



## A GLOBALLY COMPETITIVE LOCAL CLUSTER: ANALYSIS OF VIDEO GAME INDUSTRY IN WROCLAW, POLAND

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**Abstract:** The article presents analysis of the competitiveness of the video games industry cluster in Wrocław, Poland using Michael Porter's national diamond, SWOT analysis, network analysis and cluster benchmarking in order to highlight the local qualities and possibilities to develop a global competitive advantage of the video game industry cluster. The analysis was preceded by an overlook of the global video game industry, highlighting the possibilities, especially for market growth through the lens of devices used to play games as well as through the lens of the geographical nature of market growth.

**Keywords:** Asian mobile games market, augmented reality, cluster analysis, e-sport, video games, video game industry, Wrocław, virtual reality

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### Introduction

In a modern economy as Michael E. Porter stated, “National prosperity is created, not inherited”, meaning clusters artificially created or emerging organically and stimulated artificially, become the source of innovation, competitive advantage and prosperity for the regions they originate in. We can observe this phenomena in the Silicon Valley (Palo Alto, California), in the Digital Media City (Seoul, Korea), and countless less spectacular clusters around the world, but just as effective in their niches. It seems that clustering is a natural, emergent process that promotes local specialization, and with proper stimulation or steering in anticipation of upcoming trends, can provide an advantage on the global scale that is very hard to erode, especially with the “winner takes all” economy, which digital media seem to drift towards naturally.

The video game industry has grown from a small niche in the 1970s to a \$116 billion global industry in 2017 and is projected to grow to \$143 billion by 2020 ([http://newzoo.com/...](http://newzoo.com/)). It is characterized by global distribution, high product development time and cost, minimal per unit costs and transfer costs – going even further down thanks to online distribution through game stores and app stores - as well as high adaptability and innovation (Klimas 2016).

### Analysis of global video game industry

The video game industry first emerged in the San Francisco Bay area, with Silicon Valley at its core. The video game industry spread out to the Los Angeles

area, in the 1990s. In LA as in Montreal, cross-fertilization with film is important (Pilon, Tremblay 2013). This shows, that the video game industry may be dependent on clusters in order to emerge and prosper, not the other way around. Video game industry clusters have typically emerged where a wide net of suppliers and supporting businesses had already been established locally and their global success and expansion of the network that followed allowed other video game companies to emerge and benefit from the thus formed network of relations (Klimas 2015).

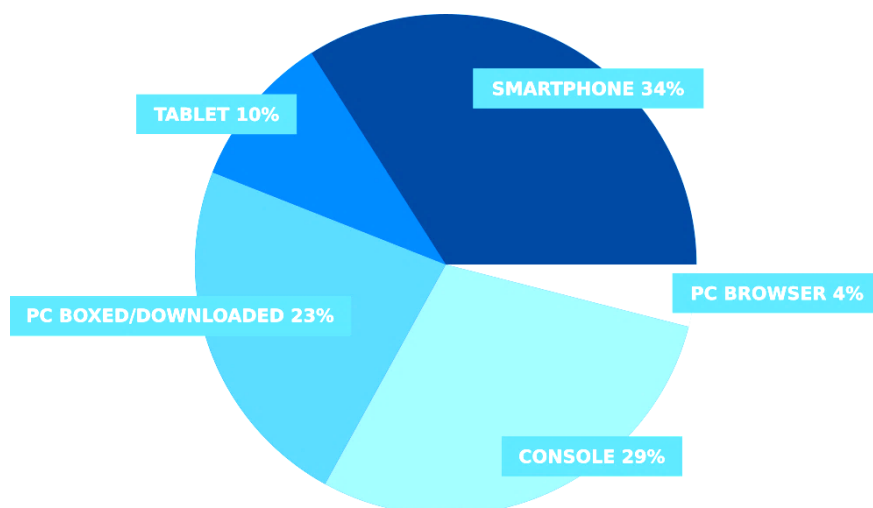
The tight connection between the movie and game industries can be seen very clearly by studying the examples of major motion picture studios entering the video game industry in the 1990s. They did so by creating their own divisions such as Disney with its Disney Interactive/Buena Vista Games division in 1994, Fox Interactive in 1996, MGM Interactive, Warner Bros Interactive Entertainment, and Vivendi Universal Games in 2000 (Pilon, Tremblay 2013). Industry cross-fertilization is clearly evident here, as many large game studios opened offices or moved to Hollywood in order to benefit from its network.

