The battle of superheroes: the rise of the knowledge platform strategy in the movie industry

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Abstract

Purpose – Over the past years – because of the huge impact of companies such as Airbnb and Uber – the concept of the platform became extremely popular in the business world. Still, the concept of the platform has been evolving for a long time in the management field, from internal platforms (like the famous case of Sony Walkman) to industry-wide platforms (like the case of computers with external software developers), up to transaction and two or multi-sided platforms (such as Airbnb and all the companies with a similar business model). Platforms are often considered disruptors in several industries, from accommodations to mobility to entertainment. Still, the disruptors in the creative world usually deal with the way in which they distribute content (Netflix or Spotify), rather than with the content itself. The purpose of this paper is to understand if and how platforms trategies can also be used in the creative industries.

Design/methodology/approach – This paper digs into the movie industry, studying the three most successful Superheroes sagas of the past two decades as follows: the Marvel Cinematic Universe (MCU), DC Comics and X-Men using a narrative approach. The three sagas are studied through network analysis to understand their ''platform approach''.

Findings – The results show how platform strategies are relevant also in creative industries – defining the concept of ''knowledge platform strategy'' – and how they have a significant impact in terms of market performance. The MCU builds on a common knowledge through the various movies that enable the chance to rely on many of the platforms' characteristics emerging from the literature.

Research limitations/implications – This research extends the concept of ''platforms,'' relying on the three kinds of platform defined in the managerial literature and introducing the ''knowledge platform strategy'' for creative industries. The main contribution is related to the extension of platforms in research fields where it has not been exploited. This opens up avenues for research both from a knowledge platform and creative industries perspectives.

Practical implications – Managers, working not only in creative industries but also in industries where a common knowledge basis may be leveraged to develop new products over time, may use the concept of ''knowledge platform strategy'' to rethink the new development process or knowledge management from a customer perspective.

Originality/value – This study explores a mature and relevant concept – the platforms – in a new filed, the creative industries using the case of Superheroes sagas, proposing a new perspective to explain the success of MCU while proposing a new platform strategy.

Keywords Business model, Creative industries, Platforms, Network effects, Knowledge strategy

Paper type Research paper

Introduction: platforms rule the world

We live in the era of the "platform revolution" (Choudary *et al.*, 2016). Every day we get in touch with platforms that aim to make our life easier or frictionless (Evans and Schmalensee, 2016). "platforms" are all those companies that put together people, organizations and resources in an interactive ecosystem, where the flows of value creation and capturing may

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overrule significantly (Choudary *et al.*, 2016). Knowledge flows changed as well, as platforms are also changing the interaction among peers, like in social networks (Antonacci *et al.*, 2017) or among seekers and solvers in crowdsourcing initiatives or innovation intermediaries (Randhawa *et al.*, 2017; Malhotra and Majchrzak, 2019).

Just a couple of years ago, our reality was a dystopic future world. Today, we can get a ride from a stranger, sleep in the bed of an ordinary person and drive a car that we do not own without asking anyone. These are just simple examples of how platforms have entered our daily lives and enable us to do previously unimaginable things.

Platforms are having a disruptive impact on many industries by challenging the status quo and changing the rules of the game in an unpredictable way (Downes and Nunes, 2014).

The music industry has changed significantly in the past 20 years (Kaplan and Haenlein, 2010) because of how first iTunes and then Spotify changed the rules of the game. Profits are spread in a different way and the physical distribution network is almost worthless. They changed how people enjoy and fiscover music creating a new meaning (Trabucchi *et al.*, 2017; Artusi and Bellini, 2020).

The mobility industry is facing the opportunities and challenges derived by new technologies like autonomous driving, but in the meantime, it must contend with the new behaviors of people. Initiatives such as Car2Go, oFo or Lime offer new ways for people to get around in cities.

Airbnb or BlaBlaCar are showing new opportunities for travelers, who can now decide to not use the traditional offering of hotels, bed and breakfasts and other accommodation providers or even to not use traditional services to move from one city to another.

Netflix – and all the other streaming services that followed over the years – provides people the chance to see what they want, when they want it. This is a huge challenge for traditional providers like TV broadcasters that saw their market positions go through significant pressure. The list of examples can continue further to include a lot of other industries, sectors and kinds of businesses.

This study focuses on the creative industries (Savino *et al.*, 2017; Latilla *et al.*, 2018, 2019), which are often involved in the platform industries through giants such as Spotify and Netflix. Nevertheless, these cases mainly work on how creative content is distributed. Taking a literature-based perspective, there is early evidence showing how companies in the creative industries – like Netflix, for example – are leveraging platforms logic in the early phases of content development, for example, using big data analytics to understand viewers' behaviors and deciding what to produce next (Verganti *et al.*, 2020). Co-creation platforms have been highly studied and used to enhance co-creation and collaboration involving end-users or to get in touch with other content creators (Saragih, 2019). Similarly, platforms influenced the business model of creative firms, for example creating distributed platforms to develop and test new solutions (Landoni *et al.*, 2020).

But what about the content? Can platform dynamics also enhance the content of the final product or are they just concerned with distribution or creation process? Can the knowledge flow typical of a platform influence the content in a creative industry?

Considering the movie production field, we can see how over the past decade's something significant has happened. The number of movies that yearly made more than US$1bn has increased year by year, moving from being a rare event to something quite common (IMDb, 2020). In total, 46 movies have reached this goal in cinema history, 37 of which just in the past decade (Renfro, 2020). Among them, the vast majority has a common denominator: the Walt Disney Company. However, there is something else clearly emerging on top of the others. The top five has two new entries in the past two years as follows: "Avengers: Infinity War" in 2018 and "Avengers: Endgame" in 2020. The franchise led by Iron Man has had a great run over the past years, with nine movies on the list since 2012.

