Media Convergence and Mobile Technology

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Abstract. *Convergence of multimedia content involves the unification of several media channels through a technology, and it is in a state of continuous transformation driven by the technological evolution. Recently developed, mobile and wireless technologies have facilitated new forms of convergence that permit users to consume information. Although media convergence involves many aspects, this paper considers just the perspective of technological convergence. The subject of this article is mobile sites created as a consequence of the convergence based on mobile technologies and devices. This paper shows new forms of media convergence designed by the mobile technologies. It presents and discusses theoretical aspects of this topic, and also describes practical solutions adopted by the media industry in Romania. The methodological solution is based on hierachical cluster analysis to group similar mobile sites based on their characteristics. The results of this study show that mobile technologies bring a new perspective to media.*

Keywords: *mobile sites, mobile convergence, mobile journalism; mobile media; mobile news.*

Introduction

Multi-platforms share multiple characteristics that belong to computers, televisions and mobile devices, encouraging media fragmentation. This means that users can consume the same information on various platforms, and can share multiple platforms at the same time. Under these conditions, the online presence of media

industries requires content to be continuously redefined. Thus, the development of mobile technology has created new possibilities for the provision and consumption of multimedia information in the media industry. Increasingly, more people use their mobile phone or other mobile devices to access sites and to read news, as Bosomworth (2013) (1) shows in an analysis of the mobile market for 2013. This technology makes it easier and quicker for news to reach users.

A study carried out by Google in partnership with Ipsos MediaCT (2), called 'Our Mobile Planet: Romania - Understanding the Mobile Consumer', in May 2013 (using a sample of 1,000 Romanian online adults) shows that smartphone penetration was 12% of the population in 2012 and has risen to 28% of the population in 2013. This survey is designed to gain insights into how consumers use the Internet on their smartphones. Results show that mobile searches, viewing of video, usage of apps and social networking are prolific. Moreover, 81% of smartphone users do multitasking operations with other media. Thus, they use their phone while doing other things, such as watching TV (32%), reading magazines/newspapers (29%), using the Internet (45%), reading a book (10%), listening to music (51%), watching movies (25 %), or playing video games (19%).

The Google survey (2) shows that smartphones are used everywhere, at home; work, in public transport, and on-the-go. 33% of respondents said they would rather give up TV than their smartphone. 63% of people search on their smartphone everyday and it is the major access point for internet searches. Other figures show that 90% of smartphone users look for local information on their phone and 50% of population uses smartphones every day.

This study concludes that smartphones are multi-activity portals. So, 82% of respondents use them for communication (to access email and social networks), 65% of them, to access news (reading news from newspapers and blogs), and 89% for entertainment (browsing the Internet, listening to music, playing games, watching videos on video-sharing sites like YouTube).

Regarding apps, the same Google study (2) shows that they have 17 apps installed on average, 8 apps used in the last month, and 2 paid apps installed on average. The same study shows that smartphone users are avid consumers of videos; 83% of users watch videos. Another conclusion shows that smartphone users are frequently connected with social networking sites: 88% of users visit social networks, and 57% of them make at least one visit per day.

The Google survey also identifies several barriers to further usage of mobile phones:
- Users cannot trust credit card security on mobile devices.
- Restricted screen size makes it hard to type.
- Website pages take rather long to open.
- Online access from mobiles tends to be interrupted.

But, this study focuses only on smartphones, not tablets. So, it can be supplemented by other data and statistics. Thus, International Telecoms Union (ITU) (3) reports the data for each country regarding mobile usage (including mobile broadband subscriptions) for 2013, to show growth in the use of mobile technologies.

In Romania, according to the Eurostat statistics (4), in 2010, individuals using mobile devices via wireless connection: mobile phones (or smartphones), handheld computers (palmtop, PDA), portable computers (laptop) away from home or work to access the Internet, was 14%. In 2012, regarding the mobile devices usage, 7% of population used a portable computer or a handheld device to access the Internet.

Statistics of Eurostat published in September 2013 show that, in 2012, 3% of Romanians with mobile Internet access did so using a handheld device every day (in comparison with an EU average of 16%). The same statistics show an insignificant percentage of individuals that used tablet computers to access the Internet in 2012 (5) in comparison with the EU average of 7%. Eurostat (6) lists possible causes and the difficulties of using mobile Internet in Romania, such as: difficulties with mobile phone network (4%), inconvenience of using small screens or entering text (2%).

According to Eurostat data (7), in 2012 in Romania, purposes to use the mobile Internet via handheld devices have been for
- Sending and receiving emails – 5% of individuals (EU average 21%).
- Reading or downloading news, newspapers and magazines – 3% of individuals (EU average 14%).
- Reading or downloading online books or e-books – 1% of individuals (EU average 4%).
- Playing or downloading games, images, music, or video – 2% of individuals (EU average 12%).
- Using podcast service to automatically receive audio video files of interest – 1% of individuals (EU average 3%).

These statistical data show the users' preferences for usage of mobile devices and consumption of Internet information through handheld devices. It can be noticed that mobile devices are becoming increasingly important in access to information and education in Romania and all over the world. This paper, therefore, is not about the consumption of information and audience preferences, or journalism practices. This paper is about the media products on mobile devices that can be found on the online market today. In this context, it considers mobile sites and mobile news.

The mobile sites are convergent products that are based on the news from the sites of traditional media and put in a new format, specific to mobile technology and devices.

Literature review

The main concepts addressed in this paper are 'mobile media', 'media convergence' and 'mobile technology'. They are all materialized in mobile sites. Each concept can be found separately in the specialized literature.

The connection between mobile technology and the media industry has generated mobile news and mobile media. Westlund (2013) shows that in recent years, mobile media and news has gained more popularity, and journalistic practices constantly use this technology for news publishing or for gathering information. The same conclusions were found by Quinn (2009).

There is a growing literature on mobile media, mobile news and mobile journalism. Many of the authors consider several more practical examples of mobile technology usage. They show how this technology was already incorporated in the publication activities of media companies. Mobile sites are developed as mobile versions of news sites. But this evolution is due to mobile technologies and to the applications on these devices. Human interaction with mobile technologies and devices is based on new practices in reading news. Thus, journalistic practice must reconsider these aspects of reading news, as Väätäjä, Koponen, and Roto (2009) recommend. They suggest that in order to provide useful information journalists must consider the audience experiences of working with text and images on the small screens of mobile devices. Authors also show that mobile tools are important for news reporting. The importance of mobile technology in gathering information is also noticed by Quinn (2009) who describes the three levels of multimedia reporting and shows the advantages of mobile journalism. Quinn's paper defines mobile journalism, discusses the journalists' output, the techniques used by the mobile journalists, and the workflow issues. All the cases presented by the author are in Asian region. He also shows that the mobile journalist needs to understand the technology and how it works and describes an economic model for mobile forms of journalism.

Mobile technology has generated not only new forms of media and journalism, but also new forms of convergence. Thus, Cameron and Sturt (2009) consider that the new form of convergence based on wireless networking, mobile telephony and digital photography sustains the mobile journalism. In this context, they give several examples of journalism practices using the mobile technologies. Moreover, Ahonen (2008) considers mobile devices as the seventh of the mass media channels and dedicated a whole book to this subject.

Mobile technologies are used as media tools both for consumption and production of news. The mobile environment permits easy and accurate identification of the audience, Web traffic, and the tracking of content usage. Erdal (2013) defines 'cross-media' as communication and production done in an integrated way, on more media platforms. This author wonders how news must be made differently to be published on different media platforms. Erdal (2013) says that convergence

and cross-media production in particular affect many journalistic practices, such as: hierarchies of information, authorship, the control of sources, and the multimedia content. Erdal (2013) shows that the differences between cross-media and multi-platform (production or publishing) must be considered. So, he considers the explanation offered by Thomasen (2007) (as cited in Erdal, 2009: 217) according to which cross-media is an extension of 'multi-platform', because it involves communicative relations or references between platforms. The most widely known example is for television channels and shows that have a Facebook page or a blog, and also use a mobile phone platform for audience feedback. Another cross-media example is when television shows use media content from users, through SMS messages or pictures, e-mails or on their Facebook pages. Erdal (2013) distinguishes between cross-media communication and cross-media production of news. These differences are identified for dealing with media convergence at the different levels of technology and content.

