Embedding persuasive features into policy issues: Implications to designing public participation processes

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ABSTRACT

Public participation is one of the most important tasks for policy making processes, and public authorities are lacking ideas on designing public participation processes facilitating active citizen participation. Based on a persuasion theory, this paper examines if policy issues embedded with persuasive features draw more attention, longer elaboration time and more participation. Particularly preference matching, location matching, social proof and authority are identified as persuasive features in e-participation context and propositions on their impacts on citizens' participation processes are developed. A prototype mobile participation tool is developed to test the propositions and tested by 80 experiment participants in the UK and Turkey. The findings indicate that the mixture of central and peripheral features is most effective in drawing participation while single feature has limitations. This study also argues that the design of e-participation tools needs to consider the psychological aspects of citizens for motivating their participations.

1. Introduction

Central and local governments define public participation as a mandatory task of public policy making processes (PMPs). Therefore, it is imperative to engage with citizens and take into consideration their opinions throughout any PMPs to ensure the sustainability of public sector policy implementation. Nevertheless, policy makers often express concerns in the lack of engagement of citizens in the development of public policies. Motivating citizens to participate and engage in PMPs has been a challenging task and public authorities are yet to find satisfactory solutions (Laurian, 2004). Responding to those needs, electronic participation (e-participation) systems have been proposed in electronic government (e-government) research discipline. However, such systems are more focused on delivering information from citizen to policy makers (and vice versa) and the literature lacks studies that provide policy makers with implications on how to motivate more citizens to participate to the public participation (Wijnhoven, Ehrenhard, & Kuhn, 2015). The literature lacks studies that illustrate what strategies are required to influence citizens' cognitive processes in deciding to participate to policy making processes. This paper aims at filling the research gap.

The effectiveness of e-participation tools can be maximised only when the end-users are committed and are having a proactive attitude to the PMPs (Cegarra-Navarro, Garcia-Perez, & Moreno-Cegarra, 2014). Hence, there is a need for innovative e-participation tools that are designed in a way that not only provides to end-users' access to the governmental information and functions, but also persuade them to be involved in the PMPs.

However, contemporary information systems for public participation are limited to persuade citizen to be more involved in PMPs. The most widely adopted approach is utilising the public authorities' web sites in which policy makers provide policy issues and wait for citizens to visit and provide their opinion. According to Janssen and his colleagues' survey, yet majority of web based business models for electronic government lack citizen-orientation (Janssen, Kuk, & Wagenaar, 2008). Macintosh (2004) characterise e-Participation systems for PMPs for the first time by providing the key dimensions of consultation systems. This research clarifies the key functional aspect of e-participation for PMP but not enough consideration was given to citizens' attitudes and their motivation. Conroy and Evans-Cowley (2006) proposed the interaction-based e-participation tools for PMPs but it was also focusing on the interface and functionality of systems. Brown (2012) proposed very advanced type of public participation-based geographic information systems and following field trials. This research emphasised the importance of persuasion process that motivate the citizens' active participation because the research experience because the proposed

system was not actively utilised by public in the field trial despite advanced methodology and functionality. From this sense, the success of e-participation systems for PMPs not only depends on the functionality of systems, but also the effective motivation strategy to make citizens actively participate in PMPs and the theories in persuasion of human behaviour can provide new perspectives on the success of e-participations systems. This argument is in line with defining electronic government systems as a socio-technological system (Janssen, Chun, & Gil-Garcia, 2009).

The issue of persuading citizen in PMPs has similarity with nudging in behavioural economics that can be used to design policies to stimulate social desirable behaviours (Linders, 2012; Thaler & Sunstein, 2008; Wilk, 1999). Also, this is related to framing strategies that more societal and political awareness and behaviour will be generated (de Bruijn & Janssen, 2017). For example, nudging is used when consumers are confronted with choice situations and their choices are sometimes made based on *automatic and unconscious* processes. Labelling the energy efficiency of appliances and choosing the default for adopting Smart Grid are examples of nudging consumers for socially desirable behaviour. In such choice situations, consumers choose wanted options by policy makers without much elaboration on the options (Ölander & Thøgersen, 2014). However, participating to policy issues require reflective and conscious processes that usually consist of attention, elaboration and behaviour stage (Flanigan & Zingale, 1994; Tam & Ho, 2005) as well as automatic and unconscious processes in the beginning. The literature lacks studies that reveal how nudging techniques interplay with information process stages for making changes on behaviour. That is, we still do not understand how labelling for example affect a persuasion process.

This paper takes elaboration likelihood model (ELM) as a theoretical lens for influencing citizens' participation behaviour. The theory highlights two routes in explaining how human attitude is changed on receiving persuasive messages: central and peripheral route (Petty & Cacioppo, 1981). The ELM, developed by Petty and Cacioppo (1981), is a model that explains how individual's attitudes are formed and changed by focusing on their information processing when they face a message. ELM differentiates two routes of persuasion from each other: the "central route," where a subject considers an idea logically, and the "peripheral route," in which the audience uses pre-existing ideas and superficial qualities to be persuaded. For example, a central route based persuasion can occur when a person logically thinks a message given to speculate the merits of the arguments of the message. On the other hand, another person may find the message not interesting but have more elaboration on the message when a celebrity delivers it. British Government has spent more than £9 m to send a leaflet to every UK household during it EU referendum in 2016. The leaflets were designed to target the central route of persuasion setting out the case for remaining in the EU. On the other hand, leave campaigners the red bus that claims £350 m can be spent for NHS by leaving the EU can be considered to target peripheral route of persuasion by drawing more attention from voters. The ELM of persuasion provides us with a theoretical ground to explore the ways that a software or tool can become an element of a persuasive strategy in electronic participation domain.

While the theory can explain why and how persuasive messages influence human attitude in other disciplines including Marketing, information systems adoption, and social psychology, the literature lacks studies that explain how such persuasive theory is applied to public participation. Public participation has different context from those studies in that citizens are not consumers. The decision to participate requires different factors than to purchase products or services. The former usually do not have direct economic incentives from participation to a survey. How a persuasive theory can be applied to influencing citizens' positive cognitive processes for public participation is the research question this paper aims at uncovering. More specifically, followings are the research questions this paper addresses.