The Marvel Cinematic Universe (MCU) is one of the closest things to the concept of "disruption" in the movie industry (Harrison et al., 2019): 22 movies for US$17bn at the box office, with an 84% rating on rotten tomatoes and 64 nominations and awards. Their movies build one on the others, creating and expanding universe that expands movie after movie. Each of them builds on what has been previously introduced in the storyline, creating opportunities that seem interesting both from a storytelling perspective and from a business perspective. This idea of "building" on a common base is typical of the platform dynamics (Gawer and Cusumano, 2014). Is Marvel a platform-based disruptor? Can we consider the chance to link all the movies and to build one on the other in a platform-strategy? And on top of that, would a platform strategy lead to better results in a creative industry like Hollywood?

This article aims to unveil the power of platforms in the creative industries, studying one of the most grossing genres of the past decades: superhero movies (Salkowitz, 2018). Answering these questions may bring to two contributions. On the one hand, it may use the platforms has an explanation of the extreme success of the Avengers case. On the other, we may expand the concept of platforms bringing it within the concept development, enhancing is contributions in different fields from where it usually applies.

Theoretical background: the superpowers of platforms

Over the past decade, management literature has seen a huge evolution of the concept of platforms.

Originally, it was used in the field of new product development. The term was used to describe those projects that were based on a shared architecture that would enable the creation of a number of derivative products (Wheelwright and Clark, 1992; Kogut and Kulatilaka, 1994; Kim and Kogut, 1996; Meyer and Lehnerd, 1997). The main idea was to create a common basis on top of which the firm had the chance to foster innovation in a faster and cheaper way. This was later defined as an "internal platform" (Gawer and Cusumano, 2014). The greatest opportunities of this "platform approach" are to spread the investment on multiple products while making the development process shorter and less expensive.

One of the greatest examples in Sony, that created 279 models based on only five different platforms, helping them to spread to every market niche in an effective and efficient way (Sanderson and Uzumeri, 1995).

Over the years, this concept evolved, reaching the definition of "industry-wide platform" (Gawer and Cusumano, 2014). Great examples such as the alliance of Microsoft, Intel and IBM showed that the power of platform may move single companies forward. Indeed, by putting together the hardware, the processor and the software, these three companies created something like an internal platform and then they opened it up. In other words, they started having complementors. This means that the platform may be used to foster innovation not only by the companies that created it but also by anyone willing to foster something new by leveraging the existing base. In other words, the platform is a knowledge base upon which various players can build on, this led to the creation of applications by external developers. Or, more broadly, also social networks and virtual communities may be part of this classification (Antonacci et al., 2017).

Similar approaches have been used by game console makers or by smartphone providers with the creation of app stores. These cases have a lot of similarities with two-sided markets (Rochet and Tirole, 2003), having two different groups of customers (sides, the end-users and the developers) that are joined by a platform (Windows, PlayStation or iOS) generating network effects (Brillinger et al., 2020). In particular, they generate indirect or cross-side network externalities (Katz and Shapiro, 1985), which means that the more players join one side (e.g. the more gamers Playstation has) the more the platform (Playstation) will be valuable for the other side (developers) and vice versa. Over the years, academics stopped

using the term "two-sided markets" and started preferring the more flexible "multi-sided platforms" (Hagiu and Wright, 2015 Täuscher, 2017), which refers to all those businesses that put together multiple customers through indirect network externalities.

Very recently, Cusumano and colleagues proposed a way to clearly distinguish between these concepts re-labeling "industry-wide platforms" as "innovation platforms" and considering all the other multi-sided platforms as "transactional platforms" (Cusumano et al., 2019). Basically, "innovation platforms" refer to all those platforms open to external players that can leverage that common basis to foster innovation, while "transactional platforms" are all those businesses that put together various sides as main value propositions, like many of the examples previously mentioned (Spotify, Airbnb and many more) (Trabucchi and Buganza, 2020).

Over the past years, academic- and practitioner-oriented literature have paid a lot of attention to these platforms, which have been highly boosted by the spread of digital technologies, as these are highly appreciated by investors (Trabucchi et al., 2019; Sanasi et al., 2020). Moreover, this kind of platform has been highly studied in the field of crowdsourcing, matching people asking and offering knowledge on given topics (Randhawa et al., 2017; Malhotra and Majchrzak, 2019).

Platforms emerged as a new business model (Amit and Han, 2017), for various reasons and offering various opportunities.

One of these opportunities is that platforms can scale fast to gain a wide diffusion in a short amount of time by leveraging the power of digital technologies (Magistretti et al., 2019). This is often-related with the chance to rely on a zero-marginal cost structure (Rifkin, 2014), which enables them to reach a worldwide diffusion and a huge number of customers quickly (Choudary et al., 2016).

Still, the basic structure of platforms embeds the concept of modularity (Baldwin and Clark, 2003), having smaller "components" or "phases," which may offer flexibility. This means having the chance to add sides over time, fostering innovation on transactional platforms and adding new services to the span of activities offered, like Uber Eats for Uber or Experiences for Airbnb (Trabucchi and Buganza, 2020).

Finally, platforms offer interesting opportunities in terms of value capture, having the chance to have multiple revenue sources and to subsidize some of the sides (Parker and Van Alstyne, 2005).

Unfortunately, not all that glitter is gold and platforms also face several challenges, with a number of downsides.

