



## Understanding the stakeholders' intention to use economic decision-support tools: A cross-sectional study with the tobacco return on investment tool

Kei Long Cheung<sup>a,\*</sup>, Silvia M.A.A. Evers<sup>b</sup>, Mickaël Hiligsmann<sup>a</sup>, Zoltán Vokó<sup>c,d</sup>, Subhash Pokhrel<sup>e</sup>, Teresa Jones<sup>e</sup>, Celia Muñoz<sup>f</sup>, Silke B. Wolfenstetter<sup>g</sup>, Judit Józwiak-Hagymásy<sup>d</sup>, Hein de Vries<sup>h</sup>

<sup>a</sup> Caphri school of Public Health and Primary Care, Health Services Research, Maastricht University, Duboisdomein 30, GT Maastricht, 6229, The Netherlands

<sup>b</sup> Caphri school of Public Health and Primary Care, Health Services Research, Maastricht University, Trimbos Institute, Netherlands Institute of Mental Health and Addiction, Duboisdomein 30, GT Maastricht, 6229, The Netherlands

<sup>c</sup> Department of Health Policy & Health Economics, Faculty of Social Sciences, Eötvös Loránd University, Pázmány Péter sétány 1/a, Budapest, 1117, Hungary

<sup>d</sup> Syreon Research Institute, Thököly út 119, Budapest, 1146, Hungary

<sup>e</sup> Health Economics Research Group, Brunel University London, UB8 3PH, Uxbridge, United Kingdom

<sup>f</sup> Centre for Research in Health and Economics (CRES), University Pompeu Fabra, Ramon Trias Fargas 25-27, Barcelona, 08005, Spain

<sup>g</sup> Institute of Health Economics and Health Care Management Helmholtz Zentrum München–German Research Center for Environmental Health (GmbH), Member of the German Center for Lung Research (DZL), Ingolstädter Landstr. 1, Neuherberg, 85764, Germany

<sup>h</sup> Caphri school of Public Health and Primary Care Health Promotion, Maastricht University, POB 616 6200, MD Maastricht, The Netherlands

### ARTICLE INFO

#### Article history:

Received 29 July 2015

Received in revised form 21 October 2015

Accepted 17 November 2015

#### Keywords:

Health policy

Decision-support tool

Economic evaluations

Uptake

Tobacco control

### ABSTRACT

**Background:** Despite an increased number of economic evaluations of tobacco control interventions, the uptake by stakeholders continues to be limited. Understanding the underlying mechanism in adopting such economic decision-support tools by stakeholders is therefore important. By applying the I-Change Model, this study aims to identify which factors determine potential uptake of an economic decision-support tool, i.e., the Return on Investment tool.

**Methods:** Stakeholders (decision-makers, purchasers of services/pharma products, professionals/service providers, evidence generators and advocates of health promotion) were interviewed in five countries, using an I-Change based questionnaire. MANOVA's were conducted to assess differences between intenders and non-intenders regarding beliefs. A multiple regression analysis was conducted to identify the main explanatory variables of intention to use an economic decision-support tool.

**Findings:** Ninety-three stakeholders participated. Significant differences in beliefs were found between non-intenders and intenders: risk perception, attitude, social support, and self-efficacy towards using the tool. Regression showed that demographics, pre-motivational, and motivational factors explained 69% of the variation in intention.

**Discussion:** This study is the first to provide a theoretical framework to understand differences in beliefs between stakeholders who do or do not intend to use economic decision-support tools, and empirically corroborating the framework. This contributes to our understanding of the facilitators and barriers to the uptake of these studies.

© 2015 The Authors. Published by Elsevier Ireland Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

\* Corresponding author. Tel.: +31 43 38 82294; fax: +31 43 38 84162.  
E-mail address: [kl.cheung@maastrichtuniversity.nl](mailto:kl.cheung@maastrichtuniversity.nl) (K.L. Cheung).

## 1. Introduction

Tobacco smoking is a worldwide health and economic problem. In Europe estimated costs of smoking tobacco are just above 1% of the EU Gross Domestic Product in 2000 [1]. Tobacco continues to adversely influence global health, accounting for 6.9% of life years lost, and 5.5% of disability-adjusted life-years in 2010 [2,3]. The WHO Framework Convention on Tobacco Control [4] has been ratified by EU member states [5], suggesting that more effort needs to be directed towards tackling tobacco smoking in the European Community at all levels, including public health research [6]. Due to limited resources available for tobacco control, health-care budget holders may have a need to set priorities regarding choices for smoking cessation methods, making it relevant to know whether the societal benefits of these methods are worth the investments that have to be made [7]. The information of cost-effectiveness studies may provide value to the policy process. As many health consequences of tobacco smoking manifest in the long-term, model-based economic evaluations may provide particular valuable information for stakeholders of tobacco control. To give an overview in costs and benefits, several (model-based) economic evaluations of tobacco control methods have already been conducted, including pharmacological and psychological interventions [8–15].

Using an earlier model-based economic evaluation tool [16], Brunel University London, the National Institute of Health and Clinical Excellence [NICE], and regional tobacco control organisations in England developed and tested the Tobacco Return on Investment Tool (hereafter ‘ROI tool’) in 2012. This tool aims to help decision-makers understand the return on investment of their chosen package of tobacco control interventions, which may include a mix of pharmacological and behavioural support components. The tool includes an interface to select the geographical area of interest, resulting in estimates of smoking prevalence in particular countries and regions within a country. Additionally, the impact of smoking on relevant outcomes is modelled taking into account several time horizons. EQUIPT (European-study on the Quantifying Utility of Investment in Protection from Tobacco) has the ambition of developing and disseminating a new version of the ROI tool across Europe [17].

Disseminating economic decision-support tools, such as the ROI tool, may be a challenge. Despite the fact that the amount of cost-effectiveness information has increased over the last decades, the uptake by stakeholders of these economic evaluations to aid their decision-making continues to be limited [11,18,19]. For instance, limited uptake of economic evaluation information was reported in research into policy decision-making in the UK [20], and in a number of European health care systems [21,22]. The availability of cost-effectiveness information does not automatically translate into the adoption of the most cost-effective intervention. For instance, in the Netherlands internet-based computer tailoring for smoking cessation has been shown to be highly cost-effective [14], and yet these interventions have currently not been adopted by national agencies.