RQ1. What factors play roles in central and peripheral route of persuasion for public participation in the consideration of citizen mobility?

RQ2. How do the factors make impact in citizen participation behaviour?

This study is timely considering the recent advance in mobile computing technologies that made mobility as an important dimension in the design of electronic participation systems. Ubiquitous interactions between public authorities and citizen means that the public participation is becoming more proactive and the participation of citizens can be implemented in the middle of citizens' every-day lives. In mobile public participation context, citizens have opportunities to be in contact with policy makers as soon as they find issues that affect their every-day life through mobile devices. The technical advance now allows policy makers apply persuasive strategy to public participation and the public participation literature urgently requires a study that verifies the value of persuasive strategy for increased citizen participation in policy making processes.

The findings of this study have theoretical as well as practical implications. Theoretically, this study extends our understanding on factors that can be used to persuade citizens to participate to policy-making processes. Secondly, this study provides an insight on how those facilitators can be integrated in the design of information systems to increase citizen participation. Thirdly, the finding of this study extends our knowledge on ELM as the model is applied to electronic participation for the first time. The practical implications of the study are expected to include providing policy makers with new insight on the design of policy-making processes to facilitate more citizen participation.

This paper is organised as follows. Section 2 presents the theoretical background of ELM. Section 3 presents the research design of the study and Section 4 the experiment design and results. Section 5 discusses the academic and practical contributions of the study and concludes the paper.

2. Theoretical backgrounds

2.1. Elaboration likelihood model

This study employs the ELM for embedding persuasion features into e-participation tools as it explains a process of people being persuaded and reveals major factors of persuasion. In particular, the identification of two ways of persuasion routes allows policy makers develop strategies for persuasion by identifying factors that affect two routes.

The Elaboration Likelihood Model (ELM) is a model of information processing and persuasion. Hence, the model attempts to understand how people process information; i.e. the term 'Elaboration' refers to the extent to which people think about issue-relevant arguments contained in persuasive messages. For that purpose, a three stages approach for information processing has been proposed comprising the following stages: attention, elaboration and behaviour as shown in Fig. 1 (Flanigan & Zingale, 1994; Tam & Ho, 2005). This information-processing model suggests that individuals follow a continuum of actions for processing a persuasive message, although not all messages will follow all stages necessarily. Starting from attracting a person's
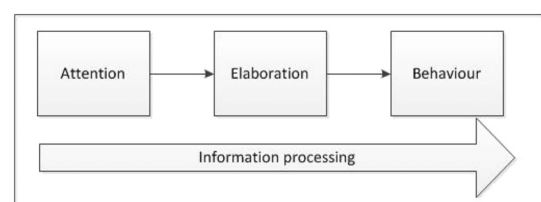

Fig. 1. Information processing stages.

attention, the elaboration stage of processing implies that the person generates own thoughts about the information exposed which in the end may or may not lead to altered behaviours.

The Elaboration Likelihood Model (ELM) of persuasion developed by Petty and Cacioppo (1981) is a dual process theory of how attitudes are formed and changed. ELM proposes an "elaboration continuum" which ranges from low elaboration (low thought) to high elaboration (high thought). The elaboration continuum determines the extent to which an argument shapes persuasion after careful processing and evaluation (high elaboration) or through peripheral cues such as source expertise or attractiveness (low elaboration). In our context ELM can provide us with the grounds to explore how e-government services can become an element of a persuasive strategy.

ELM deals with the persuasion that may result when an individual elaborates on a given message or argument. Based on ELM the individual may be persuaded by the message either after processing the idea logically (i.e., the central route of persuasion) or after superficially using pre-existing ideas (i.e. the peripheral route of persuasion). The two routes of persuasion are further elaborated in the below table.

Route of persuasion	Characteristics of persuasion process
Central route	Requires a great deal of thought and promotes high elaboration
	The individual examines the message with scrutiny and evaluates the merits of the arguments
	If the message generates favourable thoughts while examining the merits of the argument, the message will most likely be accepted. In the opposite case it will most likely be rejected.
Peripheral route	The elaboration of the message relies on environmental characteristics of the message (e.g., the perceived credibility of the source, the quality of the way in which it is presented, the attractiveness of the source, or the catchy slogan that contains the message)
	Six principles of social influence (Cialdini, 2000), describe the characteristics that trigger processing through the peripheral route: reciprocity, commitment, consistency, social proof, authority, liking and scarcity.

Which one of the two routes will be followed is influenced by the individual's motivation and ability to process the message. The motivation of the person depends on the personal relevance of the message topic, the person's accountability, and the person's need for cognition. The ability to process the message refers to the presence or absence of time pressures or distractions and the relevant knowledge needed to carefully scrutinize the arguments. A mixture of central and peripheral route processes may occur under conditions of moderate elaboration and thus both routes may guide the message processing.

If both motivation and ability are high, then elaboration is high and the central route of persuasion is used. As one or both of the ability and motivation declines, then the peripheral route of persuasion will be followed. When persuasion happens through the central route of persuasion, the resulting change in attitude is more stable and more enduring. When persuasion happens through the peripheral route it is expected to lead to temporal attitude change.

Business management research has employed ELM to formulate strategies that promote desirable employees' behaviours or discourage non-desirable ones (Douglas et al., 2008). Researchers in the field of marketing have used ELM to investigate persuasive forms of advertisement and how advertising messages influence recipients' attitudes toward a product (Dotson & Hyatt, 2000). Another stream of work uses ELM to study web-based advertisements (Tam & Ho, 2005; Yang, Hung,

Sung, & Farn, 2006). Recently information systems' researchers explore ELM's capabilities to reveal the processes of information technology adoption (Bhattacherjee & Sanford, 2006; Li, 2013; Zhou, 2012). However, the power of ELM to study the adoption of e-government systems hasn't yet been revealed.