First, setting up a platform is anything but simple. Internal and industry-wide platforms require large investments, but transactional platforms suffer the so-called chicken and egg paradox (Caillaud and Jullien, 2003). The platform is – initially – worthless until it has customers. Nevertheless, to bring on board one side, the other one should be already on board. Various tactics exist to solve this, but it remains one of the most challenging phases of the platform lifecycle (Trabucchi, 2020).

Similarly, to reach the critical mass to start the network effects is not an easy job and actually represents the most common fatal error (Evans and Schmalensee, 2010). Indeed, once the players are on board, the platform provider needs to craft *ad hoc* value propositions for each side, making the business model design a much more complex process, rather than in traditional linear value chain businesses (Muzellec et al., 2015).

Despite the various kinds of platforms that have been defined in the literature, all of them share a common element: there is a common basic structure upon which it is possible to build something bigger. This ability to "plug-and-play," to create on top of something has been defined as "platform thinking" or "platform strategy" (Bonchek and Choudary, 2013).

Leveraging and building on the platforms literature (summarized in its various perspectives in Table 1) – in their various definitions – this study aims to understand if and how a platform strategy may be applied in creative industries (Savino *et al.*, 2017; Latilla *et al.*, 2018, 2019). In other words, we aim to understand if the typical mechanisms of platforms may take place also in creative industries and if one of the various platforms better fits than the others or if a hybrid approach may emerge.

Research design and methodology: Superheroes are a powerful source of evidence

Empirical setting

Creative industries are defined as those sectors where knowledge and creativity are shared among different clusters of people. Inside the vast variety of creative sectors, we selected the film industry because it perfectly fits with the aim and scope of the investigation. Indeed, the idea of understanding how platform solutions can be designed outside the digital environment and especially how they can be adopted by the creative industry, guided us in selecting the movie industry where different strategies seem to emerge.

As previously mentioned, the past decade saw the rise and the consolidation of a relevant phenomenon: the MCU, namely, the MCU, which had a relevant impact on the box office (IMDb, 2020).

Nevertheless, superheroes are not just from the MCU; there are three relevant players in the field that seem to leverage different strategies.

The three players here considered are The Walt Disney Company, 20th Century Fox (acquired by The Walt Disney Company in 2019) and Warner Bros. In more detail, we considered three media franchises initiatives put in place by the three players, namely, the MCU by The Walt Disney Company, the X-Men series by 20th Century Fox and the DC Comics movies and the related extended Universe by Warner Bros (starting from Catwoman in 2004, as the first "modern" superhero movie in the new century). Table 2 summarizes the movies considered for each franchise.

Superhero franchises seem to be a proper field where it is possible to study the potential impact and nature of platform strategies in the creative industries. Indeed, all three franchises can be considered successful from a market perspective and seem to apply different strategies from a platform perspective.

In particular, the MCU is gaining colossal relevance in the sector for its ability to create a central saga like The Avengers. In this saga, different superheroes play a role even if the story of the character is developed outside and sometimes independently by the Avengers saga itself. Thus, the MCU strategy may seem like a platform initiative where different movies build both independent and common stories building on other movies. In other words, new movies do not build everything from scratch. They have a strong common basis (platform) to be leveraged.

Table 1 Summary of types of platforms		
Type of platforms	*Examples*	*Main references*
Internal or product platforms	Sony creating the various versions of the Walkman upon five basic architectures	Wheelwright and Clark (1992), Meyer and Lehnerd (1997) and Gawer and Cusumano (2014)
Industry-wide or innovation platforms	IBM, Microsoft and Intel offered personal computers where external complementors offer software	Gawer and Cusumano (2014), Cusumano *et al.* (2019) and Brillinger *et al.* (2020)
Multi-sided or transaction platforms	Airbnb, Uber	Gawer and Cusumano (2014), Hagiu and Wright (2015), Cusumano *et al.* (2019) and Trabucchi and Buganza (2020)

Table 2	Movies in the sample and release year					
	MCU		*X-Men series*		*DC movies*	
Year	*Movie*	*Year*	*Movie*	*Year*	*Movie*	
2008	Iron Man	2000	X-Men	2004	Catwoman	
2008	The Incredible Hulk	2003	X-Men 2	2005	Constantine	
2010	Iron Man 2	2006	X-Men: The Last Stand	2005	Batman Begins	
2011	Thor	2009	X-Men Origins: Wolverine	2006	Superman Returns	
2011	Captain America: The First Avenger	2011	X-Men: First Class	2008	The Dark Knight	
2012	The Avengers	2013	The Wolverine	2009	Watchmen	
2013	Iron Man 3	2014	X-Men: Days of Future Past	2010	Jonah Hex	
2013	Thor: The Dark World	2016	Deadpool	2011	Green Lantern	
2014	Captain America: The Winter Soldier	2016	X-Men: Apocalypse	2012	The Dark Knight Rises	
2014	Guardians of the Galaxy	2017	Logan	2013	Man of Steel	
2015	Avengers: Age of Ultron	2018	Deadpool 2	2016	Batman vs Superman: Dawn of Justice	
2015	Ant-Man	2019	Dark Phoenix	2016	Suicide Squad	
2016	Captain America: Civil War	–	–	2017	Wonder Woman	
2016	Doctor Strange	–	–	2017	Justice League	
2017	Guardians of the Galaxy Vol.2	–	–	2018	Aquaman	
2017	Spider-Man: Homecoming	–	–	2019	Shazam!	
2017	Thor: Ragnarok	–	–	2019	Joker	
2018	Black Panther	–	–	–	–	
2018	Avengers: Infinity War	–	–	–	–	
2018	Ant-Man and the Wasp	–	–	–	–	
2019	Captain Marvel	–	–	–	–	
2019	Avengers: Endgame	–	–	–	–	
2019	Spider-Man: Far from Home	–	–	–	–	

On the contrary, DC Comics, with various sagas (such as Batman, Superman and a number of stand-alone movies such as Catwoman or Wonder Woman), seem to pursue a traditional "new product development" strategy, keeping each different initiative separated from the others.