Explanations for the limited impact on health policy of economic evidence have been explored [23]. Multiple

barriers to the use of cost-effectiveness information have been identified [11,18,24], including uncertainty in the quality of the studies [19], limited applicability of the economic evaluation studies for the setting of the stakeholders [18], limited economic evaluation knowledge of several stakeholders [18,19], negative attitude towards scientific evidence, lack of tools and skills to interpret scientific evidence, no perception of relevance of research, lack of support for management and front-line staff, and difficulty of applying evidence in the local context [11]. Moreover, it is important to consider timeliness and relevance of research as well as stakeholders’ trust in the source of evidence [11].

Whilst the above studies identify key barriers for stakeholders to use available economic evidence, literature does not provide a framework of the underlying mechanism by which potential facilitators and barriers to the uptake of evidence in decision-making processes come into play. Previous studies identified important factors related to the uptake (or non-uptake) of cost effectiveness information in health policy decisions [23,25]. However, these theories focused less on the motives of stakeholders for uptake or non-uptake, which is the focus of the current study that uses an integration of social cognitive models to understand these motives. This approach also allows us to identify potential strategies to increase levels of motivation of the stakeholders.

The goal of the study is therefore twofold: (1) to explore beliefs about an economic decision-support tool of tobacco control that determine stakeholders’ intention to use such a tool; and (2) to investigate which theoretical concepts determine stakeholders’ intention to adopt such tool.

## 2. Method

### 2.1. Theoretical framework

We applied the I-Change Model (see Fig. 1) [14,26–28] to explain behaviour related to the uptake of any innovation like a health economic decision model, by integrating concepts of various health behaviours, – communication, and promotion models [29–33]. The I-Change model has been used widely in identifying the determinants of health behaviour and behaviour related to the uptake of health promoting interventions [34–38]. The model explains uptake of health behaviour and health behaviour promoting policies in (at least) three phases (i.e., awareness, motivation, and action phase), with each phase having phase specific determinants. The model postulates that the specific determinants are: knowledge, awareness, and risk perceptions for understanding awareness (i.e., knowledge and awareness of such evidence-based tools, and perceived risks of not using such tools), and attitude (perception of advantages and disadvantages towards such a tool), social support (perception whether other people support the use of such a tool), and self-efficacy (the perceived ability to use such tool) for understanding motivation. This leads to the intention to adopt certain behaviour (i.e., uptake of such a tool). As the decision-support tool in this study was not yet available at the time of the study, the action phase (i.e., developing and enactment

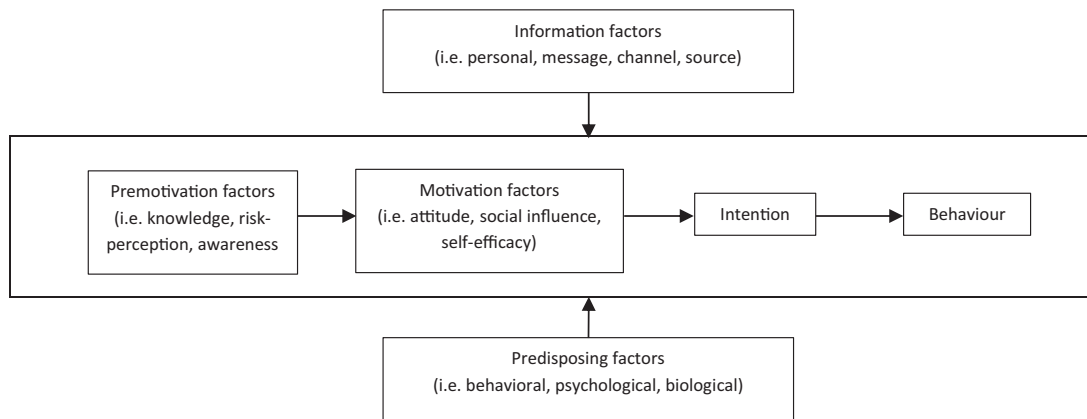


Fig. 1. I-Change model [14,26–28].

of action plans and skills to use such a tool) was not relevant in this study. Intention is considered the most proximal antecedent of behaviour in numerous theories in social and health psychology. Meta-analysis of experimental studies of intention–behaviour relations showed that a medium-to-large change in intention ( $d = 0.66$ ) leads to a small-to-medium change in behaviour ( $d = 0.36$ ) [39]. Collection of relevant data on each construct allowed us to corroborate this model in its specific application to explain stakeholders' intention related to the uptake of an economic decision-support tool.

## 2.2. Defining the 'innovation'

In order to examine important beliefs, and theoretical concepts that determine the stakeholder's intention to adopt an economic decision-support tool, we used the ROI tool as an innovation. The ROI tool is a state-transition cohort model with a cycle length of one year and assumes the Markov property. The UK version of this economic model is accessible online [9]. At this moment, the EQUIPT study is developing a new version of the ROI tool to support decision-making and information gathering for the stakeholders of tobacco control. After selecting the country (or a more specific area) of interest, the ROI tool populates the model with country-specific estimates. The stakeholder may then view and amend the tobacco control measures used in the current package. The tool then allows users to explore the short, medium and long-term impact of different combinations of interventions and strategies (i.e., to explore the impact of different scenarios). A video explaining the upcoming ROI tool was created for this study to explore beliefs (i.e., expectations) (see Supplementary file 1). The video outlines the functionality of the ROI tool with England as example. It illustrates three aspects of the tool: (1) how the ROI tool can highlight the impact of tobacco on the local area, and that the ROI tool can (2) estimate the impact of the current investment in tobacco control, and (3) amend the existing provision of interventions. We used this ROI tool as the 'innovation' to study stakeholders' intention to use it in decision-making.