2.2. Persuasive features in mobile participation context

Based on ELM, persuasive features that reflect stimuli to the central and peripheral routes of persuasion in public participation context are derived. Central route of persuasion is occurred when a person has more motivation, knowledge, or cognitive ability to examine message therefore puts more attention and elaboration on the contents of received messages. For a central route of persuasion, a message needs to be interesting to the recipient and should have good arguments to change attitude of the person. Thus, the relevance of messages to recipients is an important factor for central route persuasion.

On the other hand, peripheral route persuasion is occurred when a person has less motivation, knowledge or cognitive ability to process a message. Among Cialdini's (2000) six types of peripheral cues that can trigger peripheral route of persuasion, this study applies authority and social proof in the design of e-participation tools. Authority is chosen as rather than the quality of the arguments of a message, meta-information about the message like message source is more important for the persuasion of the recipient of the message (Bhattacherjee & Sanford, 2006). In e-participation context, the source of messages whether they are coming from governmental agencies that have policy implementation power or not plays a significant role for peripheral route of persuasion. Also, social proof is selected as the actions and words of others are likely to influence a receiver of a new message with regards to e-participation. We naturally can expect that a citizen would show more interests in a policy issue, which s/he heard from friends and neighbours about.

We discuss further how relevance, authority and social proof play roles in the persuasion process via central and peripheral route.

Firstly, literature indicates that *relevance* of policy issues encourages citizens' involvement in the public participation activities (Strobl, Maier, Ludyga, Mielck, & Grill, 2016; Taylor-Smith & Lindner, 2010). The basic assumption on this reasoning is that an individual become more motivated to participate to a policy issue if the issue is relevant to the individual. The relationship between policy *relevance* and citizen participation has been studied in public administration literature. It is suggested that better informed citizens will participate to PMPs more than less informed ones do (Vannoy & Palvia, 2010; Venkatesh, Morris, Davis, & Davis, 2003). Informed citizens have better understanding of issues, what options there are, and how their lives are affected. More closely they feel issues are related to them, more prone they are to participate. Also, access to information and innovation is considered driving factors of positive participation (Ajzen, 1991).

The relevance is classified into two categories in this study: personal interest and context relevance. Personal interest relevance measures how much a policy issue match to personal interest of a citizen. A citizen may be more interest in policy issues with regards to education if she has children in schools. Context relevance measures how much a policy issue matches to current context of citizen activities. Delivering e-government services in the contexts of citizens' lives is considered as the last stage in the digital government evolution model (Janowski, 2015). Specialization of Digital Government initiatives to different local, sectorial and local-sectorial contexts is the major goal of digital government at this stage. This highlights the importance of contexts in policy-making processes as policy issues related to citizen context can draw more attention and elaboration. For example, even though a citizen is not interested in policy issues with regards to food imports, she may find them interesting when the issues are notified during a visit to a shopping mall. The interest relevance is expected to strengthen a central route to persuasion while the context relevance a peripheral

route. The emergence of mobile technologies has opened new opportunities for public authorities to provide citizens with services anytime, anywhere through portable devices. Exploiting such opportunities for providing citizens with quality information at right place at right time will increase both interest and context relevance of policy issues.

Secondly, although there is no study that reveals the direct positive relationships between *social proof* and citizen participation in the public policy making context, there are abundant results that support the positive relationships indirectly (Yang & Ott, 2016). In recent years, social computing and networking platforms (e.g. blogs, online forums, MySpace, twitter and Facebook) are consulted more by public for different information gathering than traditional sources (Moore & Benbasat, 1996; Reddick, Chatfield, & Ojo, 2017). These platforms have been utilised by private and public sectors to encourage the public's behaviour toward their products and services. Evidence of success in influencing public attitude can be estimated by counting the number of group pages existing on these social platforms. Social forums influence individual's perception and behaviour (Yang et al., 2006). Therefore, facilitating citizen forums on policy issues can compel citizens to participate in the PMPs. Further, social proof has been presented as a direct determinant of behavioural intentions in several studies including theory of planned behaviour (Ajzen, 1991) and the innovation diffusion theory (Moore & Benbasat, 1996). It has been used in terms such as 'social influence', 'subjective norms', 'social factor and image' (Bhattacherjee & Sanford, 2006; Gotlieb & Swan, 1990; Yang & Ott, 2016). All these terms imply individual's behaviour is affected by peers' opinions and how they view them. Social pressure is also supported as a peripheral characteristic of a persuasive message by (Cialdini, 2000) who proposed six universal principles of social influence: reciprocity, commitment and consistency, social proof, authority, liking, and scarcity.

Thirdly, issue authority and accountability is an important factor for participation (Harrison & Sayogo, 2014). Source of a message has been widely reported as one of the most effective peripheral cues in the literature (Petty & Cacioppo, 1981). Policy issues asked by policy makers who can actually implement citizen input and show the results later contains bigger authority than other issues. Two sources (credibility and power) of authority can be used to influence people behaviour. Credibility is gained when a message is delivered through an expert while power plays a role when a message comes from upper layer in an organizational hierarchy. In public policy making processes, any participation requests coming from somebody who actually can implement outcomes from public participation can be considered as gaining more credibility and power therefore attract more attention from citizens and more elaboration.

3. Research model

Issue relevance is essential to attract the attention of citizens and to convince them to devote cognitive efforts to process given messages. Communication messages that match the recipient's preferences have been validated as a successful persuasion technique in the field of retail (Gotlieb & Swan, 1990), e-commerce (Tam & Ho, 2005), e-health (Angst & Agarwal, 2009) and information technology acceptance (Bhattacherjee & Sanford, 2006). Following ELM concepts, if citizens receive messages that are irrelevant to their interests then their motivations to participate to the policy issues become weakened. On the contrary, if messages received are in line with their personal interests then the probability to process the message's arguments becomes strengthened. It is also expected that the provision of issues that match the recipients' interests will increase participation, as a result of increased elaboration for the issues. On the other hand, preference matching has little to do with attention as it intervenes at central route therefore the relevance of messages are more has to do with elaboration and participation. Hence following two hypotheses are developed:

H1. *Policy issues with higher personal relevance enable more elaboration than issues with lower personal relevance.*

H2. *The decision to participate in a policy issue is more likely with preference matching that without preference matching.*

According to ELM, if a person who received a persuasive message does not have enough ability or motivation to process the message, then a peripheral route of persuasion can be activated. Peripheral cues are something that are not related with the arguments of the message, but with the peripheral characteristics of the message, for example, the attractiveness of the presenter. The most commonly used peripheral cues across contexts are the source credibility (Angst & Agarwal, 2009; Bhattacherjee & Sanford, 2006; Gotlieb & Swan, 1990; Sussman & Siegel, 2003), social proof or popularity (Tam & Ho, 2005). However, in the different contexts peripheral cues are differently shaped, such as the number of suggested personalised items for online purchase (Tam & Ho, 2005), number of arguments, communication media type and source attractiveness (Angst & Agarwal, 2009). In the context of e-participation we have identified three factors that can influence citizens through the peripheral route of persuasion; location matching, social proof and authority cues.