The video G game industry consists of many different businesses and individuals coming together to produce, distribute, consume and profit from video games. We can observe that the game industry value chain is made up of six connected, distinctive layers (Flew, Sal 2005).

- Product and talent layer: includes developers, designers and artists, who may be working under individual contracts or as part of in-house developer teams (CD Projekt RED, Techland, Bioware, Blizzard, indie developers).
- Capital or publishing layer: involved in paying for the development of new titles and seeking returns through licensing of the titles (Sony).
- Production and tools layer: generates content production tools, game development middleware, customizable game engines and production management tools (Unity 3D, Cocos2D, Unreal Engine).
- Distribution layer: or the “publishing” industry, involved in generating and marketing catalogs of games for retail and online distribution (GOG.com, Steam).
- Hardware (or virtual machine or software platform) layer: provides the underlying platform which may be console-based (Atari, Sony, Nintendo), accessed online or accessed through mobile devices. This layer now includes a network infrastructure and non-hardware platforms such as virtual machines (Java or Flash), or software platforms such as browsers or social media sites (Mozilla, Facebook, Opera Software).
- End-user layer: the consumers of games (gamers, e-sports teams, streamers).

The video game industry resembles the film industry and music industry in many ways, but presently remains more connected to new technologies, both as their generator and consumer, as well as often offering lower barriers for entry, hence higher innovation, differentiation and branching rates, to which the existing laws and ways of gathering analytical data still have a difficult time adjusting.

In 2017 the majority of revenue from video games came from the smartphone (34%), C console (29%) and PC (23%) markets, with tablet (10%) and PC browser (4%) accounting for a small fraction of the global market. By 2020 the global revenue is projected to grow by approximately \$30 billion, mainly through growth of the smartphone market in Asia ([http://newzoo.com/...](http://newzoo.com/)).



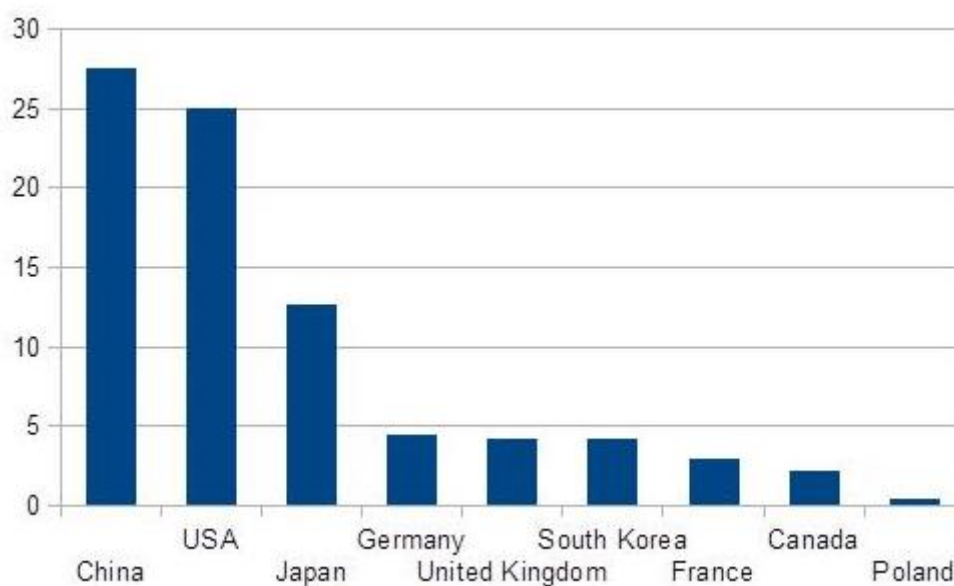
**Figure 1. Division of world video game market revenue sources in 2017**

