

# Demographics and consumption analysis of virtual products in the videogame industry: the Dota 2 case study

Análisis demográfico y de consumo de productos virtuales en la industria del videojuego: el caso de Dota 2

Analyse démographique et de consommation des produits virtuels dans l'industrie du jeu vidéo : le cas de Dota 2

Lily Ballesteros Quintero

## Summary



The development of the video game industry has grown enormously in recent years. In the case of MOBAs<sup>1</sup>, Dota 2 is one of the most attractive video games among players throughout the world. This video game has been translated into 26 languages and its monetization hinges upon additional purchases of the players, since the game itself is free. Its flagship event, the Dota 2 International, is the e-sports tournament with the highest participation, viewership, and prizes that can go up to 34 million dollars (USD), which is mostly financed by the battle passes purchased by the players. These characteristics have motivated us to study this case by analyzing the structure and operation of DOTA 2, the profile of its players, and their investments in time and money within the game.

**Keywords:** E-sports, Virtual platforms, MOBA, Capitalization, Virtual Games.

## Résumé



Le développement de l'industrie du jeu vidéo s'est énormément développé ces dernières années. Dans le cas des MOBA, Dota 2 est l'un des jeux vidéo les plus attractifs parmi les joueurs du monde entier. Ce jeu vidéo a été traduit en 26 langues et sa monétisation est donnée par les achats supplémentaires des joueurs, puisque le téléchargement et la participation du jeu sont gratuits. Son événement principal, le Dota 2 International, est le tournoi d'e-sport avec la plus forte participation et des prix pouvant aller jusqu'à 34 millions de dollars (USD), qui sont largement financés par les Battle pass achetés par les joueurs. Ces caractéristiques nous ont motivés à générer une étude de cas, qui cherche à analyser la structure et le fonctionnement de DOTA 2, le profil de ses joueurs et leur investissement en temps et en argent dans le jeu.

1. Multiplayer Online Battle Arena

Recibido / Received: 19 de Agosto de 2019 Aprobado / Approved: 20 de Septiembre de 2021

Tipo de artículo / Type of paper: Investigación científica y tecnológica

Afiliación Institucional de los autores / Institutional Affiliation of authors: Universidad Sorbonne Paris

Autor para comunicaciones / Author communications: laballesteros@unbosque.edu.co

Los autores declaran que no tienen conflicto de interés.

## Resumen



El desarrollo de la industria de los videojuegos ha crecido enormemente en los últimos años. En el caso de los MOBA, Dota 2 es uno de los videojuegos más atractivos entre los jugadores de todo el mundo. Este videojuego ha sido traducido a 26 idiomas y su monetización depende de compras adicionales de los jugadores, ya que el juego en sí es gratuito. Su evento insignia, la internacional de Dota 2, es el torneo de deportes electrónicos con mayor participación, audiencia y premios que pueden llegar hasta los 34 millones de dólares (USD), que se financia en su mayoría con los pases de batalla comprados por los jugadores. Estas características nos han motivado a estudiar este caso analizando la estructura y funcionamiento de DOTA 2, el perfil de sus jugadores y sus inversiones en tiempo y dinero dentro del juego.

## Introduction

In the global entertainment market, music, movies and spectacles have always been present. However, the game industry has established itself with great revenues in the last twenty years, they have become a mass phenomenon for consumers and companies, new technologies allow for a giant development of the industry (Marchand & Hennig-Thurau, 2013). This economic development of the videogame industry has evolved in the last years, according to the 2017 report of the Entertainment Software Association, only in the United States, sales exceeded 24.5 billion USD in 2016, the employment rate reached 65.000 direct employees and 220.000 indirect ones (Siwek, 2017). In addition, the 2018 sales, demographic and usage data reports, determine that 64% of the households in the USA owns a device for playing video games (Pc's, Smartphones, consoles, wireless devices, handheld systems and VR devices), the average gamer is 34 years old, 45% of the gamers are women and 55% men, the total consumers spent on the video game

industry was 36 billion USD in 2017, digital purchases represent the 79% while physical sales represented 21%, the industry value added to US GDP was more than 11.7 billion USD (ESA, 2018).

Moreover, according to Newzoo report, global revenue in 2017 was 121.7 billion USD, by the end of 2018 the revenue had grown to 137.9 billion USD, the yearly growth of the industry is expected to be 11% by 2021. The revenue is divided in three segments, mobile (51%), PC (24%) and console (25%). The PC segment is expected to grow 4.2% by 2021 (32.3 billion USD). (Newzoo, 2018b)

Nowadays, the videogames are also getting more attention as a new participant in the sports industry, named e-sports. The 2018 Global Esports Market Report shows that the audience of e-sports will reach 380 million in 2019, and the industry will reach 1.4 billion USD by 2020 (Newzoo, 2018a). This development of the industry is related to the users need to play, Koo, Lee and Chang (2007) present five experiential motivating factors of gaming users, table 1 summarizes the definitions of the factors and the sources:

**Table 1.** Experiential motivating factors of gaming users. (Koo, Lee and Chang 2007)

Constructs	Operationization	Sources
Perceived Enjoyment	The extent to which the activity of participating in an online game is perceived to be pleasurable, exciting, enjoyable, fun, and happy.	Moon and Kim (2001); Ghani and Deshpandes (1994); Chou and Ting (2003)
Concentration	The extent to which online game playing is perceived to be a state of losing consciousness of time elapsed, self consciousness, and being isolated from environmental cues.	Ghani et al. (1991), Moon and Kim (2001), Webster et al. (1993), Koufaris (2002); Chou and ting (2003)
Escape	The extent to which online game playing is perceived to be a relief of boredom and an escape from routine.	Bloch et al. (1994); Wood et al. (2004)

Constructs	Operationization	Sources
Epistemic Curiosity	The extent to which the activity of playing an online game is perceived to be learning experiences about new things, strategies, and trends about online game playing.	Moon and Kim (2001); Griffiths et al (2004); Bloch et al. (1994)
Social affiliation	The extent to which the activity of playing an online game is perceived to be enjoyment of talking to and socializing with other online game players.	Griffiths et al. (2004); Rohm and Swaminathan (2004); Bloch et al. (1994)

They found that gaming users are more likely to present engagement to a game in order to satisfy the motivations on concentration, escape, curiosity and social affiliation which present the highest rate as a factor of engagement. These factors are classified as experiential motivation.

Banyte & Gadeikiene (2015) conclude that the motivation to play videogames is determined by a theory of self-determination. The three types of motivation have different impacts in the player's engagement: the experimental motivation has the highest level of impact, followed by the intrinsic motivation, and in the last place, with no presence the extrinsic motivation. The massive multiplayer online role playing games, allow the user to choose different characters, their identity, skills and appearance (Koo et al., 2007).

In Korea, the rise of the videogames industry (15% between 2002 - 2010) has brought with it a high rate of addiction, some political and government organizations propose a new tax over their profits in order to create new campaigns of prevention and treatment of the addictions (Cho, Kim, Lee, & Park, 2018).

In this particular case, this case study seeks to analyze the demographic profile, the trends of consumption of time and money of the players of the MOBA DOTA 2 across the world.

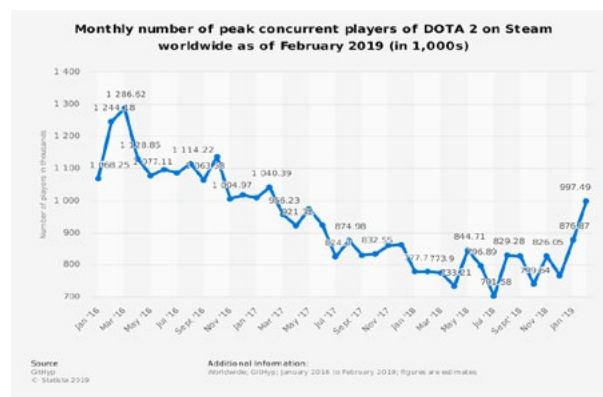
## Defense of the Ancients - DotA 2

Considered as a contemporary Multiplayer Online Battle Arena (MOBA), DotA (Defense of the Ancients) is one of the most popular PC online video games. Developed by Valve Corporation, it was released on July 9th of 2013 and it's available to download for free in 26 languages from the Steam platform also developed by

Valve Corp. This platform describes Dota 2 as the most-played game, with a great diversity of heroes that are also free to choose; they emphasize that competitive balance is "Dota's Crown Jewel". The user is able to play in real time with their own friends, in a demo mode or in a matchmaking system to play with other players (Steam, n.d.). The teams are composed of five players and each player chooses, selects a different hero with different characteristics, skills, strengths and some cosmetic items, and has to cover a special position in the arena of the game (Eggert, Herrlich, Smeddinck, & Malaka, 2015). At the present time, the "Heropedia" of Dota 2 categorizes heroes by strength, agility and intelligence, and the user can choose between more than 100 heroes (Dota 2, n.d.).

The statistics of the company Statista show the monthly peak number of players since January 2016 until February 2019. The high peak was in March of 2016 as shown in the chart 1.

**Chart 1.** Monthly number of peak concurrent players of DOTA 2 on Steam worldwide as of February 2019. (Statista 2019)



Considered as an e-sport, Dota 2 launches every year an international tournament. In 2018 the 8th version of the tournament stage took place at Rogers Arena in Vancouver - Canada, where more than 18.000 physical tickets were sold (Wharton, 2018), as online fans, more than 55 million of views were registered only through twitch<sup>1</sup> channels (escharts.com, n.d.). The prize pool for the tournament in 2018 was 25'523,177 USD, and for 1st place the prize was 11'231.158 USD (Wharton, 2018). The 2019 tournament will be hosted in Shanghai with a pool prize of 34'330,068 USD, 15'620,181 USD for 1st place.

Zuo, Xiong, & Lida (2017) compares Dota's International Tournament with other major sporting events in 2016, in terms of prizes (table 2). Zuo et al. (2017) also determine that Dota 2 is being the most profitable sport in the world.