Identifying the best time of sending a message to encourage participation is very important for persuading citizens and for assuring that they will dedicate efforts to speculate public participation requests. Policy issues that are related to citizens' current locations will achieve the best timing to approach citizens through handheld devices like mobile phones. According to ELM, such a feature is expected to attract the attention of people when the peripheral route is activated. However, a peripheral cue is not able alone to influence the final decision of the recipient (Tam & Ho, 2005). As result we develop the following hypotheses:

H3. *Policy issues with context relevance are more likely to attract attention than issues without context relevance.*

H4. *Policy issues with context relevance are more likely to induce elaboration than issues without context relevance.*

H5. *Context relevance has no effect on participation.*

As mentioned in theoretical backgrounds section, social proof is one of six peripheral cues proposed by Cialdini (2000). Social proof is based on a tendency that people seek to the behaviours of other people to guide their behaviour. The second persuasion feature that we regard as a peripheral cue is the social proof principle. According to ELM and Cialdini, such a feature is expected to attract individuals' attention and increase elaboration without affecting the final users' decision. Hence, the following hypotheses are developed:

H6. *Policy issues with social proof are more likely to attract attention than issues without social proof.*

H7. *Policy issues with social proof are more likely to induce elaboration than issues without social proof.*

H8. *Social proof has no effect on participation.*

Another principle suggested by Cialdini (2000) is issue authority. According to the authority principle, message receivers tend to be persuaded by the authority figure of the messages. Similar to the other peripheral cues, such a feature is expected to attract individuals' attention and increase elaboration without affecting the final users' decision. However, as we discussed above, the effectiveness of a persuasion messages is framed by the persuasion features that it includes. Hypotheses H1 to H8 reflect our propositions regarding a participation request that involves one persuasion feature; either addressing the central route of persuasion or the peripheral route. Nonetheless, according to ELM, the impact of policy issues combining more than one persuasive feature is important and the combination of persuasive features are expected to strengthen the persuasion capacity of policy
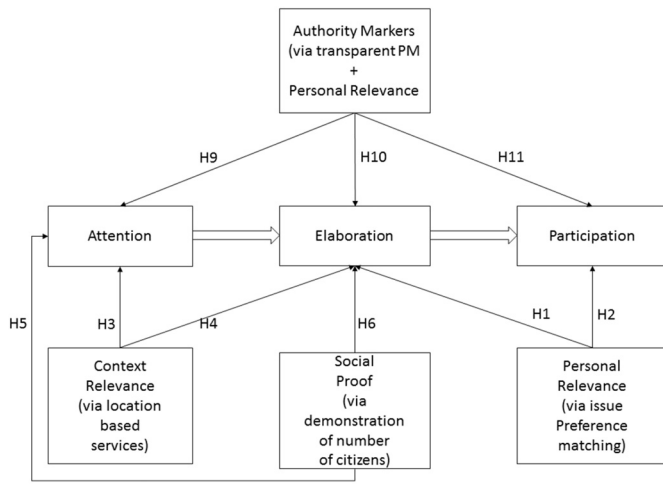
Fig. 2. The research model.

issues. Hence, combining this feature with issue relevance that attracts the central route we develop the following hypotheses:

H9. *Policy issues with personal relevance and a peripheral cue are more likely to attract attention than issues without persuasion features.*

H10. *Policy issues with personal relevance and a peripheral cue are more likely to induce elaboration than issues without persuasion features.*

H11. *Policy issues with personal relevance and a peripheral cue are more likely to achieve participation than issues without persuasion features.*

Based on above arguments, Fig. 2 shows the research model that shows how the persuasive features affect the cognitive processes of citizen for public participation.

4. Experiments

4.1. A prototype persuasive electronic participation tool

A prototype electronic participation system was developed to test the research model. The system is based on client-server architecture and client modules (mobile app) is installed on mobile devices that support Java including Android OS. The system implements the four persuasive features as citizens can be presented with policy issues in the middle of their every-day lives therefore easy to catch their preferences and current contexts. Citizens can log into the system through the mobile app which communicate with the server to request authentication and retrieve user profile data including policy preference.

The *context relevance* of policy issues was manipulated through location based issue notification. Location is one of the most effective context information of citizens' every-day lives. For this, the prototype system employed the concept of opinion tag (OT), which contains information on a policy issue and corresponding policy making process.

OTs are distributed over geographical maps according to containing policy issues and their relevant point-of-interests (POIs). This increases *context matching* as citizens can identify policy issues that most relevant to their current activities while on the move. For example, citizens are automatically presented with policy issues with regards to a public car park pricing when they enter the car-park or with regards to public library opening hours when they are in a library.

Personal relevance of policy issues was manipulated through *Preference matching* which is implemented as a central cue through profiling when a user is registered in the system. The prototype system filters issues that match users' preferences defined in their profiles.

Authority is manipulated through transparent sharing of process information of policy-making processes. It can be inferred that providing citizens with transparent process information of a policy issue with regard to who is responsible, when the process was initiated, and when the public participation process is implemented distinguishing policy issues will increase the authority of a presented policy issue therefore attract more attention and elaboration. For this, the prototype system integrates a workflow engine that automates the routing of control (what tasks to be activated once a task is completed), role resolution (who can participate to an issue and who can access to the public participation results), and routing of forms (what forms need be attached to a policy issue when the issue is presented to citizens) for the execution of policy making processes.