Source: Author's own compilation

When it comes to consumers, they can be divided into:

- Hardcore – high-spending early adopters of both hardware and software, 70-80% of sales volume in the industry can be attributed to hardcore gamers.
- Casual – play regularly, more price-sensitive, 15-25% of total sales volume can be attributed to casual gamers.
- Mass Market – actively seeks free of charge games or Free2Play offers, accounts for approximately 5% of sales volume, does not play games regularly, nor invests in hardware (Clairfield International 2018).

While hardcore gamers provide most of the sales volume and are characterized by a high adoption rate, currently, the growth of the market is mainly driven by casual gamers. It is relatively easy for non-gamers to become casual gamers and the popularization of smartphones, especially in Asia, is projected to be the main growth driving force.



**Table 1. Top gaming markets by gaming revenue (in billion USD, 2017)**

Source: Author's own compilation based on (Clairfield International 2018)

The gaming market revenue share by region is as follows (in billion USD, 2017): Asia-Pacific 47%, North America 25%, Europe, Middle East & Africa 24%, Latin America 4% (Clairfield International 2018).

As we can observe, the Asia-Pacific region has both the biggest share as well as the largest projected growth rate in the near future. The casual gaming market is tightly connected to the smartphone population size, and its rapid growth in Asia has been followed by an increase in the game market in the region. Despite China being the biggest world market, Japan remains the leader in regional video game industry clusters, but the South Korean cluster, specialized in e-sports, also holds a strong position in the region.

When it comes to the production of games and game-related hardware and software, different clusters dominate in various sectors of the market, for instance Germany contributes significantly to Free2Play on-line browser games, South Korea dominates e-sports, Japan specializes in console games, the USA in games based on movie franchises or big AAA titles requiring substantial capital. Those clusters emerged mostly as a side-effect of the pre-existing related and supporting industries (Ito et al. n.y.), and often remain leaders in their niches. Those clusters typically have one globally successful company bringing in capital from around the globe and building most of the network, while smaller companies emerge naturally as their suppliers or competitors in smaller niches. The video game industry has a few segments that are very promising in the near future. While not yet considerable in size, they are characterized by very high growth rates and are expected to replace or supplement the current ways to consume games. Among them are:

- Virtual reality (VR) hardware – very promising and hard to develop technology, at present the most limiting factor remains the cost of production. As with some technologies in other industries, the game industry might prove to be the main force pushing the technology, but the game industry will benefit greatly from virtual reality hardware.
- Virtual reality games – most promising in terms of growth and potential, which still remain largely untapped. It is likely we will see a large number of games adapted to VR when the technology becomes accessible to a wide market of consumers. MMO (massively multiplayer online) VR might also be a groundbreaking step both in culture and in terms of game industry revenue growth when the technology is able to provide a sufficient quality of experience.
- Augmented reality (AR) – with the success of games like Pokemon Go, AR has gained momentum and provides new ways to experience games, never before available, often without the need for new hardware as smartphones have reached enough capability to handle the many required features. Its non-game applications are expected to drive the technology forward, while the game market is perfect to popularize AR solutions, and by 2020 it is estimated that \$60 billion will be spent on this aim (Porter, Heppelmann 2017).
- E-sports – small in comparison to the rest of the market, characterized by big growth and promising numbers as consumers mature. It is also hard to fully account for its reach and revenue, as much of it consists of streaming and sharing videos of game play.
- Casual mobile games – when in Asia and in the future Latin America and Africa billions of people will rise out from poverty, easily accessible and low-cost games will become available to new masses of consumers who adopt casual mobile games very fast and easily. This can be already observed with the massive consumer spending in the game industry shifting to Asia, and this trend is expected to continue.
- Indie Games – with the technology to develop games bringing entry costs down as well as the advancement of crowd-funding, small studios, sometimes even one person have been observed to produce increasing numbers of highly innovative games, generating new kinds of content and ways to consume them in a dispersed and non-cluster way. This trend is expected to continue and grow as the game industry tends to attract passionate content creators much like the music or movie industry.