**Table 2.** Tournament prize in sports, mind sports and e-sports compared. (Zuo, Xiong, Lida 2017)

Event	Sports	Prize (US dollar)	1st prize
Australia Open	Tennis	35,530,000	1,040,000
NBA	Basketball	14,000,000	4,100,000
FIFA Club World Cup	Soccer	28,000,000	5,490,000
Ing Cup	Go	650,000	400,000
S6	League of Legends	5.070,000	2,130,000
Ti6	DOTA2	20,746,930	9,140,000

The model of capitalization of Dota 2 allows the user to spend money in different activities and virtual products even if the download and playing of the game is free to everybody. These activities are described down below:

- Dota Plus

This is a monthly subscription service of Dota, branded as an assistant to improve the skills of the players. This service

1. Streaming platform

has three major characteristics like hero progression, plus assistant and a weekly battle cup to be more attractive amongst the players, Table 3 summarizes the main benefits of dota plus. The cost of the service in 2019 is 3.99USD, and there is a possibility to get a discount when purchasing 6 months or 12 months (Valve Corporation, 2016).

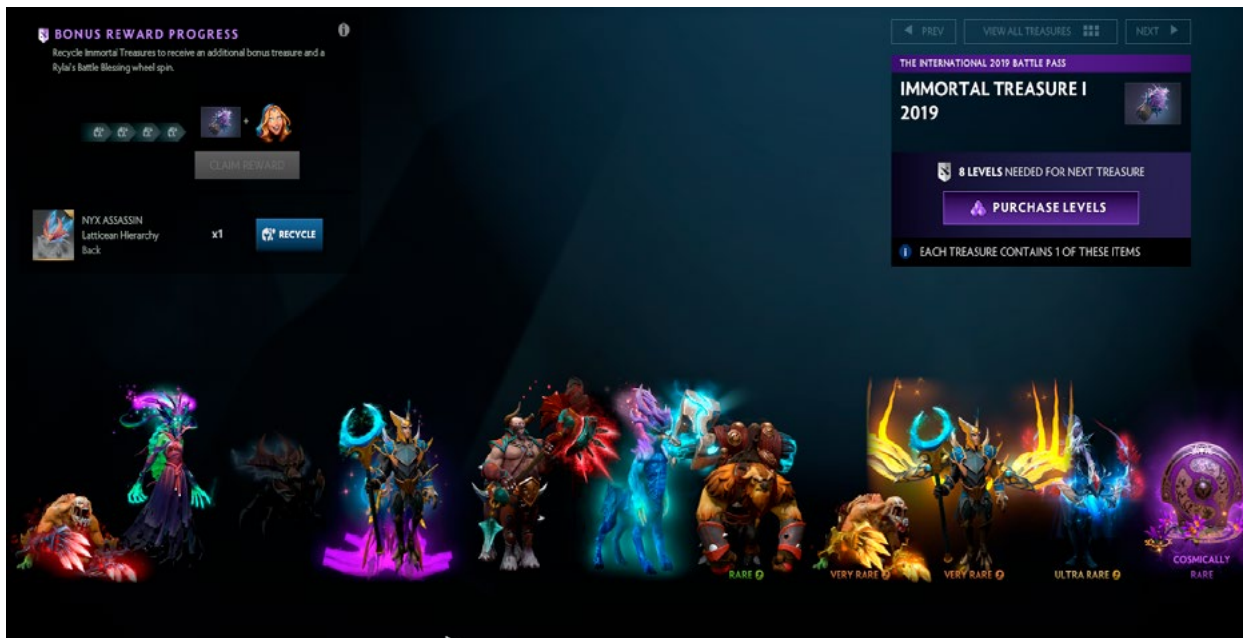
**Table 3.** Major characteristics of Dota Plus. Adapted from Valve Corporation (2019)

Hero Progression	Plus Assistant	Weekly Battle Cup
<ul style="list-style-type: none"> <li>• Hero leveling</li> <li>• Hero specific challenges</li> <li>• Hero relics</li> <li>• Hero chat wheel</li> <li>• Rewards</li> </ul>	<ul style="list-style-type: none"> <li>• Item suggestions</li> <li>• Ability suggestions</li> <li>• Hero suggestions</li> <li>• Death Summary</li> <li>• Lane Strategy</li> <li>• Analytics</li> <li>• Global rank trends</li> <li>• Probabilities</li> </ul>	<ul style="list-style-type: none"> <li>• Participation in the Battle Cup</li> <li>• Seasonal terrain</li> <li>• Purchase tools</li> <li>• Live spectating in others game</li> </ul>

- Treasures

Tran (2017) defines the treasures as “purchasable bundles that contain one or more cosmetic items. Each can be opened once and the owner receives one or more random items from its content list.” According to the Dota 2 Wiki, the user has some trade restrictions that does not allow him to trade treasures for 1 week, nevertheless they can be gifted to a friend. (Dota 2 Wiki, 2018). In the Dota Store, the price of the treasures varies from 1.60 USD to 3.80USD, in the Steam Community market it varies from 0.068USD (a portfolio of heroes ascendant) to 32.41USD (trove carafe 2016, signed by a Dota commentator from China) at the time of the writing of this article. An important point to highlight when talking about treasures, is that the potential rewards differ in desirability and drop rate (rate at which items drop), often maximizing the amount of treasures that need to be purchased by a player that wants to obtain an item in particular. Figure 1 is an example of the opening of a treasure in Dota 2.

Figure 1. Opening a treasure in Dota 2



- Cosmetic items

The cosmetic items are visual elements that allow the user to customize the appearance of heroes, get new couriers, have different music and announcers for a better experience playing. These items are only visual modifications, they do not affect the performance of the characters in the game (Dota 2 Wiki, 2019). Additionally they are designed to be very attractive and ostentatious, to incite the players to spend more money on the visuals for their favorite heroes, the main menu is also designed to show the store button with the daily sales. (Tran, 2017).