## 2.3. Data collection

A cross sectional survey with stakeholders (defined below) was conducted in five European countries that are covered by the EQUIPT Project (i.e., Germany, Hungary, the Netherlands, Spain and the UK) [17]. Individual interviews – with average duration of approximately 30 min – were conducted between April and July 2014, using a specifically- designed questionnaire consisting of both open-ended and multiple-choice questions. After assessing beliefs regarding pre-motivational constructs (i.e., knowledge, risk perception, and awareness), the participants viewed the video explaining the upcoming ROI tool. The purpose was to enhance awareness and inform stakeholders about the functions of the ROI tool. The interview continued with the motivational constructs (i.e., attitude, social support, and self-efficacy) and the intention to take up the ROI tool. A checklist was used for preparation and reporting of this study (available from the first author on request), in accordance with the STROBE statement [40].

## 2.4. Participants

Stakeholders were identified through regular meetings with participating EQUIPT partners. There was consensus about five relevant categories of stakeholders of tobacco control for economic decision-support tools: decision-makers, purchasers of services/pharma products, professional service providers, evidence generators, and advocates of health promotion. This description is similar to the stakeholder definition by the Centre for Disease Control and Prevention [41]. Decision-makers with various different roles were included, for example directors of public health services. Representatives of purchasers of services/pharma products were high-level decision-makers at insurance funds. Professional service providers included leading physicians in smoking cessation, physicians/psychologists, and coordinators of local health programs. Evidence generators included HTA professionals involved in the reimbursement procedure, heads of local tobacco control organisations, experts

in public health and health care costing, and researchers in the area of smoking. Advocates of health promotion included were leaders of NGO'S or patient organisations, for example the leader of a patient organisation for cancer patients. Participants were recruited with a convenience sampling strategy. The country teams (Germany, Hungary, Netherlands, Spain, and the UK) created a list of stakeholders in each category based on their previous knowledge. The stakeholders in that list were then approached with a request to participate in this survey. They were also asked to suggest additional names. The final sample was determined by who responded positively at the end and, therefore, it was not possible to predict *a priori* the composition of the final sample.

### 2.5. Questionnaire

A questionnaire was designed specifically for this survey. The intention was to capture the beliefs of stakeholders, regarding the constructs of the I-Change model. We assessed key background variables (i.e., country, gender, and the current professional role) of the respondent (which were filled in by the interviewers in advance) and stakeholders' beliefs about the ROI tool (which was collected during the interview).

Following the concepts of the I-Change Model [26–28], the questionnaire contained 12 questions (with multiple items) intending to measure stakeholders' knowledge, risk perception, awareness, attitude, social influences, self-efficacy, and intention to adopt the ROI tool. We did not collect data to measure the action phase because the ROI tool is not yet available to countries. Furthermore, several questions were asked in order to gain insight on how to best diffuse the ROI tool (see Supplementary file 2 for the phrasing of each item). Several open-ended questions explored more information on each construct. All constructs were measured using several items on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree with a statement). Overall scales were created by calculating the mean of the items for each construct, except for knowledge and awareness (see below).

Awareness factors were assessed through items assessing knowledge and risk perception as well as one overall item of awareness. Knowledge beliefs about HTA were assessed by asking stakeholders to what extent they agreed to five statements regarding economic evaluations. No Cronbach's  $\alpha$  was calculated, as knowledge consists of multiple dimensions, resulting in an index variable. Risk perception was assessed by asking stakeholders to rate to what extent they agreed with seven risk perception items. For the regression analysis, three items were used that created an overall risk perception scale ( $\alpha = 0.69$ ). Overall awareness of economic models was measured with one item asking whether stakeholders were aware of economic models or financial tools regarding tobacco control (yes, no).

Motivational factors were assessed through measurements of attitude, social support, and self-efficacy. Attitude towards adopting the ROI tool was measured by assessing the expected advantages and disadvantages of the ROI tool, with 12 items for advantages and 9 items for disadvantages

[28]. For the regression analysis, items for disadvantages were recoded to create an overall attitude scale ( $\alpha = 0.91$ ). Social support for using the ROI tool was measured using seven items assessing whom from the stakeholders' colleagues/organisations would support them in adopting the tool ( $\alpha = 0.83$ ). Self-efficacy beliefs were assessed using 11 items to assess participants' beliefs regarding the difficulty they may experience when adopting the ROI tool ( $\alpha = 0.76$ ).

Intention to use the ROI tool was measured with four items. The items assessed the extent to which stakeholders agreed with statements that express the intention to adopt the ROI tool ( $\alpha = 0.91$ ).

### 2.6. Piloting

The English version of the questionnaire was administered to a few colleagues in each country ( $n = 2-6$ ) who were not part of the study in a face-to-face meeting to test its validity and practicality. The received feedback was discussed widely in team meetings and a decision was taken to revise the questionnaire to address the emerged issues (e.g., questionnaire being too long, some questions being irrelevant, and the need for a response scale to reflect measurements of the level of agreement with a statement rather than level of importance of an item). The revised version was tested again by country-specific interviewers using the pilot sample. Following a few amendments (mostly related to wording), the English version was translated to country-specific languages by native speakers. Translated versions were pilot-tested again in each country with at least one pilot respondent.

### 2.7. Interviews

Stakeholders were approached by an introductory regular mail or e-mail, sent by country-specific researchers. The first communication provided information about the EQUIPT project and explained that any involvement in the survey would be confidential. An information sheet and sample informed consent were also sent at the same time. Once stakeholders agreed to participate, the country-specific interviewer arranged both the date for the interview and the mode of interview (face-to-face, telephone, or skype). During the interview, stakeholders received the questionnaire and were shown the video explaining the ROI tool. Interviews were audio recorded. In addition, the interviewers provided a much abbreviated form of the qualitative response in the specified place in the questionnaire. Microsoft Excel® was used for data-entry and a double data entry procedure was conducted to minimise entry errors.