Finally, the X-Men series seems to be a hybrid solution as follows: all movies are related to all the others, but in the same way, they figure as a long list of sequels.

The goal of this study is twofold. First, we want to test the assumptions we made in the three cases. Are these three cases leveraging different platform strategies? Second, is there any kind of correlation between platform strategies and the impact on the box office?

Narrative method

The research is approached through the narrative method, which is an interpretive description of historical facts aiming to give meaning to a series of events (Gabriel, 2000). The main goal of these studies is to provide an explanation of a phenomenon taking a process perspective, showing how things lead there (Pentland, 1999). This is highly coherent with our study, trying to understand what brought to the emergence of the Avengers case, searching for common points with the concept of the platform. From a research perspective, a number of key events need to be highlighted and the links among them (Garud *et al.*, 2014). Usually, narrative studies focus on one or more cases, aiming for a depth understanding or the chance to provide similarities and differences (Andriani and Carignani, 2014; Franzoni and Sauermann, 2014; Beltagui *et al.*, 2020).

Therefore, secondary sources have been used to recreate the development of three franchises, the links between the movies and their market results.

Data gathering and data analysis

First, we clustered all the different films that belonged to the different franchises to be sure that no film belonging to them was excluded from the analysis. Second, we looked for the

box office results achieved by the various franchises. In so doing, we referred to websites such as box office Mojo, The Numbers, IMDb and rotten tomatoes recognized in the industry as references for this kind of information. After this, we looked at the different elements inside each film that could have highlighted an existing link among the different elements. In the first part of this step, we analyzed the appearance of *characters* in different movies of the franchise. Then, we analyzed the *locations* that appear in the movies and, finally, we looked at the *items* that recur in the different movies.

The identification of such repeated elements inside the different movies allowed us to analyze the different initiatives by seeing the connections and links among the different aspects. As suggested by Miles and Huberman (1984), we qualitatively analyzed the information by first clustering it and then understanding its value.

To assess is the three franchises rely or not on a platform strategy, we used network analysis.

Network Analysis (or Social Network Analysis) is an interdisciplinary methodology developed by sociologists and researchers in social psychology in the 1960s and 1970s, further developed in collaboration with mathematics and statistics, that led to the rapid development of formal analysis techniques, which made it an attractive tool for other disciplines such as economics, marketing or industrial engineering (Scott, 2000). The main assumption Is related to the fact that the relationships among interacting units (the nodes of the network) have an important role to interpret the behavior of the actors in the network. The relations between the nodes are the fundamental component of network analysis. Originally, nodes were "social" entities (individuals, teams or organizations), even though the diffusion of the method brought also the use of products or firms as nodes (Baldwin and Woodard, 2009).

Network analysis is mainly related to two perspectives as follows: the network structure and the role of nodes within the network. The first perspective considers measure like graph density or the modularity, which is the presence of sub-groups, aiming to study the set of ties linking all the nodes (Wasserman and Faust, 1994). The second perspective focuses on the role of the nodes in spreading information, knowledge or influence (Watts, 2003). The main metrics are the centrality (how much a node is linked with the others) or the betweenness (how much a node acts as a bridge between other nodes).

Network analysis over the past years got significant attention in the management literature, specifically in the innovation (Arenas-Márquez *et al.*, 2014; Hu *et al.*, 2015) and knowledge management fields (Han *et al.*, 2020; Su, 2020). Indeed, the most common method to represent a platform is to use networks, where each node is a platform or a product (Baldwin and Woodard, 2009; Pellizzoni et al, 2019). Networks can show different information such as how elements in the platform are more or less central, the number of compliments and the evolution of the platform and complements over time. Platforms should have a denser and more structured network than "traditional" configurations.

This in-depth analysis of each film of the three franchises granted us the ability to create a network analysis and understand, which connections exist between the various elements, also in a graphical view. Using Gephi, a popular software for network analysis in the management literature (Donthu *et al.*, 2020), we analyzed the different network graphs searching for the commonalities and differences in the strategy adopted. Thus, we moved from qualitative analysis, the recognition of links among different movies (e.g. characters, locations, items) to the quantitative measures of them, so we summed up each relationship to see the strength of the connection between one movie and another. We then plotted these results with Gephi and qualitatively interpreted them. Moreover, we calculated and considered the network density, the average degree centrality and the path length. These are the typical dimensions that connote a network graph. Finally, we ran an Analysis of Variance (ANOVA) with post hoc over the data set to see potential statistical significance of the link existing between the strategy and the box office results achieved.

Empirical results: marvel cinematic universe rules everyone

The first analysis conducted aimed at understanding the results achieved by the different franchises at the box office (Figure 1).