There are several ways to get cosmetic items in Dota 2, for instance the Dota 2 store, the Steam Community Market, Dota Plus, treasures, events, etc. (Dota 2 Wiki, 2019) these items can be bought, sold, exchanged or gifted between the users with certain restrictions. In order to sell the items, the user has to reach the Steam Community Market of Dota 2 and put the item up for sale, there is not any way to get a refund annulation of the transaction. For all the Steam Community Market transactions there is a fee of 10% and a minimum of 0.01 USD, this fee is charged to the buyer and could change in the future. (Valve Corporation, 2017) the number of items in the Steam Community Market is not clear, the prices range from 0.0012 USD (ascendant tusk loading

screen) to 1866.78USD (frozen spine splitter) at the time of the writing of this article.

- Events

As the International Tournament is the biggest event of e-sports, Dota sells their tickets as a battle pass at 9.99 USD that allows the user to watch the tournament in game streaming with some additional features, this pass can be upgraded with levels that the user can buy starting from 2,49 USD. 25% of the earnings of the battle pass go to fund the prize pool of the International Tournament, if the prizepool overcomes last year's tournament prize, the user could have more battle points (Valve Corporation, n.d.). For the tickets to assist to the event, the Dota Team (2018) announced that the prices were set between 125 CAD (98 USD approx.) in midweek to 250 CAD (185 USD approx.) for the finals (Team Dota, 2018).

Some other championships are developed in different countries as majors and minors, the tickets are not as expensive as the international, and the streaming is free to all the users.

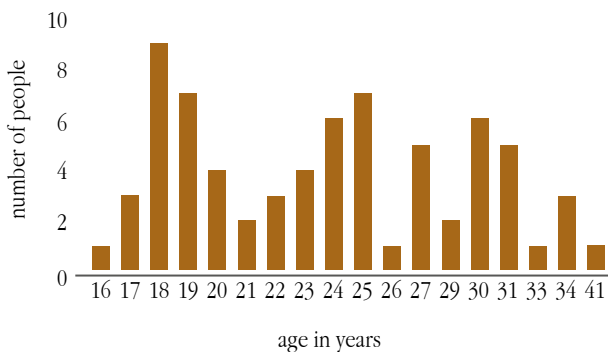
Every weekend Dota hosts a virtual championship open to all the players, the ticket to participate costs 1 USD per player and the rewards are in-game privileges.

## Methodology

This case study aims to analyze the demographic data, consumption in time and money of Dota 2 Players, 70 surveys were filled by Dota 2 Players from around the world. This survey allowed us to perform data analysis such as: age, country of residence, annual salary, years spent playing Dota 2, total hours of play, approximate money invested in the game, acquisition of different Dota products, and finally the transactions that the user makes within the Steam platform.

The players participated voluntarily in the survey and were enrolled in different virtual platforms specialized in Dota 2 players.

## Results and analysis



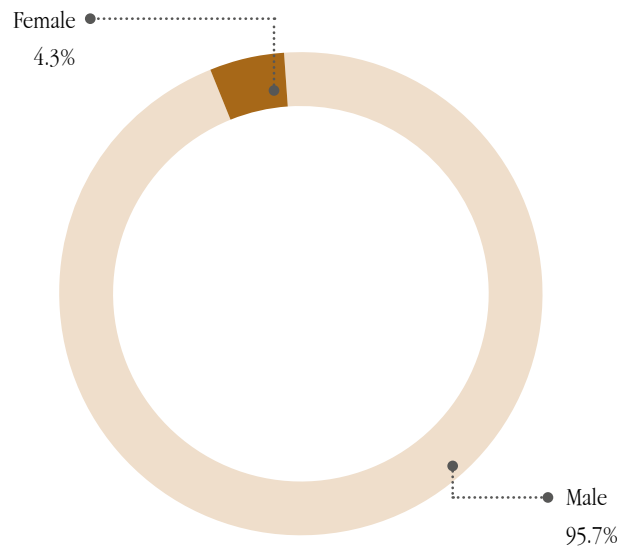
## Country of residence

The surveyed players currently reside in 34 countries, the largest presence of players is denoted in the United States of America, followed by France

The age of the players surveyed varies between 16 and 41 years, the highest trend is found in players aged 18 and 19 (22%)

## Gender

Amongst the players surveyed, only 3 of the players surveyed claimed to be female, and the remaining 67 claimed to be male, this trend is confirmed by the low participation of women in professional teams in international tournaments.



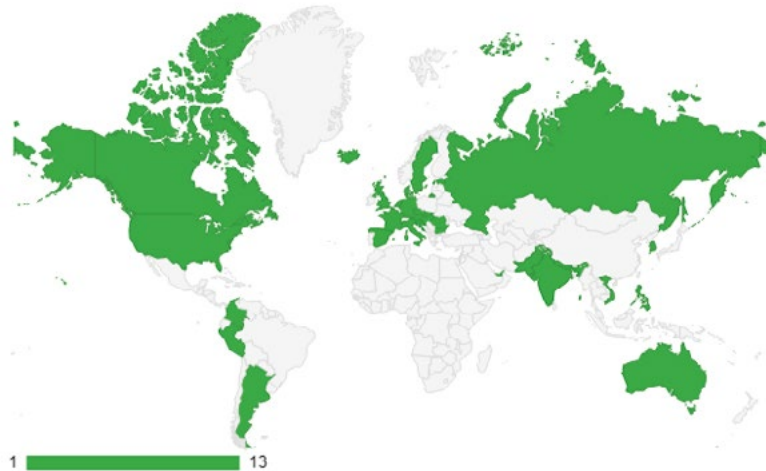
and Canada. It is important to highlight that there were no participants from the Republic of China, which is one of the highest in the Dota community. Table 4 summarizes the number of responses for each country.