A new phase of media convergence is determined by the mobile technologies. Many industries move on mobile technology: banking, media, advertising, music, computers, Internet. It is understood that technological convergence is based on multiple technologies, such as information systems, telecommunication and, of course the media technologies. Thus, the new technological convergence has led to the ability to access the Internet from a variety of mobile devices (Humphreys, Von Pape and Karnowski, 2013). They say that users distinguish different ways of consuming information online, some of which are 'extractive' and others 'immersive'. Humphreys, Von Pape and Karnowski (2013) address a study on Web browsing, and information seeking with mobile. They consider that 'mobile Internet' is assimilated today, as a bundle of services for mobile devices. The application market or 'apps' market is also important. The 'immersive' reading is for the e-books. The readers have a linear approach to browsing information. The process of 'extractive' reading involves a selective browsing and seeking specific information. For mobile technology we can access the content both through browsing the Web in a traditional way using a browser, or by using specific mobile apps. The mobile applications require users to employ both 'immersive' and 'extractive' reading techniques. Humphreys, Von Pape and Karnowski (2013) suggest that the information accessing is different in mobile Internet from the traditional Internet. The technological convergence generated by the mobile technologies is also presented by Ahonen (2009) in 50 case studies of world services, around topics of mobile social networking and digital communities. He offers stories of Twitter, MTV, i-Report, and others.

The content convergence can have a variety of forms. It is approached for news, in text or multimedia format. In media, convergence is acting as a combined or hybrid multimedia story, where different parts of it are expressed in different formats that communicate different aspects the most effectively. The convergence aspects

of mobile content are also related to mobile applications. Convergent mobile news applications are used to distribute mobile news. Even if the mobile devices are in general mobile phones, now we must take into consideration tablets and other mobile devices. Several technical possibilities and limitations permit or hinder the convergence of content (Westlund, 2013), such as:

- Mobile sites can be accessed with mobile web browsers or/and mobile apps.
- Mobile sites typically contain mostly text, and fewer images, video and audio with the purpose of quickly loading the pages and reducing the costs of data transmitted.
- Designing fluid Web sites that adapt the content to any screen: 'a mobile device, computer, tablet or television'. The content must be easily accessible and manageable.
- Native mobile applications introduce restraints regarding browsing hyperlinks and sharing content via social media platforms.
- Publishing news for mobile devices is divided between two approaches: using native apps for customizing news, or publishing tailored content for mobile using a responsive Web design (with HTML 5.0) in an explicit convergent platform.

Even if in media, convergence has a lot of forms and advantages the literature shows also the divergences in media. Thus, Singer (2009) argues that television and online journalism will continue to converge, but print and online journalism will continue to diverge.

To consider both the convergence and divergence in media, it is necessary for media companies to produce content across multiple platforms and with different formats.

The mobile technologies, with their forms of convergence and divergence have generated many important questions for journalistic mobile practices. Even if, historically, the Internet was born in the twentieth century and mobile technologies in the twenty-first, Westlund (2013) proposes a new model of journalism for mobile sites and mobile applications that is based on repurposing and customizing journalistic content. The model is obtained on findings of specialized literature in the nexus of journalism and mobile media. This model of journalism is based on technological convergence between important actors in the mobile, telecommunication, and IT markets. Even if the mobile devices work as interpersonal communication tools, they gain a 'mass' function and shape the global mobile media (Westlund, 2013).

The mobile journalism comes directly on the media market on a convergent approach. Publishing news on mobile platforms is based both on mobile news sites and apps, but each media company has chosen its own solution over time (Westlund, 2013). Editing news for mobile devices also requires customizing the content flow. Thus, unique content can be produced designated for mobile devices by 'reducing

or adding elements to the content published on other news platforms. Added elements may involve infographics, edited pictures or videos, or news summaries.' (Westlund, 2013).

Tablets and mobile phones are equipped with video and photo cameras, and also they have Web browsers and mobile applications. This situation permits a flourishing of citizen journalism. Westlund (2013) offers a model of mobile journalism which revolves around two axes. One axis is based on the relationship between human actors and technological devices and systems (such as CMS – Content Management Systems). The second axis is based on possibilities of news publishing: customization versus repositioning (the same content being published for other platforms). Westlund (2013) concludes that the mobile journalism has evolved through a customized content.

Erjavec and Poler Kovacic (2009) show that audiences have a participatory role in news production for mobile devices. Thus, they conclude that journalists create the structure and the content of the mobile news, but audience produces mobile news items as a 'denunciatory participatory practice'. This means that audience is more preoccupied to browse news, and then to react in denunciative way, as authors said.

The mobile news production process and also the mobile news structure are described by Erjavec and Poler Kovacic (2009). They say that mobile news has a headline – a title which is also the anchor of the article. The production team must control the timing and topics of the mobile news in the site. Also, the production team can ask users to send information as direct observation or photographing. The text accompanying the mobile news must be a short commentary that attracts the users' attention. It is known that images and photos are important for the news and also for the informational content. However, the visual quality of the images obtained from users is important for the gatekeeping process.

The structure of mobile news defined by Erjavec and Poler Kovacic (2009) in their work, as other authors have done before, consists of:
 – A title which is also an anchor (also termed an intro) through which the news attracts the viewers' attention.
 – The short comment, about two lines that separates the contents of the article and summarizes the central action by answering the questions 'who', 'when', 'where','what' and sometimes 'why', and establishes the point of the story as Allen and Hill (2004) or Hartley (1996) describe (as cited in Erjavec and Poler Kovacic, 2009: 159).

Mobile news is an opportunity for citizens to offer their opinions according to specific and limitative conditions and rules. Frequently, mobile news is associated with television shows and sites. Producers use this possibility and offer the audience opportunities to participate in journalistic practices (Erjavec and Poler Kovacic, 2009). However, their conclusions show that producers do not consider audience

as actors in the process of defining topics, or in supplying photographs potentially appropriate for publication.

Methodological framework

The subject of this article is the media products, mobile sites, created as consequences of the convergence based on mobile technologies and devices.

The hierarchical cluster method is used to describe the Romanian mobile media landscape. The cluster method calculates similarities and dissimilarities and creates groups of mobile sites. The whole analysis was carried out using the SPSS software package. This method is used as an exploratory method to find a structure of mobile media in Romanian virtual space.

The methodological solution is applied on a database of mobile sites found on sati.ro, an Internet audience site for Romanian virtual space. The list of mobile sites from sati.ro is registered in August 2013. This list consists of 36 mobile sites, but only 28 are mobile sites for journalism and thus considered.

Each mobile site is described and measured with a set of characteristics that help to group it in a class through cluster analysis. Cluster analysis is used to group similar mobile sites based on the criteria of their characteristics (structure, multimedia content – topics and format, layout and design of mobile news in the websites, user interaction, user participation, device access, reading mode or reading version – desktop or mobile).

Following the market characteristics (number of views and visits), the first three places in the list are occupied by the three mobile sites for sport topic: m.sport.ro; m.gsp.ro, and m.prosport.ro (Table 1).

Table 1. Most important mobile sites in terms of the market indicators

Mobile site frequently accessed	Number of views	Number of visits
m.sport.ro	19214903	7057465
m.gsp.ro	11730392	4460489
m.prosport.ro	10500505	4890089

(Source: sati.ro - August 2013)

For each of the 28 mobile sites in the sati.ro list various criteria were considered in grouping them. One criterion relates to the type of media, and considers aspects of convergence with mobile technologies. Thus, 11 mobile sites are designated to televisions channels and shows (Table 2), 15 mobile sites are for online publication (Table 3), and 2 are designated to news agencies or news portals (Table 4).

Hierarchical cluster analysis (HCA) is an exploratory tool designed to group data sets and reveal clusters that would otherwise not be apparent. This method is most useful for a small number (less than a few hundred) of objects (cases or variables). This is also our situation.