### 2.8. Analysis

The Excel data was exported to SPSS Statistics 22 format and the analysis was conducted using SPSS software. To explore beliefs that determine stakeholders' intention to use the ROI tool, differences were identified between stakeholders who do and do not intent to use the ROI tool. Enhancing interpretability, the intention scale was dichotomised into two groups of stakeholders,

**Table 1**

Differences between non-intenders and intenders in beliefs: risk perception; 1 = strongly disagree, 7 = strongly agree.

	Non-intenders	Intenders	<i>p</i> -value	Partial $\eta^2$
	Mean (SD)	Mean (SD)		
<b>Risk perception</b>				
Smoking epidemic not severe in country (10A)	2.42 (1.59)	1.68 (1.08)	0.02*	0.07
Effectiveness of interventions (10B)	3.25 (1.62)	3.77 (1.58)	0.18	0.02
Cost-effective of interventions (10C)	3.63 (1.91)	4.15 (1.94)	0.27	0.02
Mortality of smoking (10D)	6.04 (1.30)	6.69 (0.67)	<0.01*	0.10
Societal burden of smoking (10E)	5.79 (1.35)	6.53 (0.82)	<0.01*	0.10
Unacceptable to use interventions without known efficacy (10F)	5.42 (1.64)	6.05 (1.12)	0.04*	0.05
Unacceptable to use interventions without known cost-efficacy (10G)	5.04 (1.76)	5.23 (1.57)	0.64	0.00

\* *p*-value < 0.05–two-sided.

non-intenders (1.00–3.99), and intenders (4.00–7.00) [42,43]. In this study, a different dichotomisation yielded comparable results on overall constructs. Multivariate analyses of variance [MANOVA] were conducted in order to assess whether there was an overall difference in beliefs concerning factors (i.e., knowledge, risk perception attitude (advantages), attitude (disadvantages), social support and self-efficacy), followed by a post-hoc analysis for the items separately to assess differences in beliefs between the groups. Partial  $\eta^2$ 's were used to estimate the effect sizes. A multiple regression analysis was conducted to identify how well the model fitted the data and to identify the main explanatory variables of the intention to adopt the ROI tool. A regression was used with the overall intention scale to adopt the ROI tool as the dependent variable. The independent variables 'gender', 'stakeholder role', 'country', 'pre-motivational factors' (knowledge, risk perception, and awareness), and 'motivational factors' (attitude, social influences, and self-efficacy) were included in the model to identify which variables were the main explanatory variables of the intention to adopt the ROI tool. The underlying assumptions of the regression models were found to be satisfactory and there were no signs of collinearity between the explanatory variables (tolerance > 0.20 and VIF < 4.00). Despite the Likert scale being an ordinal scale, it is argued that many studies consistently show that parametric statistics are robust with respect to violations of its assumptions [44].

### 3. Results

#### 3.1. Sample characteristics

Of the 167 stakeholders approached in the five countries, 93 respondents agreed to take part (56.9% response rate). About 38% of the respondents were female. Of the 93 respondents, 30.1% were Dutch, 17.2% Hungarian, 18.3% German, 19.4% Spanish, and 15.1% British. Respondents were from different categories of stakeholders: decision-makers (31.2%), purchasers of services/pharma products (7.5%), professional service providers (19.4%), evidence generators (26.9%), and advocates of health promotion (15.1%). Based on their response, most stakeholders (72.65%) could be classified as intenders (to use the ROI tool).

#### 3.2. Differences between non-intenders and intenders in beliefs

Intenders and non-intenders were compared in their beliefs. The results of MANOVA (using Pillai's trace) revealed an overall significant difference between non-intenders and intenders in beliefs regarding risk perception,  $V=0.24$ ;  $F(7, 78)=3.43$ ;  $p=0.00$ ; partial  $\eta^2=0.24$ , attitude,  $V=0.44$ ;  $F(21, 55)=2.08$ ;  $p=0.02$ ; partial  $\eta^2=0.44$ , social support,  $V=0.30$ ;  $F(7, 67)=4.18$ ;  $p=0.00$ ; partial  $\eta^2=0.30$ , and self-efficacy,  $V=0.28$ ;  $F(11, 69)=2.48$ ;  $p=0.01$ ; partial  $\eta^2=0.28$ . No overall differences were found between non-intenders and intenders in beliefs regarding knowledge. Separate univariate ANOVA's further isolated exactly where the significant and interesting differences were to be found.

Pre-motivational beliefs in terms of risk perception differed between non-intenders and intenders (Table 1). Intenders perceived the smoking epidemic as more severe in their country, and perceived greater importance to use smoking cessation interventions due to mortality and costs.

Motivational beliefs in terms of attitude, social support, and self-efficacy differed between intenders and non-intenders (Table 2). Compared to non-intenders, intenders expected more advantages of the ROI tool in terms of its ability to provide financial justification, an easy interface, up-to-date information, relevant outcomes for the organisation, sufficient scientific support for decision-making, added value to current information, support in choosing smoking cessation methods, integration of all relevant information, different time horizons, assessment of cost-effectiveness of new interventions, assessment of potential new interventions, and increased efficiency in service delivery. Intenders expected fewer significant disadvantages of the tool (i.e., not useful, not compatible for the organisation, and no need for daily work) than non-intenders. Intenders also expected more social support, i.e., from their boss, other colleagues, organisations, reimbursement agencies, the ministry of health, and health professionals like medical specialists to use the ROI tool. Moreover, intenders believed more than non-intenders that they were able to use the ROI tool, even when they would have to enter the information on smoking cessation effects of programs themselves.

**Table 2**

Differences between non-intenders and intenders in beliefs: motivational factors; 1 = strongly disagree, 7 = strongly agree.