**Table 4.** Number of responses for country

Country	Responses	Country	Responses	Country	Responses	Country	Responses
Argentina	1	England	1	Netherlands	2	South Korea	1
Australia	4	Estonia	1	Pakistan	1	Spain	2
Austria	1	France	6	Peru	2	Sweden	1
Bulgaria	1	Germany	2	Philippines	4	United Arab Emirates	1
Canada	5	Hungary	1	Romania	1	United Kingdom	4
Colombia	1	Iceland	1	Russia	1	United States	13

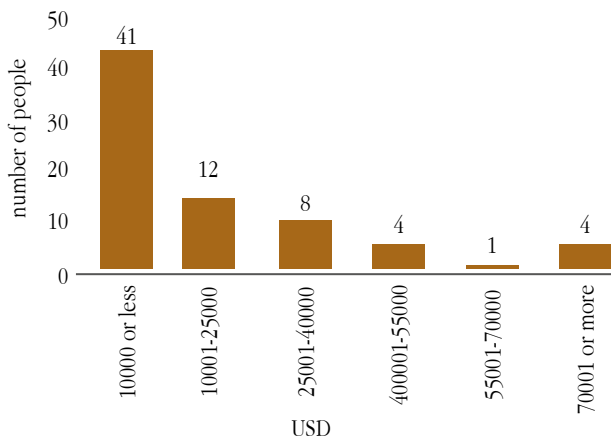
Country	Responses	Country	Responses	Country	Responses	Country	Responses
Croatia	1	India	1	Scotland	1	Vietnam	1
Czech R.	1	Italy	1	Slovakia	1		
Denmark	1	Nepal	3	Slovenia	1		

Figure 2. Global distribution of surveyed players



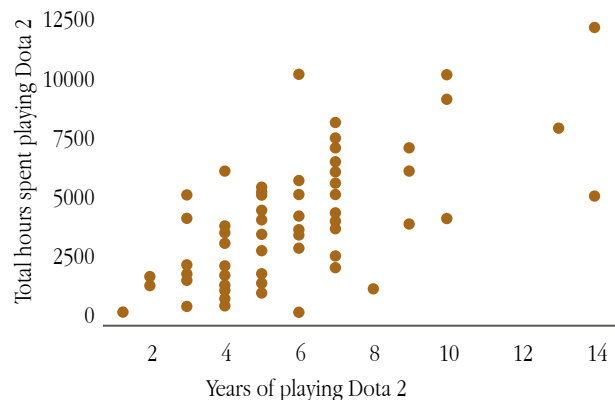
### Salary

The players were asked how much was their salary or their allowance if they are students, the result determines that the 58.57% earns less than 10.000 USD per year. In this result we can note that the earnings of the student players come from their families or scholarships, nevertheless there are some employed players from countries where salaries are low and the purchasing power is different from players in developed countries.