Table 2. Mobile sites of television channels

	Mobile sites for televisions shows and channels	Number of views	Number of visits
1	realitatea.mobi	6654968	3252496
2	m.stirileprotv.ro	4602217	3565383
3	m.wowbiz.ro	4251905	2266266
4	m.romaniatv.net	1949800	1195405
5	m.antena3.ro	1291333	763120
6	m.acasatv.ro	763956	426113
7	m.kanald.ro	417306	274463
8	m.procinema.ro	300506	258134
9	m.a1.ro	104374	70113
10	m.money.ro	79984	48023
11	primatv.mobi	26664	14802

(Source: sati.ro - August 2013)

Table 3. Mobile sites of online publications

	Mobile sites for online publications	Number of views	Number of visits
1	m.sport.ro	19214903	7057465
2	m.gsp.ro	11730392	4460489
3	m.prosport.ro	10500505	4890089
4	m.cancan.ro	4769265	3192712
5	m.libertatea.ro	4735854	2118268
6	m.gandul.info	3868597	2389931
7	m.adevarul.ro	2450749	1141437
8	m.evz.ro	2394347	1221453
9	m.click.ro	1907892	742981
10	m.zf.ro	1219292	726356
11	m.jurnalul.ro	657963	484998
12	m.descopera.ro	647257	328838
13	mobile.romanialibera.ro	631673	330907
14	m.capital.ro	529354	297699
15	m.cotidianul.ro	262734	111127

(Source: sati.ro - August 2013)

Table 4. Mobile sites of news agencies or news portals

	Mobile sites for press agencies and news portals	Number of views	Number of visits
1	m.hotnews.ro	2162855	1067904
2	m.mediafax.ro	2109448	1213066

(Source: sati.ro - August 2013)

The number of variables used in this method is 14 and they are related to a site's performance in the market (number of visitors and views), its multimedia content, layout and its interactivity. These variables are correlated through the measures

of dissimilarities and similarities. Variables are transformed in z scores based on standard deviation. This is necessary to assure the compatibility for variability of variables.

Groups of mobile sites were created based on similarities/dissimilarities evaluation of their characteristics. In this method, the closest or most similar cases are grouped iteratively.

The method of grouping used in this paper is the agglomerative hierarchical clustering technique – complete linkage. The complete-linkage clustering is based on the furthest neighbour and makes a strong classification of clusters. This solution is good to construct the distinct clusters. The dendrogram graphically represents the clusters solution for each characteristic or for more.

Cluster analysis is a useful solution for investigating mobile sites and working out their structure types. It does not test a research hypothesis, but searches the groups and typologies of mobile sites. The clustering method helps to discover the groups of similar patterns.

Findings

Usage of mobile technologies and devices creates new reading habits among users and new interests with regard to information consumption. This paper uses the hierarchical cluster analysis procedure to group mobile sites according to their number of visitors, views and their characteristics. Characteristics refer to the type of multimedia content (topics and format); layout and design of the user interface; interactivity, forms of users' participation, and structure. All characteristics refer to the homepage on each mobile site.

The variables considered are: category of site, type of mobile sites, site name, number of views, number of visitors, device access (desktop and mobile), reading mode (browser / apps), reading version (mobile or desktop), multimedia content (topics and format), layout and design, structure (number of items on homepage), interaction with the users, forms of users' participation, company. Multimedia content is measured as number of topics. A limitation of this quantification refers to the number of categories on homepage. There are considered so the categories in the mobile – tablet version and on desktop version. Multimedia content – format refers to text and photos; text; text, photos and video. Layout and design refers to the number of columns and the visual arrangements of the content on screen. Structure of mobile news addresses the number of items (mobile news) on mobile page – homepage. Interaction with users refers to links or search boxes. Forms of users' participation consider comments for mobile news; Facebook and/or Twitter connection for comments; 'like' and 'share' on Facebook.

The hierarchical cluster analysis applied to the 28 cases gives the dendrograms for the cluster solutions. Cases are listed along the left vertical axis and distance

between clusters is measured on the horizontal axis. This method is used to appraise the current mobile media market in Romania. Mobile sites are grouped according to criteria of site performance in the market (number of views and number of visitors), and their characteristics (topics, structure, layout, reading possibilities etc). Data were collected and processed using the SPSS software. This method groups mobile sites with the highest market performance, according to their number of views and specific characteristics. The results obtained are outlined below.

(Fig. 1.) Using the classification of mobile sites based on the market indicators (number of views and visitors), three groups of mobile sites were identified: a group of mobile sites in sport (sport.ro, gsp.ro and prosport.ro), another group of sites in entertainment (wowbiz, libertatea, cancan) and news (stirileprotv and realitatea. net), and the biggest group consisting mostly of news sites from television and online publications.
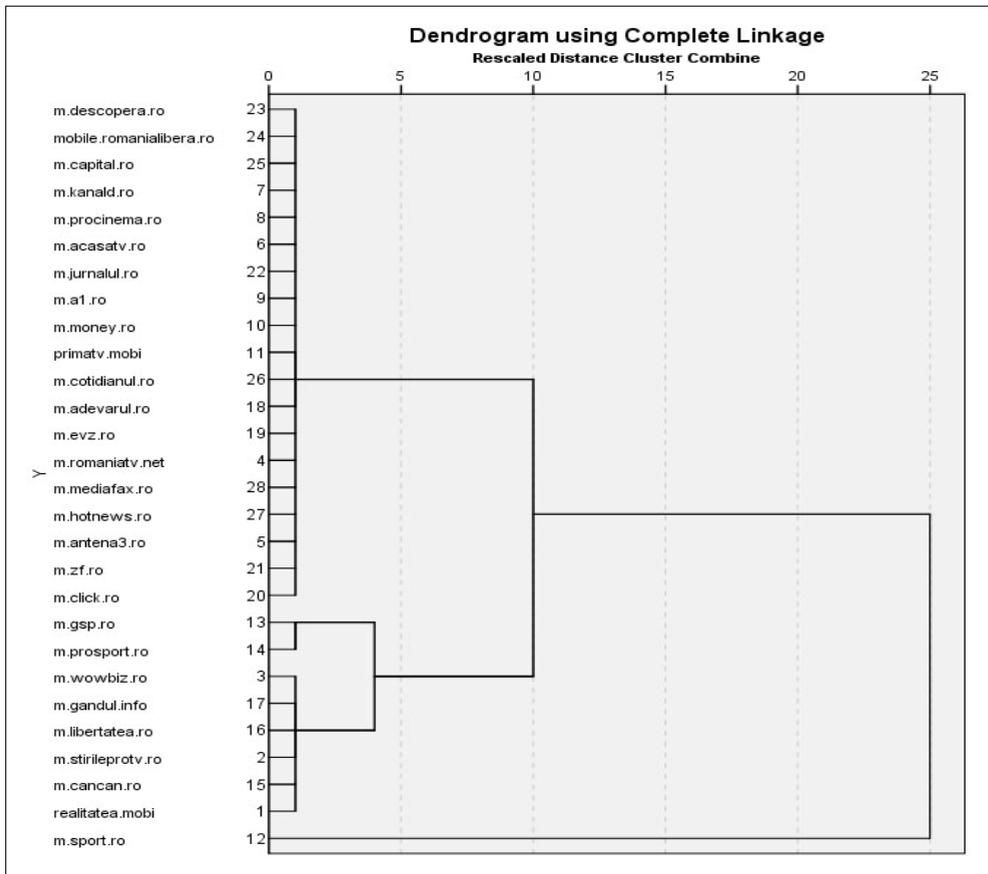

Fig.1. Groups depending on market indicators - number of views and visitors

(Fig. 2.) Following the complete linkage procedure, five clusters of mobile sites according to reading mode, device access and reading version were identified. Thus, we have a group of six mobile sites (mediafax, gandul, descopera, zf, cancan and prosport) that allow access both on the mobile devices and desktop. The mobile news can be read only with a Web browser and the mobile version is identical to the desktop version.

The largest group of mobile sites which part is hotnews.ro, permits access to mobile news both from the mobile devices and desktop and read news with a browser. Their mobile site version is different from the desktop version.

Another group is made up of the mobile sites primatv.mobi, procinema.ro, acasatv.ro and sport.ro which permit access to mobile news only from a mobile device.