### **Analysis of video game cluster in Wrocław, Poland**

The Polish video game industry is relatively young compared to Japan or the USA, but examples of Polish companies such as CD Projekt RED (Witcher series – PC, Warsaw), Techland (Call of Juarez, Dying Light – PC, Wrocław) or Infinite Dreams Inc. (Jelly Defense – Mobile, Warsaw) to name a few, show that Polish game developers can be competitive in the global game market.

The Polish game market is relatively small – evaluated to be worth \$0.49 billion, which comprises 0.1% of the Polish GDP (Raport 2017), putting it far behind the largest world markets – the USA and China, both approximately 50 times larger, as well as in terms of the size of the industry in comparison to the country economy, with countries like South Korea (0.28%), Japan (0.26%), Malaysia (0.19%) or Great Britain (0.17%) leading the way. The Polish video game market is also projected to grow slower than the global video game market (Raport 2017; [http://newzoo.com/...](http://newzoo.com/)).

Data ([http://www.gamedevmap.com/...](http://www.gamedevmap.com/)) shows, that the biggest Polish developers are clustered in large Polish cities with a good academic base: Warsaw, Katowice, Krakow, Wrocław, Łódź, Poznań. It should be noted that Krakow has taken steps to artificially support the creation of its games industry cluster through the Krakow Technological Park and is over-represented on the list of the biggest developers for the city's size. Krakow is also home to the largest video game industry event in central Europe – Digital Dragons. Warsaw having oldest and best developed cluster for high-tech in Poland is the natural leader. The star of the Polish video game industry – CD Projekt RED, originated in Warsaw, but opened offices in Krakow in 2013 and Wrocław in 2018.

Of note for the topic of this article is that Wrocław is home to the second best Polish video game industry star – Techland, founded in 1991, switched to developing games in 2000, employing around 300 people, saw its first international success in 2006 with its Call of Juarez game and continues to compete with success on the global market expanding to new platforms as well as developing new titles and has recently branched into publishing. The author would like to mention that Techland formally is located in Ostrow Wielkopolski, but the majority of company business is considered to be conducted in Wrocław.

Wrocław is the 4<sup>th</sup> largest city in Poland, located and well connected by highways between Berlin, Warsaw, Krakow, Katowice and Prague, as well as having multiple connections with European cities through its airport – not nearly enough compared to large European hubs, though.

Wrocław was chosen as the 2016 European capital of culture and is the home of numerous universities with broad education profiles, hosting around 120 000 students (“Gazeta Wroclawska”, 01.10.2016). Compared to other EU countries the quality of life is high – with costs of living and housing being low - as well as having above average or high level of safety, Internet access and business freedom ([http://teleport.org/...](http://teleport.org/)), and salaries in the tech industry are often nominally on par with Western standards.

Unfortunately, venture capital and startups in Wrocław are ranked very low ([http://teleport.org/...](http://teleport.org/)). Wrocław has experienced a significant influx of Ukrainian immigrants in recent years. Because of its history after WWII, the city is relatively open to migrants and immigrants. While programmers tend to enjoy western salaries, many supporting and creative jobs are relatively low paid compared to

other regions in the world, providing a unique cost advantage for the region to export its labor globally.