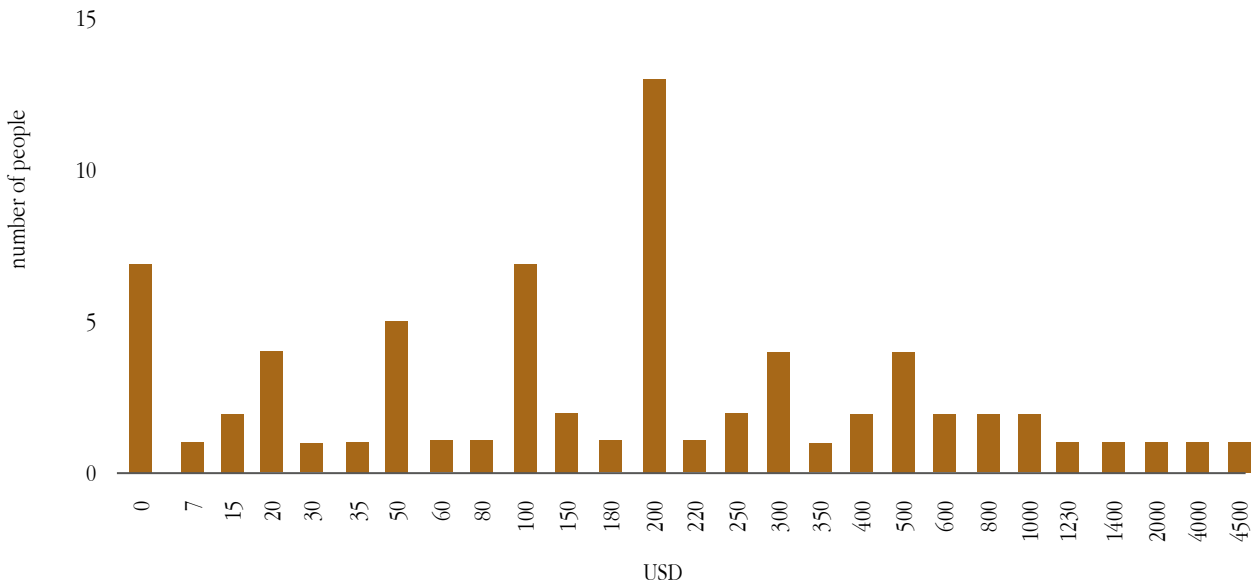
### Consumption of time

The players were surveyed about the number of years they have been playing Dota 2, the answers were between 1 and 14 years, in terms of the number of hours playing the smallest data was recorded in 8 hours, while the highest record was 12,000 in-game hours, the graph shows the relationship between years played and the number of hours recorded by each player. As of the 9th year of playing Dota 2, the increase in the number of hours for these players stands out, however there is no tendency on the number of hours per year.



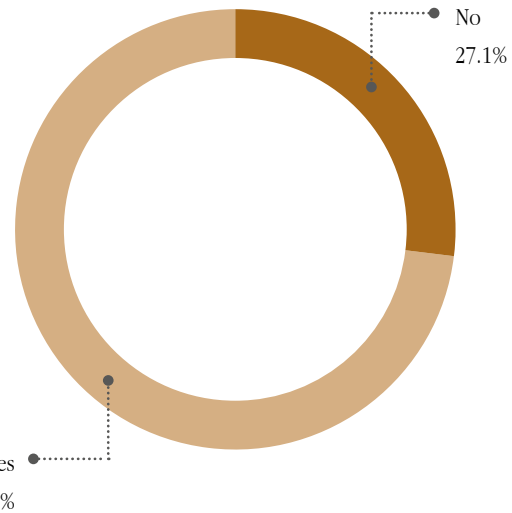
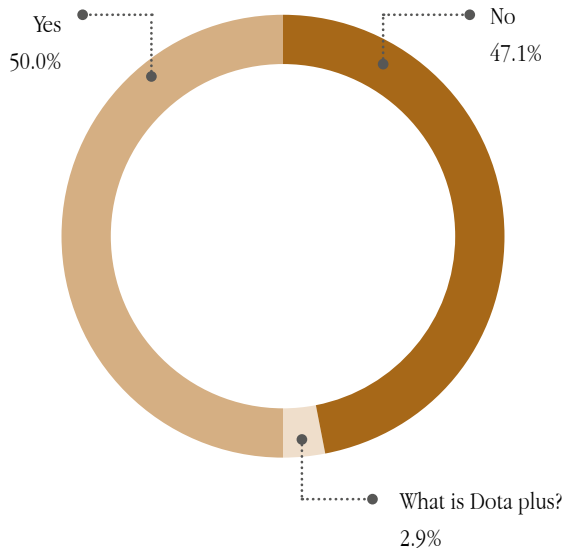
## Amount of money spent in Dota 2

90% of the Dota 2 players have spent some money in the game, the result varies from 7USD to 4500 USD, the average spent in this 60 players is 433 USD, this average per user is superior to the most expensive pc games.