Only the group formed by the mobile sites kanald and money use also a mobile application to access mobile news, and Web browser. The gsp mobile site is a special case. Its mobile news can be read only on mobile device.
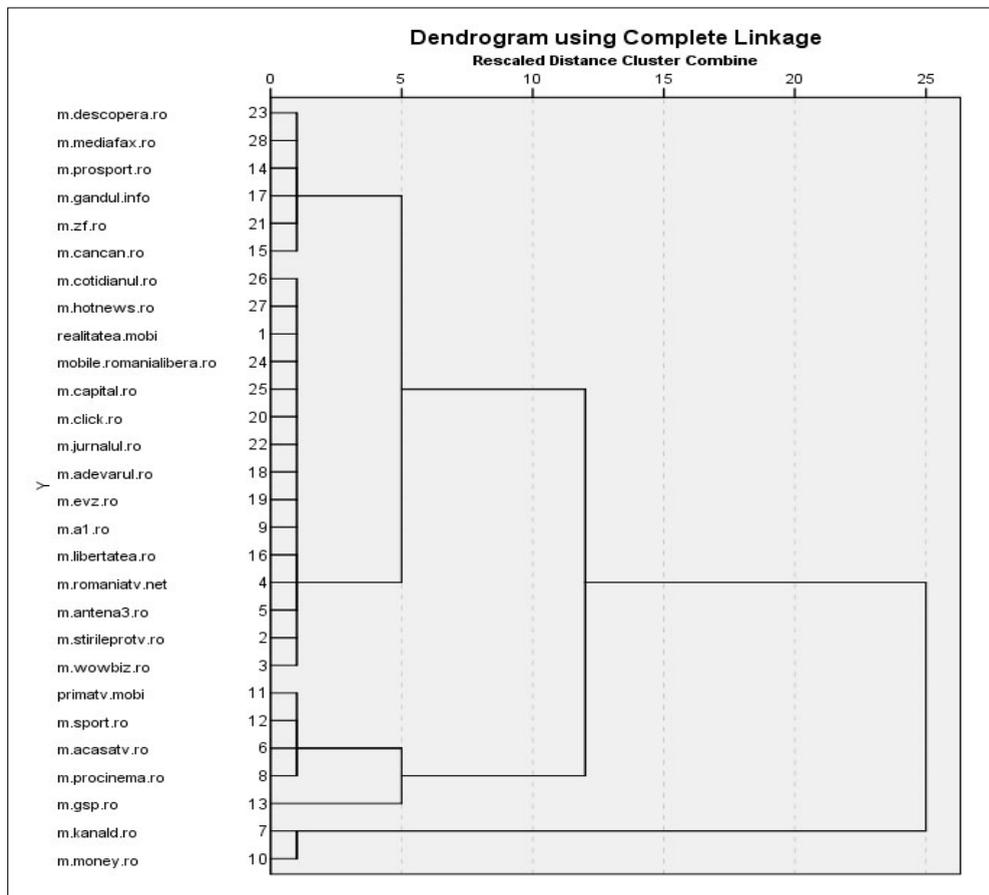

Fig. 2. Groups depending on reading mode, device access and reading version

(Fig. 3) Depending on categories of topics found on the homepages of analyzed mobile sites, three important clusters were identified. The largest cluster is formed by the mobile sites that have 9-12 categories of topics (hotnews, mediafax, stirileprotv, gsp, prosport, rtv, money, romanialibera, adevarul, evz, gandul), then the cluster that contains 5-8 categories of topics (realitatea, kanald, procinema, descopera, libertatea, click, wowbiz, a1, cancan) and the last important cluster that groups mobile sites zf, capital, acasa and primatv with 15-20 categories of topics.
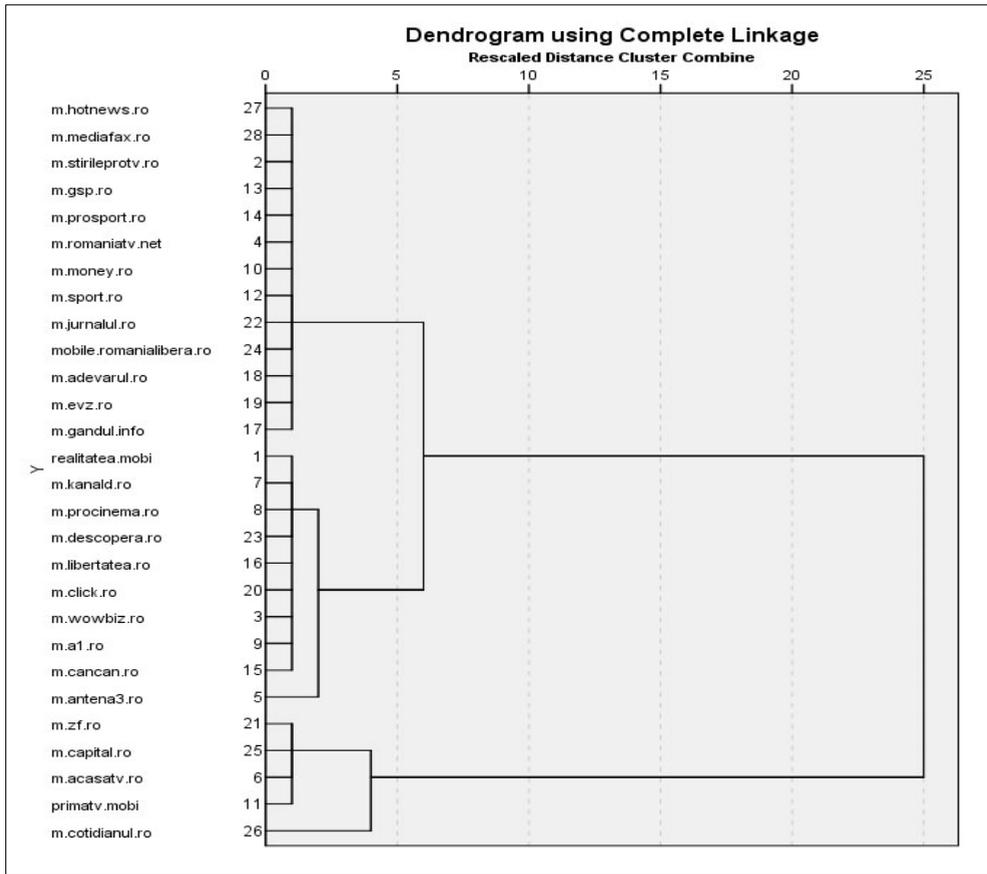
Fig. 3. Groups depending on categories of topics in the homepages of mobile sites.

(Fig. 4) Three clusters of mobile sites were obtained depending on the variable multimedia format. A cluster groups mobile sites that used only text for the list of their mobile news, another cluster groups the mobile sites that uses both texts and photos in the list of their news and a special case where video sequences are also used (stirileprotv).
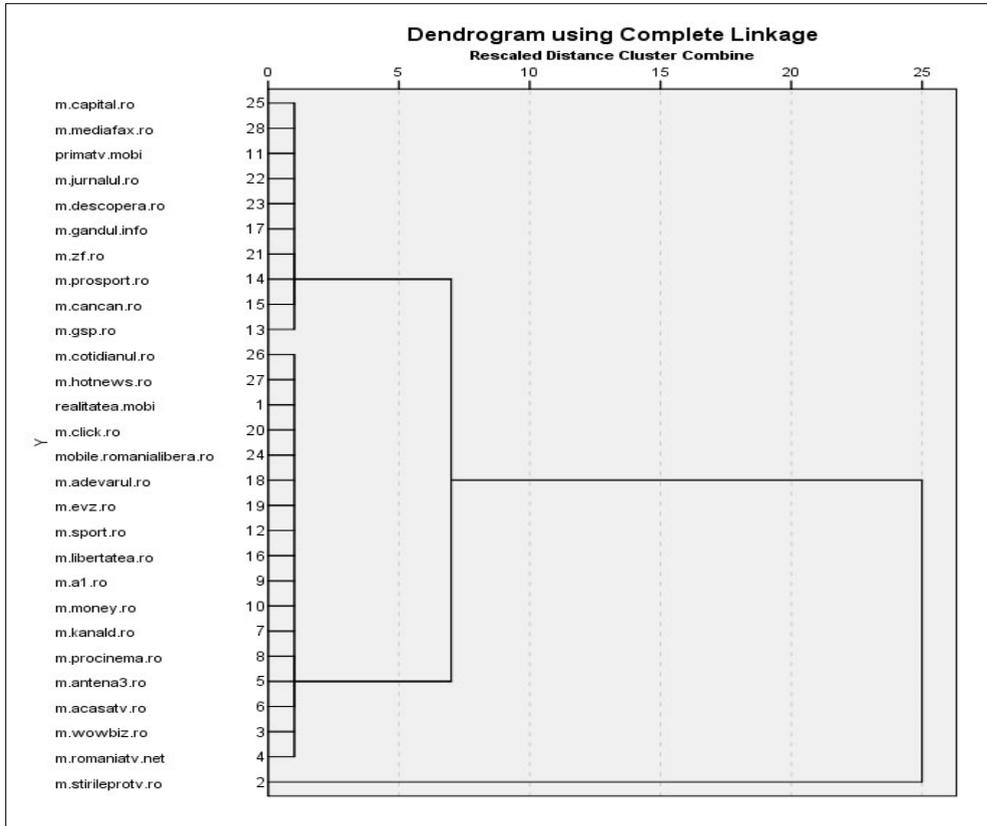