What is interesting is that the economic and financial results obtained by each of the franchises analyzed are showing peculiar differences. First, if we look at the MCU, we can see that it is showing the highest average box office income of almost US$1,000m for each film, specifically US$981,93m. This is even more interesting if we consider that starting from 2008 up to 2019, Marvel released, on average, 1.9 films per year and notwithstanding this, was able to have almost double the average income compared to the other two franchises considered. X-Men had an average box office revenue of US$500m in light of nearly one film every two years, so any occurrence of 0.5 films a year. Finally, DC shows an income a little bit higher than X-Men but lower than Marvel, averaging US$584,57m for an average release of around 1.1 films per year.

| **Figure 1** | Box office results of the three cases |

The numbers mentioned above shows some impressive results. During the past three years (2017-2019), Marvel launched three films per year with a box office average if over US $1,200m. This is interesting because it shows how launching more films does not cannibalize the box office if the strategy adopted is appropriate. The amount of US$1,200m is more than the peak of DC's most-watched movie, Aquaman, which reached US$1,148m at the box office. Thus, understanding more about how this success was reached is of interest to both practitioners and academics.

After analyzing box office results for each of the three franchises, we dug deeper into the strategy adopted to build the different stories and films. When choosing a network analysis, we looked at the three initiatives to see the existing connections between the various elements inside each franchise. What came out for the study was both the existence of these links and the intensity of them. Thus, how many characters, locations and items from the movie are present in the various movies was mapped for each franchise. In this way, we did not only search for the link but also we looked at the strength of the network. Finally, we represented these networks graphically to give evidence of the results achieved.

The avengers' supremacy

Starting from the MCU, we searched for connections between characters, locations and items that recur in different movies. The development of movies is highly based on the knowledge introduced in the previous ones. What is evident from Figure 2, which shows the three results of the network analysis on characters, locations, and items, is that all the films are somehow-related and linked and that the four Avengers movies are central in this network. Indeed, they are bigger and linked with stronger arches to each other film. Moreover, they are not only more prominent and more linked with the other films but also they are at the center of the network. This means that the other movies, even if they were released later, are building on them. This is the typical strategy of a platform where the link among different elements allows the other to benefit from the mutual existence.

| Figure 2 | Network graph of the MCU |
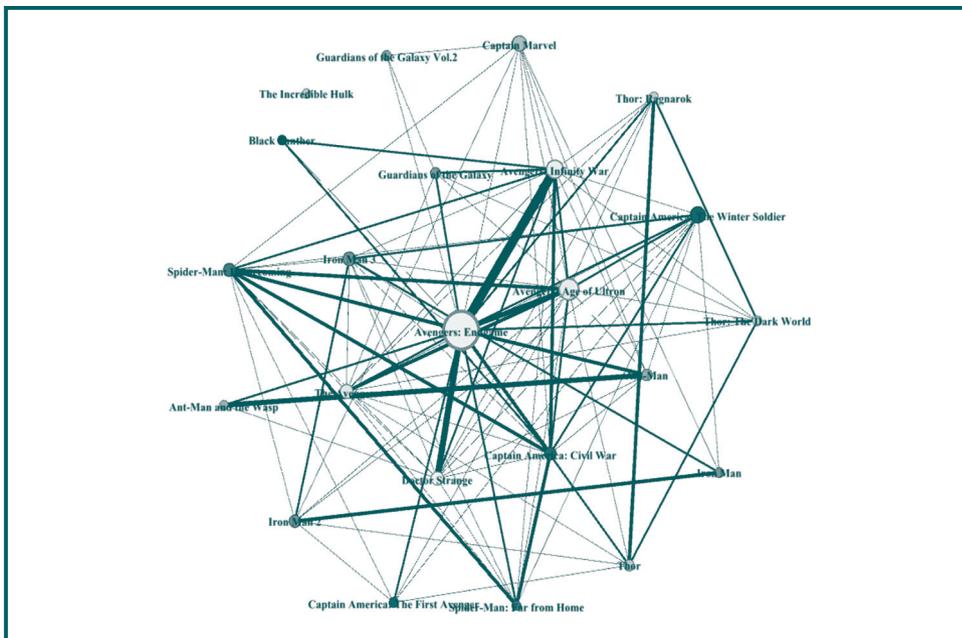
After a qualitative interpretation, we also looked at structural measurements of the network dimension. The results obtained with this analysis underlined that the number of linked nodes is very high. The average degree centrality of the total network is 15,565, having 23 nodes. Thus, the centrality is really high, and this is confirmed also by the graph density that it is not so far from 1 (actual value 0.708). So, the network is near to completion and the actual connections are not so different from the potential ones. Another interesting piece of information emerging from the analysis is the fact that, although the network is composed of a lot of nodes, the average path length is only 1,292. Coherently, it emerges that the degree centrality of "Avengers: Endgame" (22), "Avengers: Infinity War" (22) is the highest in the data set, followed by the others collective movies such as "Captain America: Civil war" (21), "Avengers: Age of Ultron" (20) and "The Avengers" (20), showing the adopted platform strategy.

The DC independency

Looking at Figure 3, we can see the representation of the network of the DC franchise. What is immediately evident is the fact that the links among the different films are less present. For example, the Green Lantern movie does not have any connections with other characters, items or locations, belonging to the DC franchise; it is an independent initiative. In other words, there is not a common knowledge base upon which all the movies refer to. This, similarly, to two other movies, Jonah Hex and Catwoman, shows how DC, in its 20 years of history, has not leveraged platform solutions. The only links existing are the ones attached to the Batman trilogy and initiatives like Batman vs Supermen, where different film characters, items and locations converge. Therefore, we can conclude that DC did not pursue a platform strategy, but has preferred a more independent initiative carried out under the same producer.

The graph density is very low (0.353) and also the average degree shows that the numbers of connections are few (5,647) out of 17 films. The average path length seems to be good (1,273), but it must be considered that five nodes in the network have no relation with anyone; therefore, it is not so efficient as it seems from the value. Finally, the movies that had the best results at the box office have a very low centrality degree, namely, "Aquaman" (3), "Joker" (6) and the "Dark Knight" trilogy (6). Thus, these numbers seem to suggest that there is no platform strategy. Still, slightly higher numbers appear in some of the latest releases ["Batman VS Superman" (11), "Suicide Squad" (10) and "Justice League" (11)], showing that a platform strategy may be followed in the next steps.