The city has attracted companies like: Google, HP, Amazon, LG and McKinsey. The key factors creating the attractiveness of the city are its large talent pool of professionals and graduates, good quality of education, high level of language skills and quantity of modern office stock. Large numbers of R&D centers together with strong IT and finance sectors are features that distinguish Wrocław (<http://invest-in-wroclaw.pl/...>).

Recently pollution has become a major issue for inhabitants (<http://www.numbeo.com/...>), especially during the winter months due to the city's geography and increasing tourism and population size (often not reflected in official data), traffic and reliance on coal as an energy source.

It is worth noting that Poland in general, and Wrocław as one of its parts has relatively short experience in creating a desirable company culture, unlike companies in the Silicon Valley famous for this feature, nonetheless, local companies are adapting rapidly as an effect of a general lack of programmers in the IT sector by offering non-salary incentives that will become available to other employees in time.

In summary the video game industry is characterized by a high growth rate, considerable size and high innovation rate as well as reliance on hi-tech and content creation industries (mainly the movie industry) for emergence and development. Wrocław, Poland seems to possess the right combination of traits to benefit from opportunities presented by the industry.

When analyzing clusters, it is beneficial to look at success stories and good practices, hence benchmarking is a helpful way to determine possible actions and look at possible ways to develop clusters. In cluster analysis, SWOT analysis and Michael Porter's National Diamond are often used as tools used to determine the forces of the environment and the qualities of the cluster itself. In this article, the author would like to add to that network analysis is a tool helpful in perceiving the cluster as part of a larger entity, interconnected with different market players and subject to changing forces of the environment.

Video game industry clusters like the one in Los Angeles area, Japan (Ito et al. n.y.) or Montreal emerged because of high-tech clusters already present, as well as closeness to the movie/media industry. Wrocław is unable to compete with them in terms of scale, available capital or a pre-existing network, but a study of successful cluster formation might be beneficial to understanding how Wrocław might best benefit and what strategy it should choose to stimulate its cluster growth.

More modest examples, such as Finland (Masira, Chowdhury 2014), Warsaw, Katowice or Krakow provide much better models and guidelines specific for Wrocław: The Finnish mobile gaming cluster became prominent after the staggering success of Angry Birds by Rovio, which became the flagship product for the whole mobile market at the time, the formation of the cluster and its success was possibly caused by the closeness to the Finnish mobile phone industry, namely

Nokia. The relatively small local market was not in any way a problem for the Finnish cluster to prosper.

Other Polish clusters seem to specialize: Warsaw seems to be home to productions requiring the biggest capital, with CD Projekt RED's *The Witcher* series as the best example, but also the city's considerable population in relation to Wroclaw, and its more developed network of international companies predestined it for this role. Katowice seems to be leading in the region in e-sports, organizing large events and promoting e-sports. This particular niche would be very hard for Wroclaw to compete in. Katowice competes with Seoul in this regard, but since it is located in central-eastern Europe, its distance and specialization in events allows it to grow and prosper.

Michael Porter proposed a national diamond as a tool to examine national clusters; its usefulness in examining city or regional clusters is universal and considered the best tool designed for this specific task.

Wroclaw's natural factor conditions are exceptional: the city has an excellent quality and quantity of skilled workforce required by the video game industry, relatively low cost of living that accounts for the high quality of life. Only access to funding is relatively weak.

Both Wroclaw's cluster and individual companies have easy access to the strategies and structures of local successful market players and can easily utilize them if needed. They are accessible both through know-how of the local workforce and through easy access to local cooperation with other market players.

As far as demand is concerned, there are numerous opportunities to help in marketing and sales both for the Polish and international market using the existing network of connections (Sales and Marketing) and reputation through association (Public Relations). A characteristic of the video game industry makes the local demand practically irrelevant – the ease and cost of digital sales all over the world triumphs any attempts at making it a local niche, hence the author chose to include locally available factors that enhance global competitiveness and give access to global demand, rather than local demand.