Fig. 4. Clusters given the multimedia format criterion

(Fig. 5) Cases are grouped in four clusters based on complete linkage analysys, depending on layout and design of the homepage. The largest group of cases is defined by a layout and a design with one column that has a photo to the left and text to the right (acasa, romaniatv, wowbiz, antena3, kanald, sport, libertatea, adevarul, hotnews, and cotidianul). The title of the mobile news item is also the link. A group has the same layout as the desktop version. This group is the same that has the reading version identical with desktop (cancan, zf, gandul, descopera, gsp, prosport, mediafax). Two very small groups, one consisting of the sites stirileprotv and procinema has more then two columns, and other group consists of sites primatv, capital and jurnalul which have only one column with texts and links, and no photos.
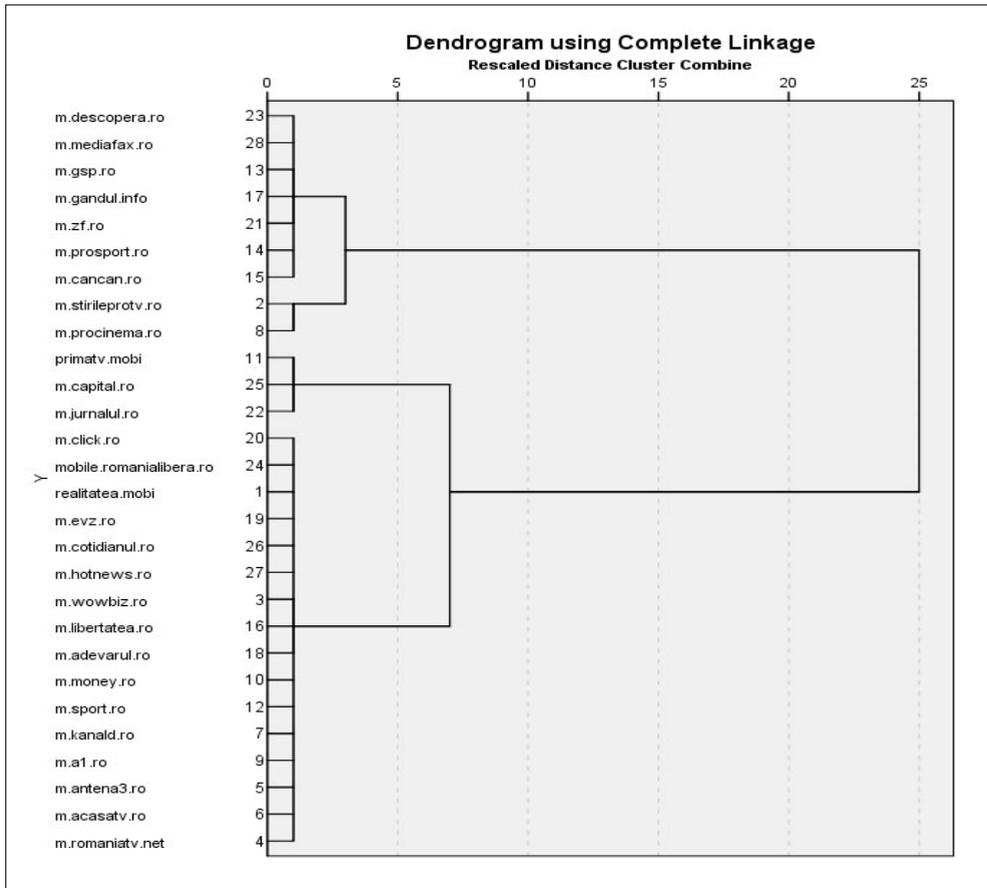

Fig. 5. Clusters depending on layout and design of the homepage in the mobile sites

(Fig. 6) Two main clusters were obtained in terms of structure. Structure refers to the number of items (mobile news) on homepage of mobile site. This variable has a limitation given by the fact that in situation of desktop version of homepage in the mobile site, the number of mobile news items was not considered. Thus, we have an important group of mobile sites with an identical structure with the desktop version. For reading version on mobile devices, clusters indicate lists of mobile news containing between 10 and 30 items per page.
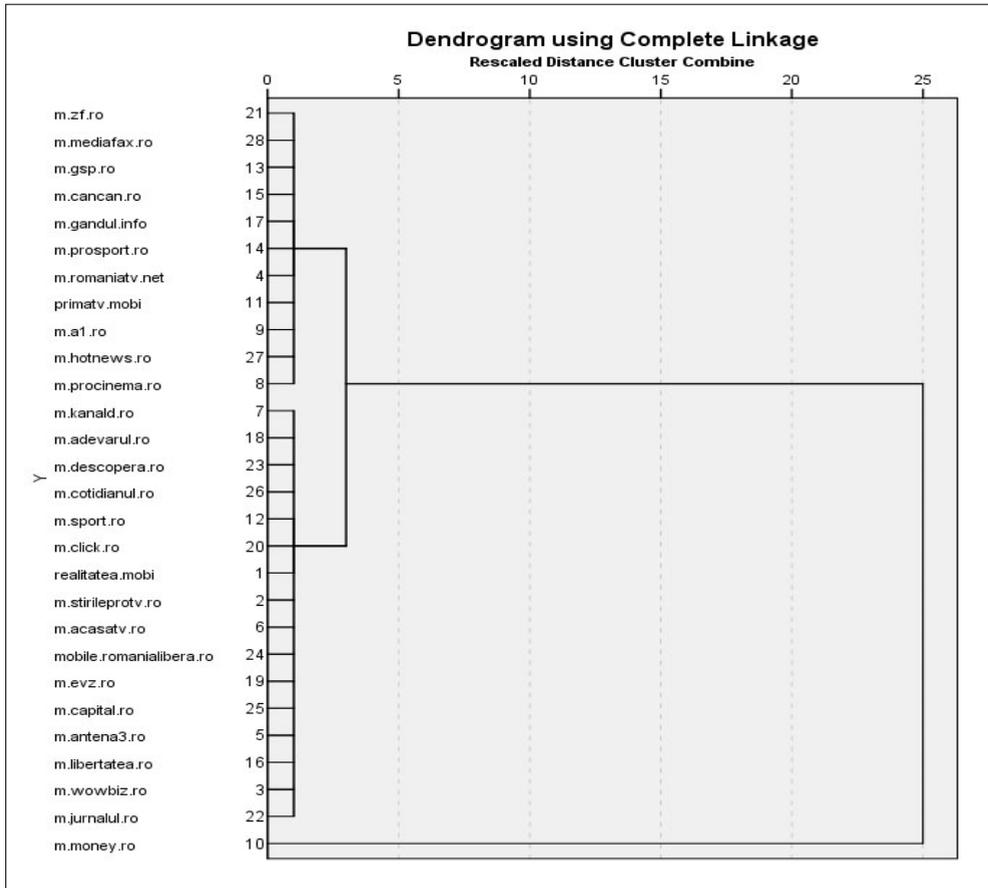