	Non-intenders	Intenders	<i>p</i> -value	Partial $\eta^2$
	Mean (SD)	Mean (SD)		
<b>Attitude (advantages)</b>				
Tool having more advantages than disadvantages (13A)	5.00 (1.38)	6.33 (0.82)	<0.01 <sup>*</sup>	0.27
I believe that a tool such as the Tobacco ROI tool				
Provides financial justification (13B)	4.96 (1.69)	6.17 (0.82)	<0.01 <sup>*</sup>	0.19
Is easy to use (13C)	4.87 (1.79)	5.67 (1.35)	0.04 <sup>*</sup>	0.06
Provides up-to-date information (13D)	4.35 (1.43)	5.56 (1.36)	<0.01 <sup>*</sup>	0.14
Provides relevant outcomes (13E)	4.96 (1.58)	6.07 (1.03)	<0.01 <sup>*</sup>	0.15
Provides sufficient scientific support (13F)	4.07 (1.66)	6.00 (1.18)	<0.01 <sup>*</sup>	0.17
Provides added value (13G)	5.26 (1.76)	6.28 (0.94 <sup>*</sup> )	<0.01 <sup>*</sup>	0.13
Helps choosing smoking interventions (13H)	4.00 (1.98)	5.74 (1.29)	<0.01 <sup>*</sup>	0.22
Integrates all relevant information available (13I)	4.26 (1.98)	5.37 (1.46)	<0.01 <sup>*</sup>	0.09
Can calculate outcomes over different periods (13J)	5.65 (1.61)	6.33 (0.91)	0.02 <sup>*</sup>	0.07
Can assess potential new interventions (13K)	4.35 (1.99)	5.63 (1.61)	<0.01 <sup>*</sup>	0.11
Helps increase efficiency in service delivery (13L)	4.83 (1.78)	5.76 (1.47)	0.02 <sup>*</sup>	0.07
<b>Attitude (disadvantages)</b>				
I believe that a tool such as the Tobacco ROI tool				
Is too time consuming (13N)	3.09 (1.54)	2.70 (1.25)	0.26	0.02
Is not useful (13O)	3.78 (2.04)	2.43 (1.59)	<0.01 <sup>*</sup>	0.12
Requires too much data input (13P)	3.39 (1.59)	2.87 (1.42)	0.16	0.03
Is too complex to work with (13Q)	2.91 (1.62)	2.46 (1.24)	0.19	0.02
Is not compatible with the way we work (13R)	3.57 (1.93)	2.37 (1.36)	<0.01 <sup>*</sup>	0.11
Provides unreliable outcomes (13S)	3.26 (1.48)	2.72 (1.49)	0.15	0.03
Does not provide insight (13T)	3.30 (1.82)	2.93 (1.71)	0.39	0.01
Results into outcomes that are too broad (13U)	2.96 (1.61)	2.76 (1.54)	0.61	0.00
Is not needed for my daily work (13V)	4.52 (2.00)	2.87 (1.76)	<0.01 <sup>*</sup>	0.15
<b>Social support</b>				
My boss (14A)	4.14 (2.08)	6.00 (1.23)	<0.01 <sup>*</sup>	0.24
My other colleagues (14B)	4.23 (2.02)	5.98 (1.15)	<0.01 <sup>*</sup>	0.24
My organisation (14C)	4.05 (2.06)	5.94 (1.25)	<0.01 <sup>*</sup>	0.25
Reimbursement agencies (14D)	3.77 (1.82)	5.23 (1.42)	<0.01 <sup>*</sup>	0.16
My ministry of health (14E)	4.36 (1.79)	5.40 (1.51)	0.01 <sup>*</sup>	0.08
Health professionals (14F)	4.27 (1.61)	5.32 (1.25)	<0.01 <sup>*</sup>	0.11
I would encounter resistance (14H)	3.32 (2.01)	2.85 (2.07)	0.37	0.01
<b>Self-efficacy</b>				
Able to use the ROI tool (14J)	5.77 (0.97)	6.31 (0.77)	0.01 <sup>*</sup>	0.08
Able to use the ROI tool when I need to enter information myself (14K)	4.95 (1.94)	5.92 (1.01)	<0.01 <sup>*</sup>	0.10
Able to understand the ROI tool when the data is given in a list of figures (14L)	6.18 (0.85)	6.14 (1.07)	0.86	0.00
Able to use the ROI tool if my organisation does not support me (14M)	4.18 (2.26)	4.88 (2.09)	0.19	0.02
Able to use the ROI tool without help from others (14N)	4.86 (1.75)	5.58 (1.45)	0.07	0.04
Comparable others will be able to use the ROI tool (14O)	5.95 (0.79)	5.88 (1.05)	0.77	0.00
Able to interpret the output (14P)	6.14 (0.83)	6.24 (0.73)	0.60	0.00
Able to use the ROI tool with limited knowledge about health economics (14Q)	5.68 (1.25)	5.69 (1.30)	0.97	0.00
Able to use the ROI tool without technical support (14R)	5.23 (1.45)	4.69 (1.76)	0.21	0.02
Able to use the ROI tool without a manual (14S)	3.59 (1.76)	3.69 (1.79)	0.82	0.00
Able to use the ROI tool without a website (14T)	3.68 (1.64)	3.90 (1.88)	0.64	0.00

\* *p*-value < 0.05–two-sided.

### 3.3. Model explaining the intention to adopt economic decision-support tools

A multiple linear regression analysis identified I-Change Model constructs that significantly explain the likelihood of intention to use the ROI tool (see Table 3). The model explained a significant proportion of the variation in intention to use,  $R^2 = 0.69$ ,  $F(15.42) = 6.11$ ,  $p < 0.01$ . Compared to the UK stakeholders, stakeholders from Hungary were more likely to have a higher intention to use the ROI tool. Evidence generators and advocates of health promotion were more likely to have a lower intention to use the ROI tool. Awareness of an economic tool of tobacco control was positively associated with the intention to use the ROI tool. A positive attitude of the ROI tool and the perception of high social support to use the ROI tool were also positively associated with the intention. Self-efficacy

was not identified as a significant explanatory variable for intention.

## 4. Discussion

To the best of our knowledge, this is the first study to provide a theoretical framework to explain what makes stakeholders – including decision-makers – to take up economic decision-support tools in decision-making. This study showed which relevant beliefs and theoretical constructs determine the intention to take up an economic decision-support tool, like the ROI tool. These beliefs and constructs may also be relevant in explaining the intention to conduct the higher-order behaviour, the usage of model-based economic evaluations in decision-making.