Social proof is manipulated by the number of citizens participated to each policy issue. That is, a citizen can identify the number of citizens who contributed to a policy issue when s/he is notified with the policy issue. Different numbers of citizen participation shown on the list of policy issues are expected to influence their choice of attention, elaboration and participation as presumed in the research model section.

4.2. Experiment design

In order to test the hypotheses and validate the performance of the prototype system we follow an experimental design to measure the *actual behaviour* of users instead of their perceptions about the system as traditional information technology acceptance models do. To test the eleven hypotheses, we conducted four different experiments in which the four persuasive features are manipulated and combined.

Table 1 summarises the four experiments.

Our empirical data was collected in the UK and Turkey; we have invited 50 PhD students and staff members of a University and residents of the London Borough of Hillingdon in the UK and 100 staff members of a private company in Turkey. 80 invitees accepted to participate and installed the mobile app of the prototype system on their mobile devices. The participants were between in their 20s and 30s. Male participants were dominant group (64 males and 16 females). Twenty-two participants were working in University as Ph D students or Lecturers and the other fifty-eight participants were professionals working for IT companies. Data were collected during three months from November 2012 to January 2013; the first two months the users got familiar with the application and the last month they experienced the manipulated

Table 1
Experimental setup.

Experiment	Notifications' setup	Scheduling
Experiment 1	The users received two notifications at the same time; a preference-matching and a random issue	7 days and included 28 notifications per trialist (4 notifications presented in two notification sets per day)
Experiment 2	Two notifications at the same time; a location-matching and a random issue	7 days and included 28 notifications per trialist (4 notifications presented in two notification sets per day)
Experiment 3	Three or four notifications at the same time with variant popularity as reflected by the number of subscribers per issue	8 days and included 32 notifications per trialist (4 notifications per day presented as one notification set)
Experiment 4	Four notifications at the same time; one trackable (marked with icon) personalised, one trackable (marked with icon) not personalised, one not-trackable personalised and one non-trackable not personalised	7 days and included 28 notifications per trialist (4 notifications per day presented as one notification set)

Table 2
Example policy issues notification.

Notification category	Question/notification
Residency	Thinking about your day-to-day activities in London Borough of Hillingdon, do you feel safe? If not, what are your concerns? (Open ended question)
	How satisfied or dissatisfied are you with household waste collection provided by Hillingdon Council? (Likert scale 1–5)
	How satisfied or dissatisfied are you with local recycling facilities provided by Hillingdon Council? (Likert scale 1–5)
Transportation	What is your major mode of transportation to for arriving at Brunel University?
	If you are using a car, where do you usually park? a. University Park (annual parking permit) b. Public car parks c. Use pay and display d. On street e. Other; please specify:

features of the mobile application.

Using a customised logging system, we captured users' choices while using the system and compared them against our expectations, which are reflected to our hypotheses. We have collected and analysed 9639 logging events, including opening the notification list, opening an issue, opening a questionnaire, opening saving given answers to the questionnaire, returning to the pending notification list and closing the pending notification list.

The participants were expected to engage to PMPs associated with their residency and transportation policies. The residency topics regarded issues such as recycling and waste collection, safety, streets and pavements' condition, public service customer service, and others. The transportation topics regarded issues such as preferred modes of transportation, transportation schemes (e.g., discounts, cycle promotion), car parking, ride sharing, satisfaction from public transportation, etc. An indicative set of the questions used in the experiments in the UK is presented in Table 2. For the experiments in Turkey the questions remained the same, with modified locations and public agencies.

When a notification is triggered, the system automatically retrieves the available questions and demonstrates them at the users' mobile application. We ensured that the same question(s) would appear to all participants having same parameters (passing through the same specified location, same preferences) by manually feeding the system with questions depending on the experiment (i.e., only a subset of the questions was available per day ensuring that only one question is available per location in experiment 1, only one question was available per preference for experiment 2 and only two trackable questions for experiment 4).

The first experiment was to test the impact of preference relevance of policy issues on citizen participation. The configuration of the application enforced that during the experiment a citizen gets notified about a policy issue that corresponds to profile preferences and at the same time about a policy issue that does not. The additional notification is only generated if at least one notification is generated with the user actual notification filters.

The preference-matching issues are visually differentiated to the user from the random ones (using a stamp in top left corner of the issue) (Fig. 3 (a)). It should be noted that the preference-matching issue was always presented second in the list; hence related observations could not be associated with users' tendency to open first the issue that is first on the notifications list.

The second experiment was to test the effect of context relevance of policy issues on citizen participation. The configuration of the application enforced that during the experiment a citizen gets notified about a policy issue that corresponds to his/her location and at the same time about a policy issue that does not. The additional notification is only generated if at least one notification is generated to fit the user's location. The location-relevant issues are visually differentiated from the random ones (using a stamp in top left corner of the issue) (Fig. 3(a)).

It should be noted that the location-matching issue was always presented second in the list; hence related observations could not be associated with users' tendency to open first the issue that is first on the notifications list.

The third experiment was to test the effect of social proof in citizen participation. The configuration of the application enforced that a

citizen receives notifications in a descendent order according to the number of current respondents – starting from the most popular issue and descending. The number of respondents is displayed to the user (in the top left corner of an issue) (Fig. 3(b)).

The fourth experiment was designed to test the effect of the combined preference matching and a peripheral cue in citizen participation. According to ELM sometimes a mixed route of persuasion is followed and H9–H11 aim to test this combination. To test these hypotheses we designed experiment 4 to create triggers for both routes of persuasion at the same time. In particular preference matching triggers the central route of persuasion while authority cues (trackable notification) triggers the peripheral route of persuasion. In this study, we test the impact of the combination of preference matching and authority for the compactness of the experiments but the similar impacts are expected from use of other peripheral cues (context matching and social proof). The mobile application configuration enforced that citizens get notifications that correspond to their preferences (filters). The citizen is not allowed to track the progress of some policy issues but for the others s/he can track their progress. The user knows if he can track the issue by a stamp placed in the top left corner of each issue (Fig. 3 (c)).