Fig. 6. Clusters in terms of structure (number of mobile news items)

(Fig. 7) Three clusters are defined in terms of user interactions. One group uses a homepage of mobile site-only links to navigate through the page (realitatea, stirile-protv, wowbiz, acasatv, primatv, sport, libertatea, adevarul, click, jurnalul, desco-pera, cotidianul). Another group also introduces several interactive elements, such as a search box (procinema, a1, money, evz, romanailibera and hotnews), and the third group enjoys the same interactive elements as the desktop page (gsp, prosport, cancan, gandul, zf, mediafax).
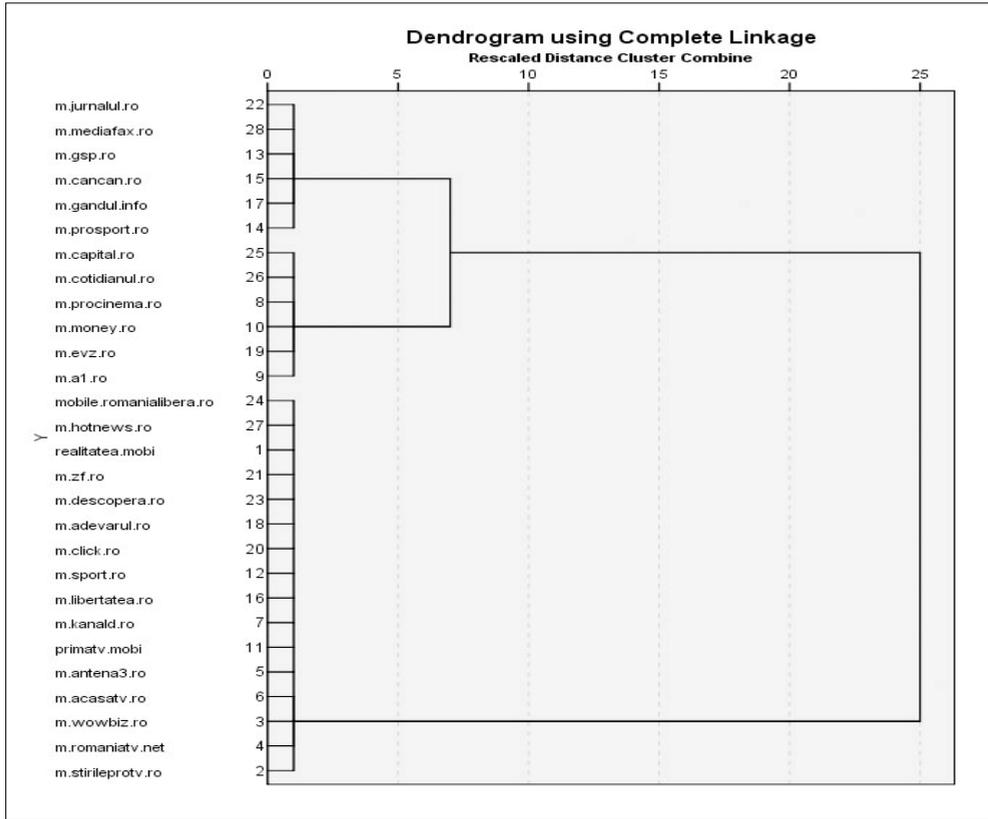

Fig. 7. Clusters in terms of user interactions

(Fig. 8) Using complete linkage procedure of HTA for the 28 cases of mobile sites in terms of users' participation, four clusters were identified. All four groups are almost equal to the number of mobile sites. The first group (mediafax, gsp, cancan, gandul, prosport, romanialibera) has the same forms of participation as the desktop version. The second group (sport, libertatea, a1, adevarul) permits participation on the Facebook platform with likes and comments. The third group (money, zf, cotidianul, hotnews, antena3, click, capital, acasatv, primatv) permits interactions with Facebook and Twitter platforms. The fourth group (procinema, descopera, wowbiz, romaniatv, kanald, realitatea, stirileprotv) permits user comments for mobile news on the site itself and on Facebook. Some cases offer all forms of participation, others none.
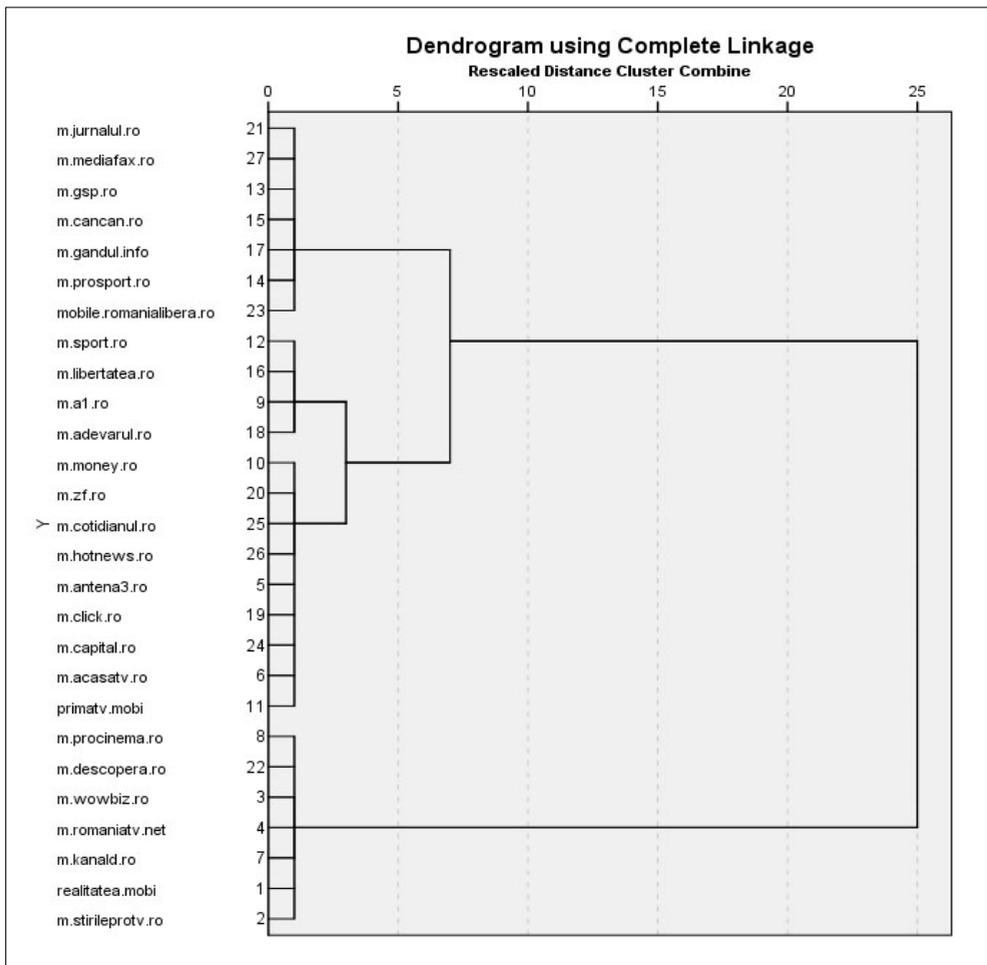