The finding that intenders and non-intenders differed in their beliefs in risk perception, attitude, social support,

**Table 3**

Results of multiple linear regression analyses: intention predicted by demographics, pre-motivational variables, and motivational variables.

Measure	B	SE B	$\beta$
(Constant)	-5.16	1.93	-
<b>Demographic factors</b>			
Gender	0.52	0.35	0.15
Role (ref: Decision maker)			
Purchasers	-0.34	0.67	-0.05
Professionals	0.03	0.53	0.01
Evidence generators	-0.93 <sup>*</sup>	0.45	-0.26 <sup>*</sup>
Advocates	-1.24 <sup>*</sup>	0.58	-0.25 <sup>*</sup>
Country (ref: UK)			
Netherlands	0.16	0.55	0.05
Hungary	1.88 <sup>*</sup>	0.84	0.31 <sup>*</sup>
Spain	0.43	0.69	0.08
Germany	0.93	0.77	0.19
<b>Pre-motivational factors</b>			
Knowledge	0.20	0.19	0.11
Risk perception	0.26	0.16	0.19
Awareness	0.76 <sup>*</sup>	0.36	0.20 <sup>*</sup>
<b>Motivational factors</b>			
Attitude	0.94 <sup>*</sup>	0.25	0.51 <sup>*</sup>
Social support	0.41 <sup>*</sup>	0.19	0.30 <sup>*</sup>
Self-efficacy	0.03	0.21	0.02

<sup>\*</sup>  $p$ -value < 0.05–two-sided.

and self-efficacy implies that those beliefs will need to be addressed when developing and disseminating any economic decision-support tool, like the ROI tool. Hence, in order to stimulate dissemination of the ROI tool, the first step is to create awareness about the societal burden of tobacco smoking and the risks of implementing non-evidence based measures (e.g., that the smoking epidemic is severe and that there is a high mortality due to the consequences of smoking). Next, it is important to enhance stakeholders' attitude, of which partial  $\eta^2$  indicates that 44% of the between subject variance is accounted for by attitudinal beliefs. In the communication with stakeholders, it is important to stress the advantages of using an economic decision-support tool like the ROI tool, especially financial justification for decision-making, and to give clear guidance in choosing specific smoking cessation methods. Moreover, it is important to enhance stakeholders' beliefs about the social support they may receive. In order to increase self-efficacy to use the tool and relevant skills, (online) training outlining how to use the ROI tool is also recommended. Furthermore, our data also shows that the ROI tool needs to be transparent (concerning algorithms used), reliable, user-friendly, able to yield different and relevant outcomes over different time horizons, updated regularly, and able to incorporate new interventions.

This study may also add to a body of literature that contributes to a better understanding of the likely facilitators and barriers for stakeholders to use economic decision-support tools, which may be similar to the facilitating and hindering factors regarding the uptake of model-based economic evaluations in general [11,18,19]. The differences in beliefs between intenders and non-intenders provide useful insights to the mechanism by which facilitators and barriers to take up economic evaluations interplay with each other. Previous literature identifies uncertainty in the quality of the studies, limited applicability to the stakeholders' setting, negative attitude towards scientific evidence,

timeliness and relevance of research, and trust in the source of evidence as barriers for the uptake of economic evaluations [11,18,19]. Interestingly, these correspond to some of the attitudinal beliefs that we have measured in the survey, respectively: the ROI tool "provides sufficient scientific support for decision-making", "provides relevant outcomes for my organisation", "provides added value to the information currently used", "can calculate the cost-effectiveness outcomes over different periods such as 2 years, 5 years, 10 years, and lifetime", and "integrates all relevant information available to calculate cost-effectiveness". Other barriers are the lack of support for management and front-line staff, and lack of tools and skills to interpret scientific evidence [11], which we captured in the survey as lack of social support by other colleagues and the perception that they are able to use the ROI tool. Furthermore, the I-Change Model constructs explained a large proportion of the variation in intention to use an economic decision-support tool like the ROI tool, which is comparable with several other studies (e.g., Godin et al. [45]). This provides us with confidence to suggest that facilitators and barriers indicated in previous literature can be framed using the I-Change model. Interesting is that self-efficacy did not have a unique contribution for understanding the intention in the model. One explanation may be that the ROI tool was designed to assist stakeholders to interpret model-based economic evidence, improving their self-efficacy. Self-efficacy beliefs with regard to using the ROI tool may be associated with self-efficacy beliefs to use model-based economic evidence in decision making. This is reflected by the small effect sizes regarding the two significant beliefs of self-efficacy.

As cross-context transferability of economic evidence is a growing subject of investigation currently, this study provides further evidence that approaches to evidence transfer need not concentrate solely on methods to validate an economic model for its robustness (e.g., Welte et al. [46]); how this model will need to be presented to stakeholders in different countries can also play a significant role. If transferred tools and evidence are not likely to be taken up widely in any new context, the entire effort to transfer evidence can be ineffective, regardless of the quality of the evidence in question.

This study is not free from limitations. The findings reflect cross-sectional views and intentions of stakeholders and it is difficult to know to what extent current conclusions would remain valid, if temporal measures were available. A bias in the study could have emerged due to the fact that stakeholders were told in advance a ROI tool would eventually be developed and a prototype was shown by means of a video. This may have led stakeholders to change their original position. The small sample size limited our ability to explore the differences between intenders and non-intenders in each country. Furthermore, as the ROI tool was not yet available, the action phase was not examined in this study. Yet, intentions to use do not always predict actual use in practice. One reason may be the lack of freedom in decision-making at the local level. Additionally, translating intentions successfully also requires making very specific action plans, also referred to as implementation intentions [39]. Forming an implementation intention (plans that specify when, where, and how one will perform

the behaviour; if  $x$ , then behaviour  $y$ ) has shown to improve rates of behavioural enactment, by delegating control of behaviour to specified situational cues [39,47]. It is therefore relevant for future studies to explore methods to enhance translations of plans into actual behaviour.