Wroclaw offers an excellent base for the video game industry through its long existent IT and financial sectors, as well as numerous universities supplying new talent each year. There is access to all kinds of required skill sets, among which programming and graphic design seem to be most prominent for game production and the local financial sector offers know-how in reducing the effect of relatively low access to local VC.





**Figure 2. Wroclaw video game cluster diamond analysis**

Source: Author's own elaboration

From the diamond analysis and the fact that major Polish game developers open their offices in Wroclaw, we can conclude that the city is perfectly suited to develop its video game cluster. The high quality of life stemming mainly from the low cost of life compared to Western Europe, central location in Western Poland among other video game clusters and high quality universities form a winning combination. The Wroclaw video game cluster, however, suffers due to a lack of formal support and guidance, with no clear niche or unique competitive advantages in the region, while – the Krakow video game cluster especially, seems to be developing at a faster pace.

Diamond analysis provides valuable insight into the qualities of the cluster, but in order to look at it from another angle and dive a bit deeper into its potential, SWOT analysis seems an appropriate method; the threats and opportunities are of particular value to analyse the cluster.

The strengths and weaknesses were chosen as the internal factors in developing the cluster as a whole. They are mostly the inherent, natural qualities of the city or local government activities. The opportunities and threats are viewed on a much larger scale, through the lens of the global video game market, and allow one to assess the cluster in view of global trends, markets and competitors – both clusters and individual companies.

	HELPFUL	HARMFUL
INTERNAL	<p><b>STRENGTHS</b></p> <ul style="list-style-type: none"> <li>+ Great talent pool</li> <li>+ Quality and quantity of local higher education</li> <li>+ Quality of life attracting highly skilled immigrants</li> <li>+ Low labour costs, especially in non-technical jobs</li> <li>+ Successful local companies (Techland)</li> <li>+ Culture focused on problem solving</li> <li>+ Over a decade of cluster development</li> </ul>	<p><b>WEAKNESSES</b></p> <ul style="list-style-type: none"> <li>- Pollution, especially during winter</li> <li>- Polish law not adjusted to startup needs</li> <li>- Local entrepreneurs and employees leaving for other clusters thanks to easy access</li> <li>- Relatively small VC activity in the region</li> <li>- Limited government support for cluster</li> <li>- No significant local events connected to the industry</li> </ul>
EXTERNAL	<p><b>OPPORTUNITIES</b></p> <ul style="list-style-type: none"> <li>+ Utilizing cost advantage thanks to low-cost non-technical workforce</li> <li>+ Local initiatives to promote formation and development of the cluster</li> <li>+ Numerous attractive niches still with no winning cluster in the vicinity</li> <li>+ Industry adequate for telecommuting</li> <li>+ Industry attracting highly entrepreneurial and highly motivated enthusiasts</li> </ul>	<p><b>THREATS</b></p> <ul style="list-style-type: none"> <li>- Surrounding cities performing well in stimulation of their clusters</li> <li>- Only one star company in the cluster</li> <li>- Other clusters attracting local entrepreneurs</li> <li>- Deteriorating condition of air pollution might lead to worsening of perceived quality of life rating</li> <li>- Growing Asian market might result in strong global competition in near future</li> </ul>

**Figure 3. Wrocław video game cluster SWOT analysis**

Source: Author's own elaboration

The SWOT analysis clearly points out to the relative infancy of the cluster despite more than a decade of development. This might be the result of the city focusing on attracting foreign companies to utilize the local talent pool and neglecting stimulation of the cluster. The Wrocław cluster possesses all the qualities necessary for regional and global competition in niches that do not have a clear dominating cluster yet. This opens opportunities for specializing in promising new technologies: perhaps AR or VR, mainly because of the many accomplishments of Wrocław University of Technology and its strong position in the region.