Fig. 8. Clusters of mobile sites in terms of user participation

(Fig. 9) Groups in terms of multimedia format, layout, and structure, through a complete linkage procedure are four, and also three different cases (stirileprotv, procinema and money.ro). From this perspective mobile sites zf, mediafax, gsp, cancan, gandul and prosport are more similar and create a group. Mobile sites primatv, capital and jurnalul are also similar from the perspectives of their content, layout and structure. The largest group is formed by the mobile sites evz, romanialibera, kanald, adevarul, cotidianul, acasatv, and sport.ro, very similar to each other, even though their objectives and the types of news offered are very different.
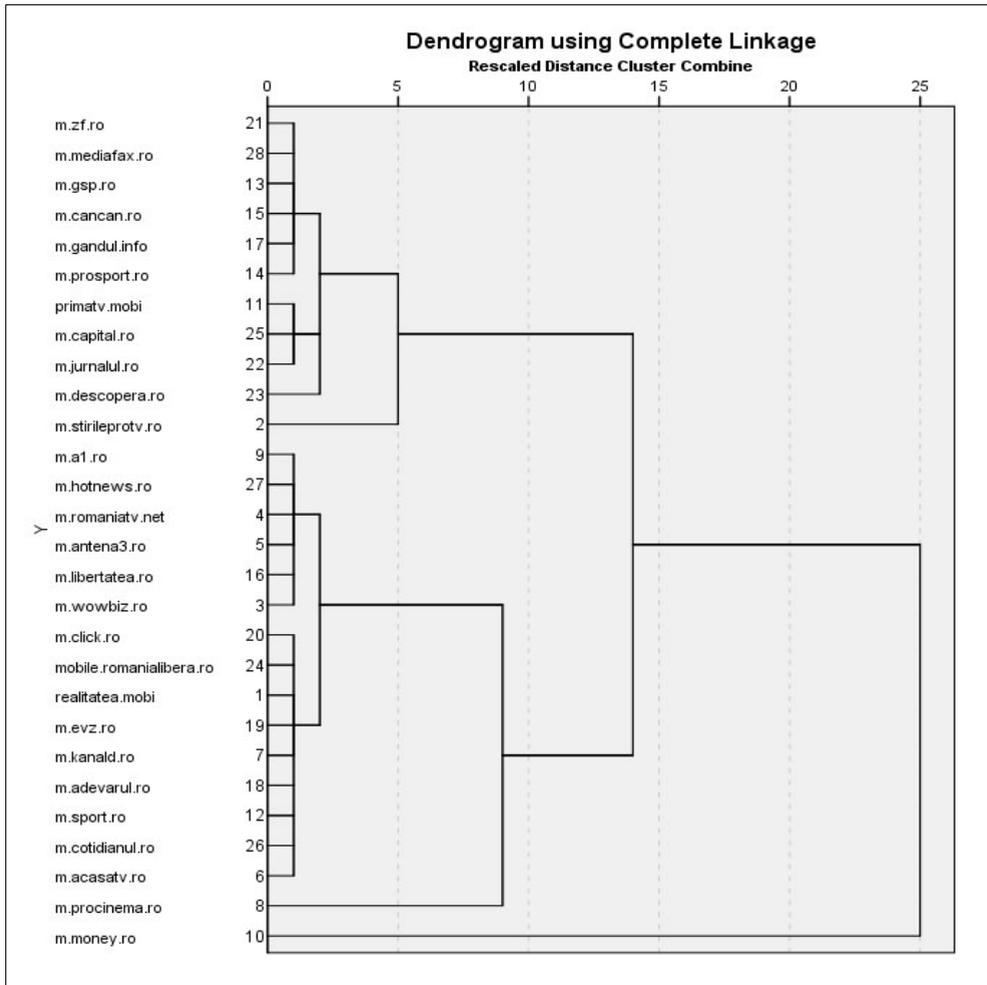

Fig. 9. Groups in terms of multimedia format, layout, and structure

(Fig. 10) Five main clusters are identified in terms of user interactions and participation. Three of the five groups have the same number of mobile sites and show us that they have chosen the same forms to have connections with the audience. In terms of these characteristics, there are no relationships between the type of the mobile sites and their connectivity with the audience.
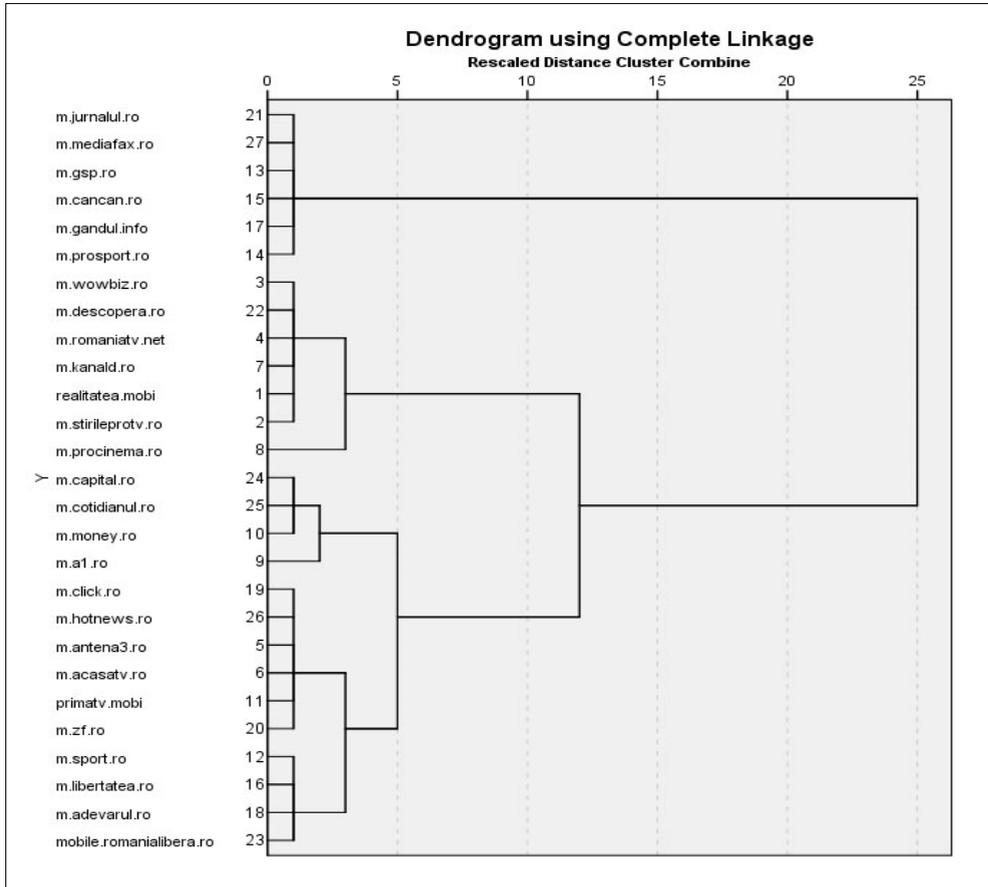

Fig. 10. Groups in terms of user interaction and participations

(Fig. 11) Complete linkage procedure of hierarchical cluster method applied for all cases and considering all variables gives 12 clusters. This situation shows a great diversity of mobile sites in terms of their characteristics.
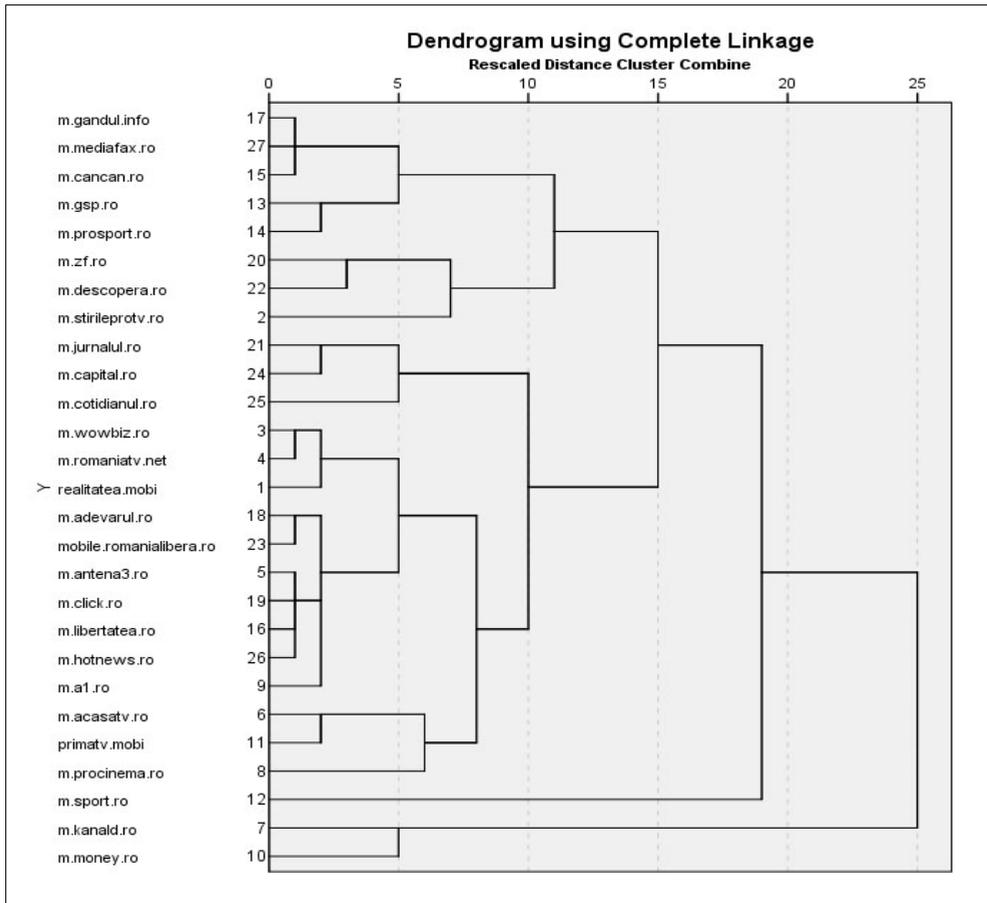
Fig. 11. Clusters of mobile sites in terms of all characteristics