## Spending in Dota 2 (Dota 2 Store - Steam Community Market)

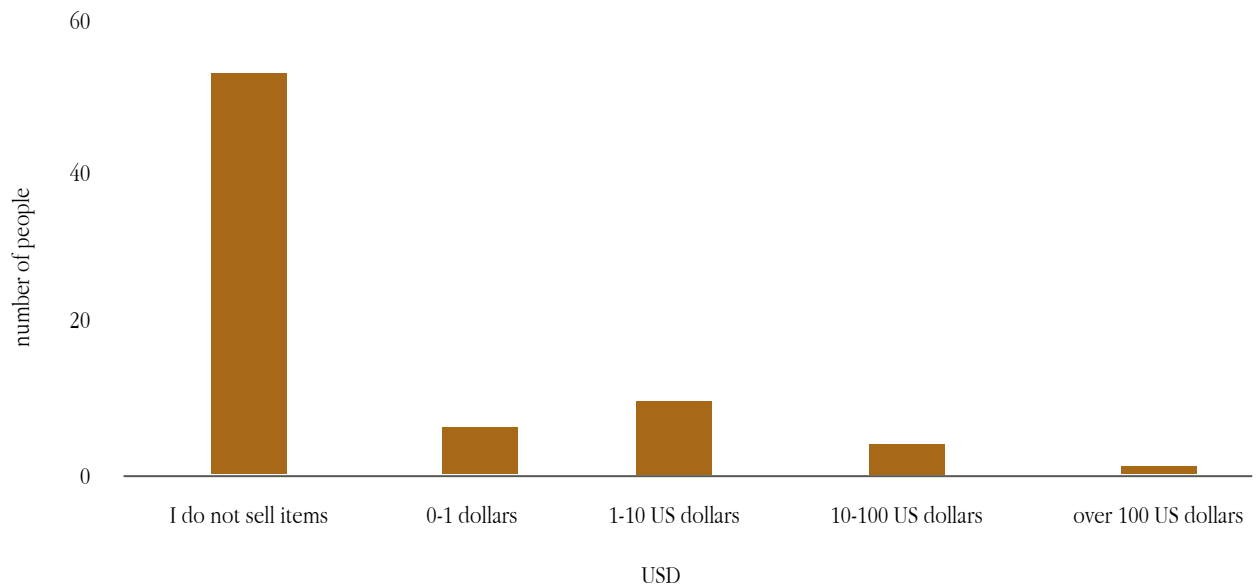
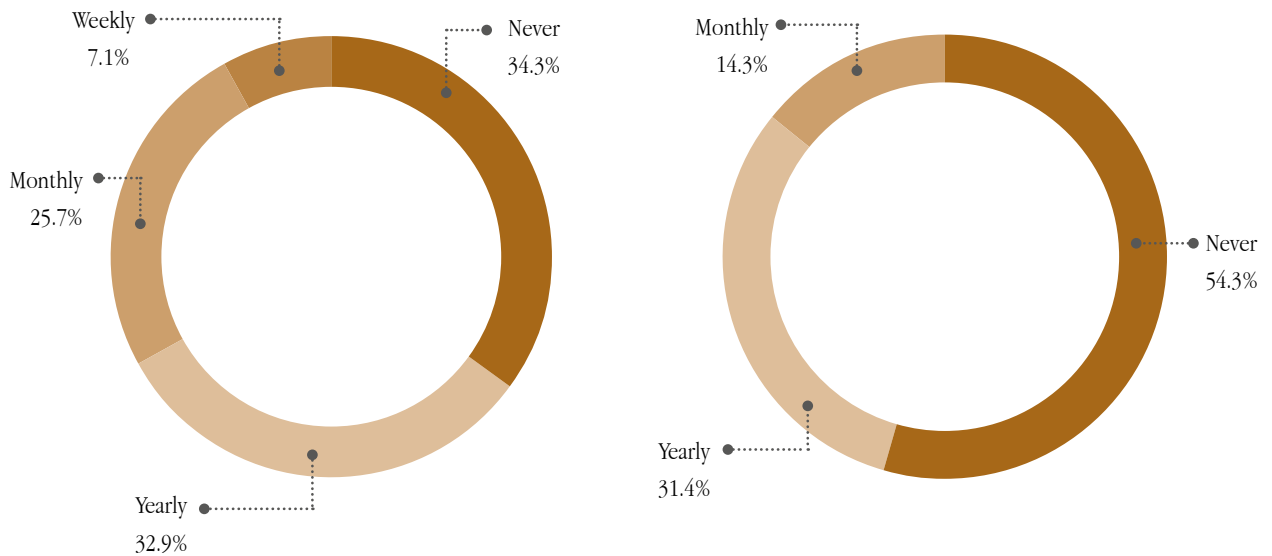
As for the Dota 2 subscription, 50% of the users has bought it, and for the international compendium “battle pass” the 72.9% of the players have bought it.



Players have a higher tendency to buy a simple item from the Steam Community Market than to buy treasures in the Dota 2 Store. In both cases, the players tend to buy items in a yearly basis.

As the Steam community market is open for everybody to sell, the 78.57% of the players affirm that they do not sell items in the market.





## Discussion

This discussion begins with the low participation of women in the MOBA of DOTA 2, it may be associated with poor conformity with the expectations of the game among women, the game may not meet the expectations of enjoyment, concentration, escape, epistemic curiosity or Social affiliation that women seek in video games.

This article managed to find Dota players from 34 different countries, however players from the Republic of China, named as one of the fastest growing countries

in the industry, could not be found, barriers such as language, the specificity of the platforms in The Republic of China and some governmental restrictions of this country could affect the participation of its players.

In terms of salary and spending in the game, while the majority of players earn less than 10000 USD per year, it can be established that even players with less income have made purchases in the Dota 2 Store or in the Steam Community Market. These purchases do not affect the user's performance in the game, they are only cosmetic purchases, additional and not necessary, but they are

highly striking in terms of visual, sound and status within the players of Dota 2. According to the sum of the expenses supplied by the 70 respondents, Dota 2 received more than 27,000 USD, taking into account that Dota 2 in the last month had 12'040,653 active players, it can be determined that this MOBA has high financial returns. As indicated by (King et al., 2019), the monetization of video games can become a financial and psychological risk for gamers, who start with a free game but who find campaigns to encourage consumption over time

Among the different elements that can be bought in Dota, the “battle pass” is one of the most purchased annually by the players, this battle pass finances a part of the international prize and generates a feeling of belonging to a community, this feeling fills the motivation of “social affiliation” within the players. the Dota Plus service is known and acquired by 50% of the respondents, that is, 35 people currently have this monthly service and pay 3.99USD to Dota 2.

As for the community market, 65.7% of the surveyed players frequently buy cosmetic items through this medium. There are a couple of elements that vastly increase the revenue of this trading system. First, items can be marketed an unlimited number of times, and the platform receives a 10% commission benefit for each transaction. The reality of these digital and infinitely replicable items put all the control in the platform, which can pretty much dictate the rarity and popularity of items at a certain time. Since the platform is also the publisher of the game, the game could potentially be modified at any time to increase the platform’s revenue.

## Conclusion

This article has allowed us to determine some demographic and consumer characteristics of gaming players, increasing the field of knowledge of the videogame market and providing a new space for new research in the internal market of MOBAs such as DOTA 2.