Studies have shown that video game clusters emerge where a concentration of human creativity in arts and in technology is a significant economic localization factor, but cross-fertilization of sectors and public policy also contributes to understanding the emergence of clusters in certain urban regions (Pilon, Tremblay 2013). Wrocław has the potential to develop a globally competitive video game cluster because of its high quality of education and good talent pool, but has to address its main weakness – the lack of venture capital and stimulation for startups. Moreover, implementing solutions to improve air quality and addressing traffic problems are efforts that need to be made in order to avoid a decrease in the quality

of life. Video game clusters work as networks, both having complex inter-network connections, as well as connecting to other clusters and industries, as single entities. Depending on the network rent, a network as a whole can be considered to be on certain level of development (Organa, Niemczyk 2017).

The author chose to include only selected elements in the network, only sometimes going deeper into the interconnectivity of the network, in order to keep the connections clear and easily distinguishable. The visualization shows some interesting connections and possibilities, like the possibility of cooperating with LG, which manufactures LCD screens in Wrocław, but as a whole is tightly connected to the smartphone and Asian markets. LG along with the Katowice cluster are closely connected with e-sports and the Seoul Digital Media City, which might produce cooperation, or competition in the future.

Network analysis is meant to show most of all the numerous 'second level' connections for Wrocław's video game cluster: connections that can be relatively easily expanded and brought to the first level if effort in this direction is taken. An example is a connection through LG's and Katowice's e-sports cluster to Korea – one of two (after Japan) Asian market leaders in the supply of video games, and an exemplar e-sports cluster and potentially a 'bridge' to the Asian market. In network analysis, interwoven factors can be visualized and assessed. This is of course only a partial, low resolution analysis as the number of factors, players, markets and connections can be virtually endless if a sufficient level of detail is undertaken. The author decided on low resolution for clarity of the connections, limiting the network to only the most important and strongest connections. The Wrocław video game cluster was made a central and determining factor for the inclusion of other nodes, which in this analysis have a subservient role.

*Figure 4* clearly shows the global character of the industry, with high levels of connections between different regions and illustrates that prominent links in regions correlate with the market size and level of development. Africa and Latin America remain relatively scarcely connected to the network, both because of small market penetration and because of no prominent video game clusters.

## Conclusions

The Wrocław video game industry cluster is relatively underdeveloped on the global scale, but thanks to the proximity to other clusters and easily accessible network connections with video game industry clusters around the world, as well as some natural advantages – mainly the high level of local university education and relatively low cost of living, has the potential to become competitive on the global market. Formal actions need to be taken in order to realize that potential, with the activities of the Krakow Technology Park serving as a benchmark and proof that applying this approach in the Polish environment can bring substantial results. Steering towards an attractive niche and leveraging the city's advantages seems like an obvious strategy in this case. If developed, the Wrocław video game industry cluster can bring substantial prosperity to the region and become globally competitive for decades to come.