Figure 3 Network graph of DC
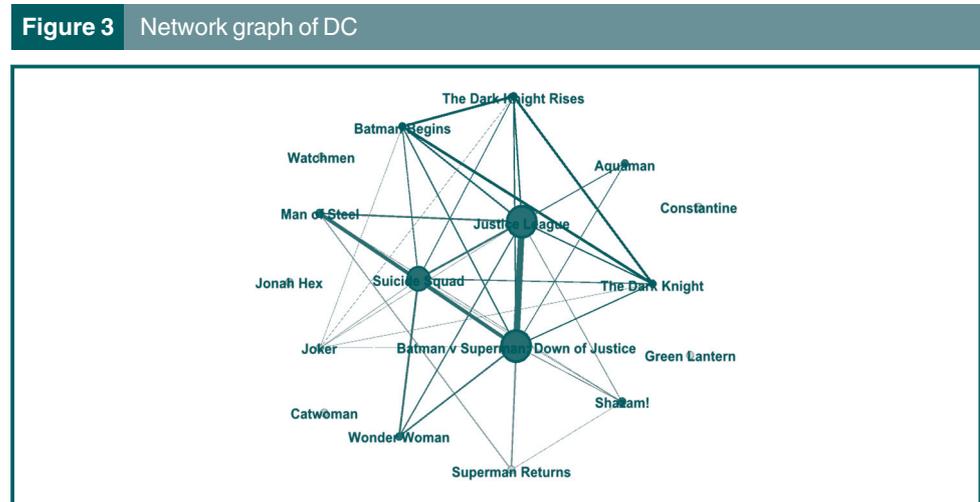
The X-Men bet

The X-Men franchise has a different network compared to the MCU. Indeed, the fact that the nodes have almost the same dimensions seems to imply that one is not more relevant than the others in the network, even if they are all almost related to each other. Therefore, even if they show a good network of relations there are no central nodes that prevail. Thus, the analysis of the graphs shows that the franchise decided to connect the different films intensively in terms of characters and less with items and locations, as reported in Figure 4. Considering the absence of central relevant nodes and less tight links among items and locations, the strategy adopted here seems to be a less platform-oriented solution.

The structural measurements have confirmed what we noticed before. The X-Men network is very similar to the MCU network. Moreover, the numbers seem to be even better than the ones obtained in the MCU network. The total network has the maximum value of the average degree centrality, 11 out of 12 films and the graph density turned out to be one similar to the path length, meaning that there is a high level of cohesion in the network. These numbers are supporting the assumption made in the sampling: this looks like a hybrid structure. The numbers are high, suggesting a platform strategy. Nevertheless, they are basically perfect. In other words, all the movies build on all the previous movies in a continuous sequence: all the movies have the same centrality.

The knowledge platform is the way to succeed in the creative industry

The third analysis that we conducted to comprehend the results achieved by the MCU and the other two franchises regard the statistical analysis to see and prove if there is a statistical significance between the strategy adopted and the box office results. Indeed, the two previous qualitative analyzes of the box office and the network analysis seems to indicate that MCU was outperforming compared to the two other franchises because of the existence of the platform strategy. This was shown by the performance at the box office and the strong network shown in Figure 2. Therefore, by adopting an ANOVA analysis between the strategy adopted and the box office results, it emerged that the Marvel strategy (2) is significantly different from DC (0) and X-Men (1) (confirmed by the post hoc analysis), see Tables 3 and 4. This means that the strategy explains statistically the success achieved by the company at the box office. Thus, the adoption of a platform strategy seems to support the success of initiatives also in the creative industry.

| Figure 4 | Network graph of X-Men |
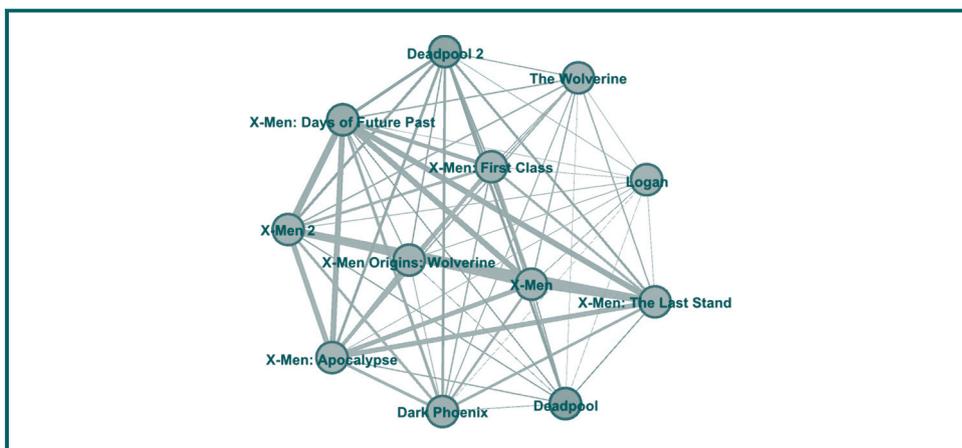
Discussion: Defining the knowledge platform strategy

MCU, X-Men and DC Comics seemed to base their success on three different approaches to platforms and our data proved them. The first, Marvel, is actually building a platform: a set of movies (the stand-alone of the original Avengers) representing the knowledge foundations upon which they built the Infinity Saga, showing the power of the platform from its first collective movie: The Avengers (2012). From that moment on, each movie built on the previous to create a virtuous knowledge cycle that let them reinforce the central movies (until the last "Avengers: Endgame" was able to get the top of the charts of the top-grossing movies in history) and the peripherical movies, adding new lines that revitalize the platform (such as Black Panther and Captain Marvel).