The measurement of variables was conducted as follows. **Attention** is a binary variable {0,1} with the following two dimensions: attention (control_issue) and attention (Random_issue). Control_issue is preference_matching, location_matching, most_popular, or authority_matching issue in experiment 1, 2, 3, and 4 respectively. Random issue is the issue that does not match any of those four in the notification list in each experiment. Attention is measured once for each notification set. In experiment 1 every time a user receives notifications, opens the notification list and selects to open one of the enlisted policy issues, if the first one that the user selects is the preference-matching then attention (Preference-matching) = 1 and attention (random) = 0. Otherwise, attention (Preference matching) = 0 and attention (random) = 1. The same goes for experiment 2, 3, and 4 and the attention for control issues get 1 if it is selected by users before random issues.

Elaboration is calculated in milliseconds and has two dimensions: elaboration (control_issue) and elaboration (random). Elaboration is measured multiple times for each notification set; specifically as many times as the user opens an issue from the notifications list. Within a notification set, when a user opens a policy issue, elaboration is calculated as the time between opening the issue and deciding to participate or ignore the issue. For example, in experiment 1 when the user opens a preference matching issue then elaboration (Preference_matching) is calculated and when the user opens a random issue then elaboration (random) is calculated.

Participation is a binary variable {0,1} with the following two dimensions: participation (control_issue) and participation (random). Participation is measured multiple times for each notification set; specifically as many times as the number of issues present in the notification list. For example, in experiment 2, if the user participates in an issue that is location relevant then participation (Location_matching) = 1 and if the user participates in an issue that is random then participation (Random) = 1. For any issue that the user does not participate, participation gets value = 0.
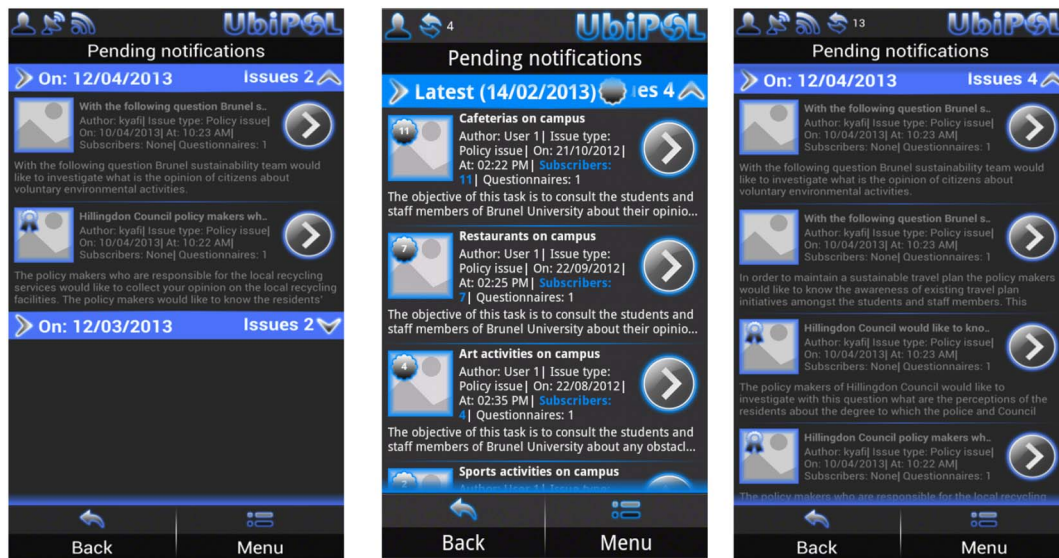
Fig. 3. Screenshots of the mobile app: (a) experiment 1 and 2; (b) experiment 3; (c) experiment 4.

4.3. Results

In the first experiment, we first analysed users' elaboration time and participation. Among 153 notifications, 55.88% of the times the users dedicated more time to the preference-matching issue and 44.12% of the times to the random issue. The mean values of the two random variables are 12 min and 8 min respectively and a paired two-sample *t*-test confirms that the difference is significant leading to supporting H1. To test participation we compared the participation ratio of two groups of policy issues (preference matched and random issues) but there was no significant difference on the participation ratio between two groups rejecting H2.

In experiment 2, we collected two data samples to test H3 (difference on attention); the scores of location-matching issue being the first to be opened and the scores of the random issue to be the first to be opened. We collected 207 notification sets among which the users opened first 157 times the location-matching issue and 50 times the random issue. A paired *t*-test confirms the significant difference between the two samples in 99% confidence level therefore we accept H3. To test H4 (difference on elaboration) we collected two data samples: the elaboration time that was devoted to a location-matching issue and to a random issue. We collected 192 notifications sets among which 49% of the times the users dedicated more time to the location-matching issue and 51% of the times to the random issue. The mean values of the two random variables were 2.4 min and 2.9 min respectively and a paired two-sample *t*-test confirms that there is no significant difference between the two groups rejecting H4. To test H5 (difference on participation), we collected 204 notifications sets (hence 408 potential participation actions) but there were less than 1% difference on the participation ratio between two groups of the issue therefore accepting H5.

In experiment 3, we tested H6–H8. For H6 (difference on attention) we collected data on the times in which the users opened first the issue with greater number of subscribers (the most popular issue) and the times that another issue was opened first. We have collected 78 notifications sets among which the users 69 times opened first the most popular issue and only 9 times any of the other issues. This leads to accepting H6 with confidence 99%. To test H7, we measured the elaboration time devoted to the most popular issue and the average elaboration time devoted to the other issues. We collected 68 notifications sets among which 63.06% of the times users dedicated more time to the most popular issue and 36.94% of the times dedicated more time to the not popular issue. The mean values of the two random variables were

4.4 min and 2.8 min and a paired two-sample *t*-test confirms accepting H7. To test Participation we collected two samples: the times that the users participated to the most popular issue and the times that participated to any of the other issues. We collected 70 notifications sets (hence 140 potential participation actions). The difference on the participation ratio was less than 2% therefore accepting H8 with 97% confidence level.

