the process.

10 The valuation of intangible assets, when based on criteria well defined by development institutions, can simplify complex methodologies without compromising the necessary rigor. This structuring contributes to greater objectivity and coherence in decision-making related to technology transfer.

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