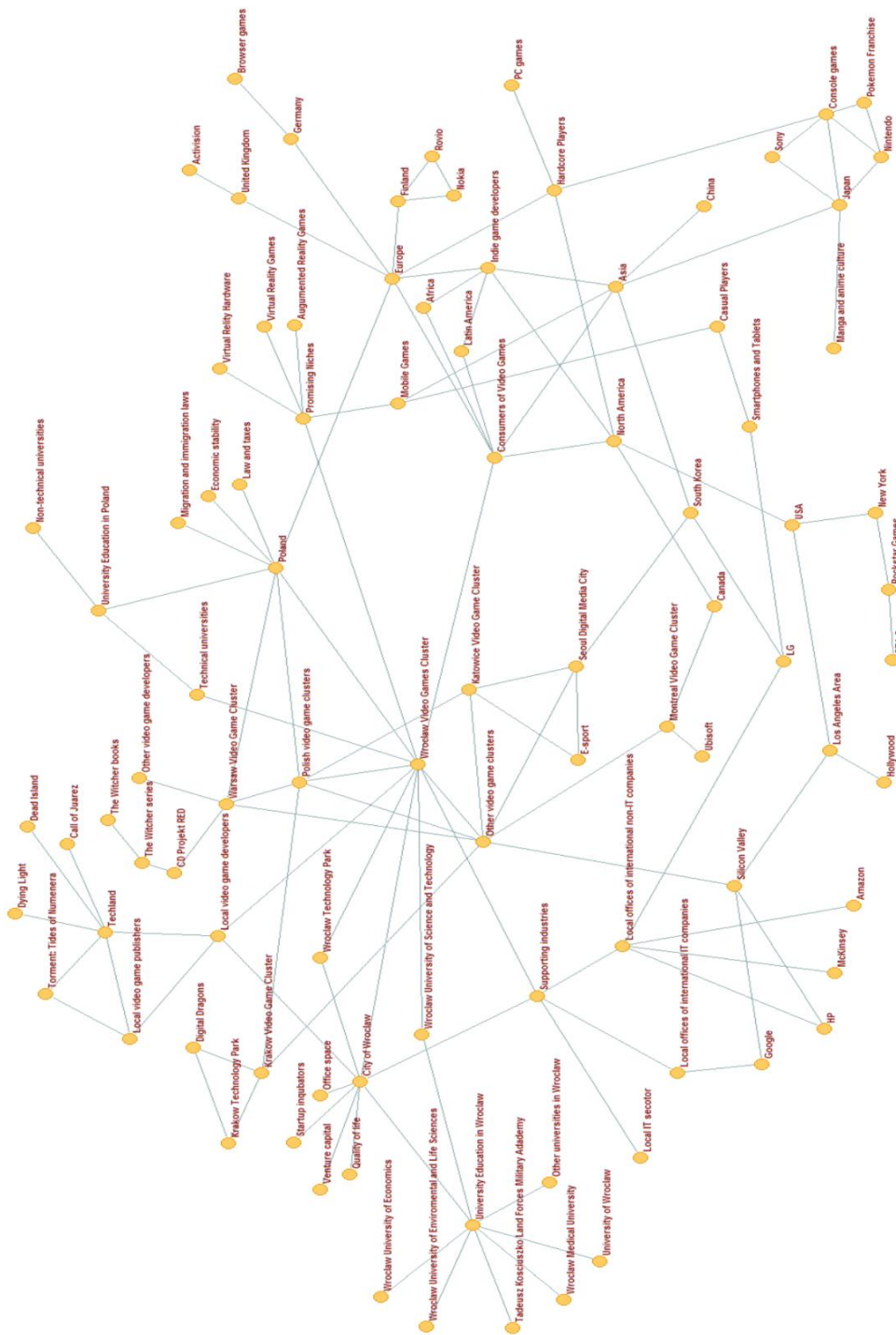


Figure 4. Wroclaw video game cluster network analysis

Source: Author's own elaboration

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## **GLOBALNIE KONKURENCYJNY LOKALNY KLASTER: ANALIZA BRANŻY GIER WIDEO WE WROCŁAWIU (POLSKA)**

**Streszczenie:** W artykule przedstawiono analizę konkurencyjności klastra branży gier wideo we Wrocławiu (Polska), przy użyciu metody diamentu Portera, analizy SWOT, analizy sieciowej oraz benchmarkingu klastrów, w celu naświetlenia lokalnych charakterystyk i możliwości rozwoju globalnie konkurencyjnego klastra gier wideo. Analizę poprzedzono przedstawieniem perspektywy globalnego rynku gier wideo z naświetleniem możliwości, zwłaszcza wzrostu rynku, a szczególnie pod kątem urządzeń wykorzystywanych do gier wideo oraz przez pryzmat geograficznego charakteru rozwoju rynku.

**Słowa kluczowe:** analiza klastrów, azjatycki rynek mobilnych gier wideo, branża gier wideo, Wrocław, e-sport, gry wideo, rzeczywistość rozszerzona, rzeczywistość wirtualna