In experiment 4, we tested H9–H11. For H9 we collected data on the times in which the users opened first; the trackable and personalised issue, the trackable not personalised issue, the personalised not trackable issue or the not trackable and not personalised issue. We have collected 49 notification sets among which the users 41 times opened first an issue with a persuasion feature (i.e. 25 times the trackable not personalised issue, 15 times the trackable and personalised issue and 1 time the personalised not trackable issue) and only 8 times the other issue. A two-factor without replication ANOVA confirms the significant difference between the four samples and leads in accepting H9 with 99% confidence level. To test Elaboration we have collected 48 notification sets among which 35% of the times the users dedicated more time to the issue that is both personalised and trackable (peripheral and central route), 27% to the trackable not personalised (peripheral route), 25% to the personalised not trackable (central route) and only 13% to the issue without persuasive features. The ANOVA shows that $F = 2.872277$ which is greater than the critical value (2.668793) and that elaboration is significantly different for the four samples with $p = 0.038547$ (which is lower than 0.05) confirming H10 with 96% confidence. For testing Participation we collected 49 notification sets (hence 196 potential participation actions) among which the users made 103 participations (83%) to the issues with persuasive features and only 17% participations to the issues that had no persuasive feature. The ANOVA test shows that $F = 4.735426$ which is significantly greater than the critical value (2.667443) and that participation is significantly different for the four samples with $p = 0.003512$ leading to confirming H11 with confidence 99%. Table 3 summarises the experiment results.

5. Discussion

The findings of this study indicate that policy issues embedded with the mixture of central cue (preference matching) and a peripheral cue (authority) draw more attention, the longer elaboration time, and higher participation than policy issues without those features. On the other hand, policy issues embedded with single cue whether it is central

Table 3
The experiment results.

Hypothesis	Relationship	Results
H1	Policy issues with higher personal relevance enable more elaboration than issues with lower personal relevance.	Supported
H2	The decision to participate in a policy issue is more likely with preference matching that without preference matching.	Rejected
H3	Policy issues with context relevance are more likely to attract attention than issues without context relevance.	Supported
H4	Policy issues with context relevance are more likely to induce elaboration than issues without context relevance.	Rejected
H5	Context relevance has no effect on participation.	Supported
H6	Policy issues with social proof are more likely to attract attention than issues without social proof.	Supported
H7	Policy issues with social proof are more likely to induce elaboration than issues without social proof.	Supported
H8	Social proof has no effect on participation.	Supported
H9	Policy issues with personal relevance and authority cues are more likely to attract attention than issues without persuasion features.	Supported
H10	Policy issues with personal relevance and authority cues are more likely to induce elaboration than issues without persuasion features.	Supported
H11	Policy issues with personal relevance and authority cues are more likely to achieve participation than issues without persuasion features.	Supported

(preference matching) or peripheral (location matching and social proof) showed limitation in drawing more participation though they draw more attention and longer elaboration time.

The recent trend of mobility being as a major part of citizens life, it is becoming more important for policy makers to use the channel for more proactive approach to attract citizen participation to policy making processes. The findings from the experiments indicate that citizens respond to policy issues differently depending on how the issues are presented to them in particular in mobile context. More specifically the implications for academics and policy-makers of this study are discussed hereafter.

5.1. Academic implications

The findings of this study provides following academic implications.

Firstly, the implication to electronic participation literature is that this study shows how a persuasion theory (ELM) can be applied to e-participation settings and enhance the design of e-participation tools in mobile context. E-participation tools aim to broaden and deepen political participation by enabling citizens to connect with one another and with the government (Bonsón, Royo, & Ratkai, 2015; Macintosh, 2007). In this paper we regard as the purpose of e-participation tools to change citizens' behaviour into more active participation to the PMPs and we use ELM as a theoretical device to shape an e-participation persuasion strategy. Hence, our study provides a novel approach on investigating how citizens' attitudes are shaped in the e-participation context (i.e. the participation request, the location of the citizen, the relevance of the policy issue, others' opinions and the tracking capability). This study is one of the first efforts, to the best of our knowledge, which aims to explore the processes of changing the attitude of citizens toward public participation. Despite the provision of many public services in electronic form, governments encounter several barriers to e-government adoption (Al-Sebie & Irani, 2005; Savoldelli, Codagnone, & Misuraca, 2014; Weerakkody & Choudrie, 2005). Governments have devoted significant expenditures in awareness campaigns aiming to persuade citizens to use available e-government services; the UK Connect to Your Council campaign cost £5 m without however significant effect in citizens' adoption of e-government (Cross, 2007). It is becoming more and more evident that it is not sufficient to make citizens aware of the e-government services; citizens need to be motivated to use the e-government services (Vannoy & Palvia, 2010). Existing literature (Kamal, 2006; Singh, Sarkar, Dissanayake, & Pittachayawa, 2008) examines passive motivators like adoption factors for e-government adoption. Little guidance is given in these studies about the designing features that would increase these persuasion factors. Although it is acknowledged that persuading citizens to use e-government services is challenging (Bannister & Connolly, 2014; Davison, Wagner, & Ma, 2005), literature lacks suggestions and guidelines on how e-participation affects citizens' attitudes. In this paper, we contributed to this gap by proposing and evaluating a persuasive strategy for e-participation based on the grounds of a psychological theory for citizen persuasion.

Secondly, this study contributes to ELM literature. Our study enables insight on the strengths and weaknesses of the application of a persuasive theory to public participation context. ELM has allowed us to assess the persuasive capacity of the technological features of an e-participation tool. Furthermore, it allowed us to develop an experimental design and empirically investigate the influence of those technological features on citizens' attitude change toward public participation requests. Our findings confirm that applying a psychological theory has given valuable insights on how e-participation software design can change citizens' attitudes toward more favourable participation to policy issues. On the other hand, our study also reveals the weaknesses of applying ELM in the public policy domain. Specifically, the nature of citizens' political consultation differs from purchase behaviours in two main aspects. First, when a customer commits to a purchase he/she has to provide a financial return while in the e-participation context the citizen only provides his/her time and cognitive effort. Second, in the marketing context the recipient of the persuasion messages receives a direct result of his decision; e.g. a purchased product or service. However, in the public participation context the result of citizens' behaviour can be observed only on the long-term and hence the recipient of the persuasion messages cannot directly observe the outcomes of participation or non-participation to policy issues.