Lastly, one assumption of our approach is that decision-making concerning the adoption of ROI tools will occur based on sound rational decision-making, whereas this may not always be the case and may also be based on other factors, such as system rigidities, value conflict and competing objectives. Hence, it is important to also consider the wider array of contexts influencing this process [23].

## 5. Conclusions

This is the first study to propose a theoretical framework to explain what makes stakeholders including decision-makers to use economic decision-support tools on tobacco control. The empirical results based on the I-Change model indicate that pre-motivational and motivational factors (i.e., awareness, attitude, and social support) explain a significant proportion of variation in stakeholders' intention to take up an economic decision-support tool. Future communication strategies to promote the use of economic decision-support tools among stakeholders should therefore focus on those factors, for example, by highlighting the advantages of such tools for decision-making.

### On behalf of EQUIPT study group

(Health Economics Research Group, Brunel University London (UK), Caphri School for Public Health and Primary Care, Maastricht University (the Netherlands), Institute of Health Economics and Health Care Management, Helmholtz Zentrum München (Germany), Syreon Research Institute (Hungary), Centre for Research in Health and Economics, Pompeu Fabra University (Spain), National Institute for Health and Care Excellence (UK), LeLan Solutions (UK), European Network for Smoking and Tobacco Prevention (Belgium), National Centre for Smoking Cessation and Training (UK), Agency for Quality and Accreditation in Health Care and Social Welfare (Croatia), NHS Bristol Primary Care Trust (UK), hosting Smokefree South West, Tobacco Free Futures and FRESH North East)

### Conflict of interest

None.

### Ethical clearance

Brunel University Research Ethics Committee (UK) reviewed this research and gave full ethical clearance. Respective authorities in sample countries (Ethik-Kommission, Bayerische Landesärztekammer from Germany, Egészségügyi Tudományos Tanács, Tudományos és Kutatásetikai Bizottság from Hungary, Parc de Salut MAR - Clinical Research Ethics Committee from Spain and Medisch-ethische toetsingscommissie (METC) azM/UM from the Netherlands) also provided clearance.

## Sources of funding

European Community's Seventh Framework Programme Grant no. 602270. The funding had no role in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication.

## Author's contribution

KLC planned and managed the work, analysed and interpreted results and produced the first draft of the manuscript with support from HDV, SE, MH, SP, and ZV. Different versions of the manuscript have been reviewed and conceptualised by all co-authors. Data was collected by KLC (Netherlands), TJ (UK), CM (Spain), SW (Germany), and JJH (Hungary). SP, HDV, SE, MH, and ZV critically reviewed the first draft and provided further inputs. KLC produced the final manuscript and is the corresponding author. All authors have read and approved the final manuscript.

## Acknowledgement

The first results from this study were presented in the EQUIPT Annual Meeting in 2014 (Brussels), the EU HEA conference (Manchester) in 2014, iHEA World Congress in 2014 (Dublin), LolaHESG in 2015 (Maastricht), the conference of the EHPS in 2015 (Cyprus), the SRNT Europe in 2015 (Maastricht), and we thank the participants for their feedback. We are indebted to Adam Lester-George for producing the video used in the interviews. The views expressed and any errors in this article are those of the authors and not of the funding agency or the institutions the authors belong to.

## Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.healthpol.2015.11.004>.

## References

- [1] Consortium A. Tobacco or health in the European Union: Past, present and future: European Commission, Directorate General for Health and Consumer Protection; 2004.
- [2] Lim SS, Vos T, Flaxman AD, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet* 2013;380(9859):2224–60.
- [3] Institute for Health Metrics and Evaluation. Global Burden of Disease (GBD) Visualizations. (<http://www.healthmetricsandevaluation.org/gbd/visualizations/country/>); 2014 [accessed 17.06.14].
- [4] WHO "WHO Framework Convention on Tobacco Control. (<http://www.who.int/fctc/en/>); 2003 [accessed: 17.06.14].
- [5] European Commission. "Public Health: Tobacco Policy." (<http://ec.europa.eu/health/tobacco/policy/index.en.htm>); 2012 [accessed: 17.06.14].
- [6] Joossens L, Raw M. The tobacco control scale: a new scale to measure country activity. *Tobacco Control* 2006;15(3):247–53.
- [7] Park AL, McDaid D, Weiser P, et al. Examining the cost effectiveness of interventions to promote the physical health of people with mental health problems: a systematic review. *BMC Public Health* 2013;13:787 (PubMed PMID: 23988266. Pubmed Central PMCID:3765875).