Differently, DC did not rely on a platform strategy, having a lot of movies – potentially connected – but that were building their own stories.

While X-Men appears to have a hybrid approach, they were actually telling a long sequential story. The assumptions made in the sampling phase have been confirmed by the empirical results and by the network analysis, showing a greater density in the MCU movies.

The first two comments on these results reinforce previous evidence in the literature on platforms. On the one hand, networks proved their power in mapping platforms (Baldwin and Woodard, 2009; Pellizzoni et al., 2019). On the other, platforms proved their impact on the market – in this case, measured through the box office – also in the creative industry, reinforcing the literature that sustains their disruptive power (Choudary et al., 2016). Still, what these observations let emerge is that MCU is a peculiar kind of platform, sharing some elements with all the concepts previously mentioned, but at the same time not fitting – perfectly – any of those definitions.

Is the MCU an internal platform, an industrywide/innovation platform or a transaction/multi-sided platform? In the remaining part of this paper, we'll provide an answer to this question by comparing the literature on these kinds of platforms with the empirical evidence that emerged from the MCU and defining it as a case of "knowledge platform strategy".

Internal platforms represent the common basis upon which a firm can foster innovation enhancing a standard set of assets (Wheelwright and Clark, 1992; Kogut and Kulatilaka, 1994; Kim and Kogut, 1996; Meyer and Lehnerd, 1997). Like the basic architectures of the

Table 3 ANOVA: platform strategy → box office results

Platform approach → box office results	Sum of squares	gl	Mean	F	Sign
Between groups	2,430,611.26	2	1,215,305.63	5.951	0.005
Within groups	10,006,335.4	49	204,210.926	–	–
Total	12,436,946.6	51	–	–	–

Table 4 Post hoc analysis: platform strategy → box office results

(I) Platform approach	(J) Platform approach	Difference from the man (I-J)	Standard error	Sign
0 (DC)	1	81.53814	170.38188	0.634
	2	−397.3596	144.53769	0.008
1 (X-Men)	0	−478.89775	170.38188	0.634
	2	−81.53814	160.92331	0.005
2 (MCU)	0	397.3596	144.53769	0.008
	1	478.89775	160.92331	0.005

Sony Walkman, Marvel created a common world; a common set of characters, places and items upon which they can create new products; and new franchises. Similarly, to this kind of platform, the investment made to create the platform will have returns over time (Sanderson and Uzumeri, 1995) and not only with the single product. Therefore, MCU shares some characteristics with internal platforms:

P1. The Knowledge Platforms Strategy enables the creative firm to create a common world where to build new products and franchises, making a long-term investment, similarly to internal platforms.

Nevertheless, there is a huge difference: internal platforms are "components" and not complete products (Gawer and Cusumano, 2014), while the components, in this case, are the original movies (Iron Man, Hulk, Thor and Captain America) that created the knowledge basis for the first collective movie: The Avengers. This consideration pushes forwards a comparison with industry-wide platforms (Gawer and Cusumano, 2014) or more broadly innovation platforms (Cusumano *et al.*, 2019). Indeed, the iPhone or the computer (previously mentioned with the example of Intel, Microsoft and IBM) are working products (like the four previously mentioned movies), upon which something new can be built. Indeed, on this basic structure, not only collective movies can be created but also new derivates like Black Panther or Captain Marvel. This is closer to the second type of platform. These platforms are characterized by indirect or cross-sides network externalities: the more complements added to the platform, the more it is going to be valuable for the end-users and vice-versa. This mechanism is difficult to see, as we do not really have "sides," but we are complements that become part of the "platform." Still, the more the initial platform is valuable, the more it is going to be valuable to add new complements. This is shown by the increased impact of the new characters launched, which – in the last two cases (Black Panther and Captain Marvel) – brought about first stand-alone movies able to gross more than US$1bn:

P2. The knowledge platform strategy uses finished products as the basic modules upon which to build the platform strategy, representing the basic knowledge structure upon which launching new derivatives, generating network externalities as in industry-wide platforms.

Nevertheless, also, in this case, we can highlight a significant difference: the role of network externalities. Still, this virtuous cycle does not exactly exemplify cross-side network externalities (Katz and Shapiro, 1985) for two main reasons as follows: first, there is no second side of external compliments and second, the complementors enter the platform continuously rather working "on top of it," as it happens with software and apps in previous examples.

Finally, moving to the transaction and multi-sided platforms (Cusumano *et al.*, 2019), we can again highlight a couple of similarities. First, the strong diffusion curve that can be seen in the box office curves (Figure 1) and the great impact to the market that recalls the impact of disruptors based on a multi-sided structure (Choudary *et al.*, 2016). The chance to add the basic structure and customers, to exploit its value by adding new streams, is much more coherent with the supply-side extension's strategy of multi-sided platforms, which can capture more value once the platform is launched, like Airbnb launching the Experiences (Trabucchi and Buganza, 2020). A possible example here is the usage of original series created in the MCU used to launch the Disney+ initiatives. Starting in 2020, Marvel will release add on series (like WandaVision or Loki), integrating with the main plot developed through the 22 movies, through the streaming service Disney+. This is a case of "knowledge" exploitation: the common basis created with the movies is further exploited generating a new product line that is generating revenues through a different initiative (the subscription to Disney+):

P3. The knowledge platform strategy requires a significant initial investment but offers the chance to develop multiple parallel projects once the "critical knowledge mass" is reached.