5.2. Policy implications

Firstly, policy makers have repeatedly expressed concerns about the reduced lack of interest by citizens toward government public affairs and policies during the last decades. Striking lack of public affairs knowledge and low levels of civic engagement have been noted especially among young people (Frissen, 2008; Warren, Sulaiman, & Jaafar, 2014). According to ELM in the presence of a persuasion message (a.k.a. in our case an e-participation request) drawing the attention of the recipient, is the first step of the elaboration continuum; attracting attention implies the activation of the information cognitive processing mechanisms (Tam & Ho, 2005). In our context, governments aim at changing citizens' behaviour toward more active participation to public decision making; drawing the attention of citizens to analyse the policy making consultation messages would be the first step of such effort. According to our findings there is strong evidence that policy issues embedded with persuasion features attract recipients' attention; specifically matching users' preferences and location, providing social proof recommendations and allowing tracking information is a key in attracting citizens' attention. Hence our research validates that governments can benefit from the proposed e-participation tool design to defeat citizens' lack of interest by restoring their attention to public affairs. Furthermore, it can be concluded that technological features that attract either the central route of persuasion or the peripheral route are suitable for attracting citizens' attention and hence similar technological features could be applied in other e-participation tools.

Secondly, according to ELM gaining the attention of the audience activates their cognitive mechanisms to process the message and the

level of cognitive resources will depend on the recipient's ability and motivation; in our context increased elaboration of public participation requests would mean increased judgement and awareness of public policies. Taking into consideration that ignorance of political issues is considered as one of the main reasons for citizens not participating in the decision making processes of public policy formulation (Barret & Green, 2001; Bellamy, 2000; Helbig, Gil-García, & Ferro, 2009), convincing citizens to devote more time and effort in judging public policies before deciding to participate or ignore them could be the key in high participation. Our findings indicate that the effective design of e-participation tools with factors that enable the central route of persuasion may succeed in increasing citizens' elaboration; nonetheless the increased elaboration was not statistically supported from our data. However, our results validate that the design of the tools with factors that enable at the same time the central and the peripheral route of persuasion are successful in triggering increased elaboration toward e-participation requests.

Thirdly, while extant studies argue that "*performing stakeholder analysis and design the process to encourage active participation by those with interests at stake* (Bryson, Quick, Slotterback, & Crosby, 2013)" is one of the important design guidelines, the policy makers still lack on more specific guidelines for identifying stakeholders with interests at stake and encouraging their active participation. It should be noted that ELM does not specify that an adequately elaborated message necessarily leads to a favourable outcome; it only indicates that the arguments associated with a message will be scrutinized through a high or low elaboration process based on the persuasion factors (Tam & Ho, 2005). Our findings validate that a design of an e-participation tool that enables the central and the peripheral route of persuasion at the same time is successful in increasing citizens' participation to PMPs. Hence, the results overall demonstrate that policy issues embedded with persuasive features can resolve the identified problem of low citizens' participation to PMPS. Also, the designers of e-participation tools should take into account that they can rely on the correct combination of central and peripheral cues to attract citizens' attention, elaboration and ultimately citizens' participation.

Finally, it is also notable that one of the most frequently referred barriers for implementing public participation includes the lack of resources (Lowndes, Pratchett, & Stoker, 2001). The proposed prototype systems can dramatically reduce the resources required for identifying stakeholders and collecting their opinion through a mobile app which can freely installed to citizens' mobile devices. The context matching through geographical POIs allow the most relevant stakeholders get notification of relevant policy issues reducing enormous time to identify the stakeholders from public authorities. The persuasive features embedded into notification of policy issues were verified to be effective to draw more active participation.

5.3. Limitations

It is needed to note that two out of eleven hypotheses were rejected from this study. H2 was rejected indicating that policy issues with central cue did not attract more participation even though they attracted longer elaboration. As a matter of fact, the participation ratios between two groups were high (92% vs 90%) therefore it was difficult to make statistically significant differences. This may be due to the nature of the volunteers who are more active in participating to the experiments therefore have higher tendency to participate to policy issues than citizens who did not participate to the experiments. Also, H4 was rejected meaning policy issues with context relevance cues did not attract more elaboration time than other issues. This may be since contextual cue is based on current location of experiment participants and their mobility did not allow enough time to elaborate the policy issues they received. The impact of such mobility on information processing of citizens needs to be further investigated in the future studies.

Also, the application of findings in this study to designing public

participation process needs to be cautious as nudging citizens can be misused. For example, only selected policy issues can be notified to citizens with central and peripheral cues and therefore citizen view could be biased toward those issues. A careful consideration on selecting and distributing policy issues on virtual maps needs to be exercised by policy makers.

Another limitation of this study is that the testing of hypotheses was conducted by voluntary participants therefore the participants might have shown more proactive attitudes toward participating to policy issues than usual during the experiment. In the future, the validation of the model can be conducted by analysing data collected from widely deployed system.

6. Conclusion

This paper applied a persuasion theory to explaining how citizens' attitude and behaviour toward policy issues can be changed through central route and peripheral route of persuasion. Based on ELM, persuasion features in e-participation context were identified and a research model that explains how such features can affect citizens' information processing stages including attention, elaboration and participation. A prototype mobile participation tool that embeds the persuasion features was developed and used to test the research model via experiments in Turkey and the UK. The experiment results partially verify the research model with two out of 11 hypotheses rejected. Overall, policy issues with central and peripheral cues drew more attention and elaboration from citizens than issues without such cues. On the other hand, single cue (either central or peripheral) did not lead to more participation. The mix of central and peripheral cues attracted more attention, elaboration and participation.

This study contributes to e-participation literature by providing theoretical advances in understanding how citizen's attitude and behaviour toward public participation is affected and shaped in response to persuasion features of policy issues. Also, policy makers can use central and peripheral cues in presenting policy issues to citizens in e-participation and mobile participation contexts.

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