To be a free download game and that the purchases do not affect the user’s performance within the game, it would be thought that its capitalization model is complex, however the diversification of its revenue sources has allowed Dota 2 to be highly profitable. It is

a game that has allowed a development of community feeling and keeps its users united and attentive to the different events worldwide.

## Funding

This work was financed by the Economic and Administrative Sciences Faculty of El Bosque University – Bogota, Colombia.

## References

- [1] Banyte, J., & Gadeikiene, A. (2015). The Effect of Consumer Motivation to Play Games on Video Game-playing *Engagement*. *4th World Conference on Business, Economics and Management (WCBEM-2015)*, 26, 505–514. [https://doi.org/10.1016/S2212-5671\(15\)00880-1](https://doi.org/10.1016/S2212-5671(15)00880-1)
- [2] Cho, D. J., Kim, H. T., Lee, J., & Park, S. H. (2018). Economic cost–benefit analysis of the addictive digital game industry. *Applied Economics Letters*, 25(9), 638–642. <https://doi.org/10.1080/13504851.2017.1355528>
- [3] Dota 2. (n.d.). Heroes. Retrieved April 24, 2019, from <http://www.dota2.com/heroes/>
- [4] Dota 2 Wiki. (2018). Treasure. Retrieved May 3, 2019, from Dota 2 Wiki website: <https://dota2.gamepedia.com/Treasure>
- [5] Dota 2 Wiki. (2019). Cosmetic Item. Retrieved May 3, 2019, from Dota 2 Wiki website: [https://dota2.gamepedia.com/Cosmetic\\_Item](https://dota2.gamepedia.com/Cosmetic_Item)
- [6] King, D. L., Delfabbro, P. H., Gainsbury, S. M., Dreier, M., Greer, N., & Billieux, J. (2019). Unfair play? Video games as exploitative monetized services: An examination of game patents from a consumer protection perspective. *Computers in Human Behavior*, 101, 131–143. <https://doi.org/10.1016/j.chb.2019.07.017>
- [7] ESA. (2018). *2018 Sales, demographic and usage data: Essential facts about the computer and video game industry*. Retrieved from Entertainment Software Association website: [http://www.theesa.com/wp-content/uploads/2018/05/EF2018\\_FINAL.pdf](http://www.theesa.com/wp-content/uploads/2018/05/EF2018_FINAL.pdf)

- [8] escharts.com. (n.d.). The International 2018 detailed stats. Retrieved May 3, 2019, from <https://escharts.com/tournaments/dota2/international-2018>
- [9] Koo, D.-M., Lee, S.-H., & Chang, H.-S. (2007). *Experiential Motives for Playing Online Games* (Vol. 2).
- [10] Marchand, A., & Hennig-Thurau, T. (2013). Value Creation in the Video Game Industry: Industry Economics, Consumer Benefits, and Research Opportunities. *Journal of Interactive Marketing*, 27(3), 141–157. <https://doi.org/10.1016/j.intmar.2013.05.001>
- [11] Newzoo. (2018a). *2018 Global Esports Market Report* (No. 4). Retrieved from <https://newzoo.com/solutions/standard/market-forecasts/global-esports-market-report/>
- [12] Newzoo. (2018b). *Global Games Market Report* [Quarterly update]. Retrieved from <https://newzoo.com/solutions/standard/market-forecasts/global-games-market-report/>
- [13] Siwek, S. (2017). *Video games in the 21st century: the 2017 report*. Retrieved from Entertainment Software Association website: [http://www.theesa.com/wp-content/uploads/2017/02/ESA\\_EconomicImpactReport\\_Design\\_V3.pdf](http://www.theesa.com/wp-content/uploads/2017/02/ESA_EconomicImpactReport_Design_V3.pdf)
- [14] Steam. (n.d.). Dota 2 on Steam. Retrieved April 24, 2019, from [https://store.steampowered.com/app/570/Dota\\_2/](https://store.steampowered.com/app/570/Dota_2/)
- [15] Team Dota. (2018). The International 2018 Tickets and Venue | Dota 2. Retrieved May 3, 2019, from <http://blog.dota2.com/2018/03/the-international-2018-tickets-and-venue/>
- [16] Tran, A. (2017). *Cross-cultures impact on video game industry.: Case study: Dota 2's game design and customer experience*.
- [17] Valve Corporation. (2016). Dota Plus. Retrieved May 3, 2019, from <https://www.dota2.com/plus>
- [18] Valve Corporation. (2017). Community Market FAQ - Documentation - Knowledge Base - Steam Support. Retrieved May 3, 2019, from [https://support.steampowered.com/kb\\_article.php?ref=6088-UDXM-7214](https://support.steampowered.com/kb_article.php?ref=6088-UDXM-7214)
- [19] Valve Corporation. (n.d.). Dota 2 - The International Battle Pass/. Retrieved May 3, 2019, from Dota2.com website: <http://www.dota2.com/international/battlepass>
- [20] Wharton, M. (2018). PICK YOUR REALITY: The Dota 2 International Finals Show. *Projection, Lights & Staging News*, 19(10), 74. Retrieved from edo.
- [21] Zuo, L., Xiong, S., & Iida, H. (2017). *An analysis of DOTA2 using game refinement measure*. [https://doi.org/10.1007/978-3-319-66715-7\\_29](https://doi.org/10.1007/978-3-319-66715-7_29)