Also, in this case, a huge difference: the chicken and egg (Caillaud and Jullien, 2003) paradox is not present, as this platform is created as a set of stand-alone movies, but it enhances the launch of the following movies by building on what happened before.

In conclusion, this section summarizes the points of commonalities and differences between the MCU platform and the three types of platforms that emerge from the literature. MCU is a platform and shows the chance to leverage the power of platforms also in creative industries, but probably it needs a proper label: it is a "knowledge platform strategy" (Figure 5). The platforms are built about a knowledge network made of stand-alone creative contents that create the basic structure upon which new content is provided leveraging and expanding the knowledge put in the platform.

The three propositions let also emerge a process view on the creation and exploitation of a knowledge platform strategy, which integrates the view of the different definitions of platforms showed in the literature (Figure 6).

Conclusion: What superheroes can teach us about designing platforms?

Superheroes have had a super impact on the box office during the past decade, but the three most successful franchises seemed to have adopted very different approaches. MCU built a platform, movie after movie, upon which everything relies and new movies can be launched. X-Men built a list of sequential movies. DC created disjointed movies, leveraging sequels in some cases and only in recent years linking some movies together. The peculiarities of this industry let us explore the potential impact of platform strategies in the creative industry and this study has two main contributions.

This study explores a mature and relevant concept – the platforms – in a new filed, the creative industries using the case of Superheroes sagas, proposing a new perspective to explain the success of MCU while proposing the "knowledge platform strategy".

In terms of theoretical contribution, this research extends the concept of "platforms," relying on the three kinds of platform defined in the managerial literature (Gawer and Cusumano, 2014; Trabucchi and Buganza, 2020; Cusumano et al., 2019) and introducing the "knowledge platform strategy" for creative industries. The main contribution is related to the extension of platforms in research fields where it has not been exploited. This opens up avenues for research both from a knowledge platform and creative industries perspectives. In other words, it supports the literature presenting the power and impact of the platform paradigm, also in creative industries and not just in the digital environment.

| Figure 5 | Knowledge platform strategy and its similarities and differences with internal, industry-wide and multi-sided platforms (table) |

	Similarities	Differences	
Internal Platforms	-There is a common base upon which to build further releases -The investments are going to have a return also with future releases	-An internal platform is usually made of "components" or of "a basic structure". In this case, the components are stand-alone movies	Knowledge Platform Strategy
Industry-Wide or Innovation Platforms	-The initial platform (first movies) is a "working product" -The more the platform grows, the more valuable it becomes	-Industry-wide platforms have "cross-side" network externalities. In this case a "virtuous cycle" has been created	
Multi-Sided or Transactional Platforms	-Increasing returns after the "critical mass" is reached -Continuous extension and modularity	-Multi-sided platforms suffer from the "chicken and egg" paradox. In this case launching the platform (initial movies) equals launching products	

| Figure 6 | Knowledge platform strategy and its longitudinal view |

Stand-alone products that create the
common knowledge basis

(e.g., the first stand alone movies of the MCU, such as
Iron Man, Hulk and Captain America)

The stand-alone products may be
joint together collective products
that may be used to launch new
derivatives

(e.g., the first stand alone movies of the MCU joined
together in The Avengers and later gave birth to new
stand alone like Black Panther and Captain Marvel)

The entire knowledge platform can
be further exploited through the
extensions towards new kinds of
products

(e.g., the overall MCU is further exploited through the
original series created for Disney +, like WandaVision
or Loki)

From a managerial viewpoint, it suggests the concept of "knowledge platform strategy" to managers working in creative industries, but no only. This label has been inspired by various definitions of platforms but fits the peculiar case of all the industries where a common knowledge base may be valuable for the customers and for the development of new products. A "knowledge platform strategy" is an approach that may help managers in rethinking the development process or the knowledge management strategy. In a creative industry it means that a set of characters, storylines and places can be built through various stand-alone products (in this case movies, more broadly products) creating a knowledge base upon which future content will build on. Their links offer the chance to build common collective products (like The Avengers) that exploit the value of the interest collected with all the single components. Then, the platform can be exploited by using it to launch new streams, new sets of characters, storylines and places that will become part of the common ground of the platform and help it enter a virtuous cycle that lets it expand in various directions.

Obviously, this research is not free of limitations. It is an exploratory study focusing on a very peculiar case that let emerge an interesting and new strategy. It needs to be noted how all the three cases analyzed can be considered successful from a market perspective and how single products (such as Joker or the Batman Trilogy) are considered high-quality products. In other words, the knowledge platform strategy is definitely not the only way to be successful but seems to offer great insights for a sustainable and overtime impact. Nevertheless, the approach and the case under observation may open up direction for new studies. Future avenues for research may consider the translation of this "knowledge platform strategy" in different creative industries or even in other knowledge-based industries. It may be interesting to replicate the analysis of the market impact on other cases. It may be very interesting also to study possible reactions to the COVID-19 emergency, which had huge impacts in the movie industry (with many movies delayed both in terms of production and release), it may be interesting to understand if and how a platform strategy may help. Furthermore – in terms of qualitative research – it would be interesting to study the coordination mechanisms and alignments rules that companies use to build this kind of platform.

This is not new in the world of Superheroes, where both MCU and DC comics have been published following the same logic. Still, it shows that the relevance of platforms goes far beyond the speed of Uber and Airbnb and gives superpowers even to superheroes.

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