In all analyzed situations, the average number of clusters is 3-4, depending on each variable. Analyzing the dissimilarities between variables, such as number of views and visitors, or reading mode, reading version, and device access, it can be noticed that the variable 'number of views' is closer to number of visitors and further by the reading modes with browser or mobile apps. Availibility through mobile devices or desktop influences also the number of views.

Regarding the audiences and users' preferences for the mobile sites, it can be noticed that the sites that have important traffic indicators on Internet also have traffic on mobile devices (Table 5). Thus, it was shown that the audience migrates from one platform to another, which is more comfortable to be read. Also, it can be seen that the sites with high traffic, have similar views and visits on the mobile versions. The sport and tabloid categories of sites have many users on mobile devices. These categories are on top.

Table 5: Audiences of news sites and their mobile version

Site category as sati.ro	Type of mobile sites	Site name	Mobile - No. of views	Mobile - No. of visitors	Site - No. of views	Site - No. of visitors	Company
Sport	Online Publication (OP)	m.sport.ro	19214903	7057465	36631793	13788668	Pro TV
sport	OP	m.gsp.ro	11730392	4460489	34045243	9699721	Convergent Media
sport	OP	m.prosport.ro	10500505	4890089	27518312	10616493	Mediafax Group
General news	TV	realitatea.mobi	6654968	3252496	39914949	16107630	m-realitat
tabloide	OP	m.cancan.ro	4769265	3192712	42377891	15166920	Pro TV
tabloide	OP	m.libertatea.ro	4735854	2118268	37466115	12088838	Ringier Romania
General news	TV	m.stirileprotv.ro	4602217	3565383	28163323	16355438	Pro TV
Tabloide	TV	m.wowbiz.ro	4251905	2226266	22642726	11405629	Dogan Media International
General news	OP	m.gandul.info	3868597	2389931	20573660	10137515	Mediafax Group
General news	OP	m.adevarul.ro	2450749	1141437	13175309	5827256	Adevarul Holding
General news	OP	m.evz.ro	2394347	1221453	12421868	4642453	Editura Evenimentul si Capital
General news	News Portals	m.hotnews.ro	2162855	1067904	10357395	4208857	Media Bit Software
General news	News Agencies	m.mediafax.ro	2109448	1213066	6632430	3326833	Mediafax Group
General news	TV	m.romaniatv.net	1949800	1195405	11275318	6772620	Q2M
Tabloide	OP	m.click.ro	1907892	742981	19357824	4940357	Adevarul Holding
General news	TV	m.antena3.ro	1291333	763120	14809572	4114481	Antena 3
Economic & financiar	OP	m.zf.ro	1219292	726356	5855656	2740746	Mediafax Group
Lifestyle feminin	TV	m.acasatv.ro	763956	426113	4438588	1573755	Pro TV
General news	OP	m.jurnalul.ro	657963	484998	6873606	3156917	Intact Publishing
Science & research	OP	m.descopera.ro	647257	328838	2677614	1316639	Mediafax Group
General news	OP	mobile.romanialibera.ro	631673	330907	3515222	1160771	Media Gamma Publishers
Economic & financiar	OP	m.capital.ro	529354	297699	3400685	2210143	Editura Evenimentul si Capital
Entertainment	TV	m.kanal.ro	417306	274463	4441878	2422932	Dogan Media International
Entertainment	TV	m.procinema.ro	300506	258134	3232914	1601538	Pro TV
General News	OP	m.cotidianul.ro	262734	111127	2847924	1065298	Q2M
Entertainment	TV	m.a1.ro	104374	70113	7015415	2465285	Antena TV Group
Economic & financiar	TV	m.money.ro	79984	48023	494434	275354	Q2M
Entertainment	TV	primatv.mobi	26664	14802	1311285	427395	SBS Broadcasting Media

(Source: sati.ro - August 2013)

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Conclusions

The results obtained in this study show that the convergence has lot of forms when it meets mobile technology in the Romanian media landscape. The results of cluster analysis applied below present various solutions for unification of media channels through mobile technology. The multimedia content found on the news sites are also accessed on mobile devices in a device-specific approach, in a traditional-desktop approach, or in combination. However, because the border between convergence and cross-platform is difficult to define, it can be noticed that media companies have chosen both convergent and cross-platform solutions for their online products. Thus, several new sites adopted the cross-platform solution which is based on the desktop version of the news site on mobile devices, such as: gsp (Convergent Media Company), cancan (ProTV Company), and gandul, zf, prosport, descopera, mediafax (Mediafax Company).

Other news sites have mobile versions that are appropriate for a convergent solution. In this case, different media channels (TV, publications, news agencies, and Web sites) are unified through the mobile technology in a specific mode. Such examples are given by news sites realitatea (m-realitat Company), stirileproTV, acasaTV, procinemaTV, sport.ro (ProTV Company), romaniaTV, money, cotidianul (Q2M Company), antena3 (Antena3 Company), primaTV (SBS Broadcasting Media Company), libertatea (Ringier Romania Company), adevarul, click (Adevarul Holding Company), evz, capital (Editura Evenimentul si Capital Company), romanialibera (Media Gamma Publishers Company), jurnalul (Intact Publishing Company), hotnews (Media Bit Software Company).

It can be noticed that media industry and companies adopt both solutions for implementation of mobile technology for their products.

Also, there are no differences of implementation the mobile technology depending on the type of mobile site, such as television channel or show, online publication, news agency or news portal. Also, groups of news sites on a specific category of media channel were not identified. The characteristics of mobile sites in the Romanian media landscape vary a lot from case to case. This conclusion shows that the convergence between online, tradition media channels and mobile technology is working. The differencies between them can not be clearly identified.

Romanian media companies choose various solutions for the adoption of mobile technology for their media products (television channels, shows, online publications, news portals, news agencies). Users that access the mobile sites are conditioned by the mobile devices, phones or tablets. Thus, several mobile sites can be accessed only from a mobile device, and there is no possibility of using the desktop computer to access the mobile version (acasaTV, procinema, primaTV, sport, and gsp). Most news sites permit access to the mobile versions of sites from the desktop, too.

Another conclusion of this study shows that the characteristics of mobile sites do not influence the number of views and visitors. Audience come mainly from the news sites. The sites with many visitors and views on Internet also have visitors and views on mobile devices. This is the cases for the most visited sites both on Internet and on mobile devices, sport, prosport and gsp.

Regarding the audience aspect of the mobile sites, and if we compare the usage of mobile technology with the traffic values on Internet and category of site, it can be concluded that sport and tabloid categories are very frequently read on mobile devices.

The mobile and wireless technologies increased the forms of media convergence as we analyzed below.

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