- [8] Cromwell J, Bartosch WJ, Fiore MC, et al. Cost-effectiveness of the clinical practice recommendations in the AHCPR guideline for smoking cessation. *Journal of the American Medical Association* 1997;278(21):1759–66.
- [9] NICE. The NICE Tobacco Return on Investment Tool, (<http://www.nice.org.uk/usingguidance/implementationtools/returnoninvestment/TobaccoROITool.jsp>); 2012.
- [10] Feenstra TL, Hamberg-van Reenen HH, Hoogenveen RT, et al. Cost-effectiveness of face-to-face smoking cessation interventions: a dynamic modeling study. *Value in Health* 2005;8(3):178–90.
- [11] Garrido MV. Health technology assessment and health policy-making in Europe: current status, challenges and potential. Copenhagen: WHO Regional Office Europe; 2008.
- [12] Lemmens V, Oenema A, Knut IK, et al. Effectiveness of smoking cessation interventions among adults: a systematic review of reviews. *European Journal of Cancer Prevention* 2008;17(6):535–44.
- [13] Mudde AN, de Vries H, Strecher VJ. Cost-effectiveness of smoking cessation modalities: comparing apples with oranges? *Preventive Medicine* 1996;25(6):708–16.
- [14] Smit ES, Evers SM, de Vries H, et al. Cost-effectiveness and cost-utility of Internet-based computer tailoring for smoking cessation. *Journal of Medical Internet Research* 2013;15(3):e57.
- [15] Song F, Raftery J, Aveyard P, et al. Cost-effectiveness of pharmacological interventions for smoking cessation: a literature review and a decision analytic analysis. *Medical Decision Making* 2002;22(5 Suppl):S26–37.
- [16] Trapero-Bertran M, Pokhrel S, Trueman P. An economic model of tobacco control version 1. Tobacco Free Futures, Fresh Smoke Free North East & Smokefree South West. 2011.
- [17] Pokhrel S, Evers SM, Leidl R, et al. EQUIPT: protocol of a comparative effectiveness research study evaluating cross-context transferability of economic evidence on tobacco control. *BMJ open* 2014;4(11):e006945.
- [18] van Velden ME, Severens JL, Novak A. Economic evaluations of healthcare programmes and decision making. *Pharmacoeconomics* 2005;23(11):1075–82.
- [19] Drummond M. Economic evaluation in health care: is it really useful or are we just kidding ourselves. *Australian Economic Review* 2004;37(1):3–11.
- [20] Walley T, Barton S, Cooke J, et al. Economic evaluations of drug therapy: attitudes of primary care prescribing advisers in Great Britain. *Health Policy* 1997;41(1):61–72.
- [21] Hoffmann C, von der Schulenburg J-MG. The influence of economic evaluation studies on decision making.: a European survey. *Health Policy* 2000;52(3):179–92.
- [22] Elsinga E, Rutten FF. Economic evaluation in support of national health policy: the case of The Netherlands. *Social Science & Medicine* 1997;45(4):605–20.
- [23] Williams I, Bryan S. Understanding the limited impact of economic evaluation in health care resource allocation: a conceptual framework. *Health Policy* 2007;80(1):135–43.
- [24] Oliver K, Innvar S, Lorenc T, et al. A systematic review of barriers to and facilitators of the use of evidence by policymakers. *BMC Health Services Research* 2014;14:2 (PubMed PMID: 24383766. PubMed Central PMCID: 3909454).
- [25] Brousselle A, Lessard C. Economic evaluation to inform health care decision-making: promise, pitfalls and a proposal for an alternative path. *Social Science & Medicine* 2011;72(6):832–9.
- [26] de Vries H, Eggers SM, Bolman C. The role of action planning and plan enactment for smoking cessation. *BMC Public Health* 2013;13(1):393.
- [27] De Vries H, Eggers SM, Jinabhai C, Meyer-Weitz A, Sathiparsad R, Taylor M. Adolescents' Beliefs About Forced Sex in KwaZulu-Natal, South Africa. *Archives of Sexual Behavior* 2014;43(6):1087–95.
- [28] de Vries H, Mudde A, Leijs I, et al. The European smoking prevention framework approach (EFSA): an example of integral prevention. *Health Education Research* 2003;18(5):611–26.
- [29] Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 1991;50(2):179–211.
- [30] Bandura A. Self-efficacy conception of anxiety. *Anxiety Research* 1988;1(2):77–98.
- [31] Green LW, Kreuter MW. Health promotion planning: an educational and environmental approach. Mountain View: Mayfield; 1991.
- [32] Locke EA, Latham GP. A theory of goal setting & task performance. Englewood Cliffs: Prentice-Hall Inc.; 1990.
- [33] McGuire WJ. Attitude and attitude change Lindzey, Gardner and Elliot Aronson Handbook of social psychology, 3. Random House: New York; 1985.
- [34] Bolman C, de Vries H, Mesters I. Factors determining cardiac nurses' intentions to continue using a smoking cessation protocol. *Heart & Lung: The Journal of Acute and Critical Care* 2002;31(1):15–24.
- [35] Leitlein L, Smit ES, de Vries H, et al. Factors influencing Dutch practice nurses' intention to adopt a new smoking cessation intervention. *Journal of Advanced Nursing* 2012;68(10):2185–94.
- [36] Segaar D, Bolman C, Willemsen MC, et al. Determinants of adoption of cognitive behavioral interventions in a hospital setting: example of a minimal-contact smoking cessation intervention for cardiology wards. *Patient Education and Counseling* 2006;61(2):262–71.
- [37] Cremers H-P, Mercken L, Oenema A, et al. A web-based computer-tailored smoking prevention programme for primary school children: intervention design and study protocol. *BMC Public Health* 2012;12(1):277.
- [38] Walthouwer MJL, Oenema A, Soetens K, et al. Systematic development of a text-driven and a video-driven web-based computer-tailored obesity prevention intervention. *BMC Public Health* 2013;13(1):978.
- [39] Webb TL, Sheeran P. Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychological Bulletin* 2006;132(2):249.
- [40] Von Elm E, Altman DG, Egger M, et al. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *Preventive Medicine* 2007;45(4):247–51.
- [41] Centre for Disease Control and Prevention. Introduction to program evaluation for public health programs: A self-study guide. In: Services USDoHaH, editor. (<http://www.cdc.gov/eval/guide/CDCEvalManual.pdf>2011.).
- [42] Hoving C, Mudde AN, de Vries H. Intention to implement a smoking cessation intervention in Dutch general practice. *Health Education* 2007;107(3):307–15.
- [43] Smit ES, Vries H, Hoving C. Determinants of practice nurses' intention to implement a new smoking cessation intervention: the importance of attitude and innovation characteristics. *Journal of Advanced Nursing* 2013;69(12):2665–74.
- [44] Norman G. Likert scales, levels of measurement and the "laws" of statistics. *Advances in Health Sciences Education* 2010;15(5):625–32.
- [45] Godin G, Kok G. The theory of planned behavior: a review of its applications to health-related behaviors. *American Journal of Health Promotion* 1996;11(2):87–98.
- [46] Welte R, Feenstra T, Jager H, et al. A decision chart for assessing and improving the transferability of economic evaluation results between countries. *Pharmacoeconomics* 2004;22(13):857–76.
- [47] Sheeran P, Webb TL, Gollwitzer PM. The interplay between goal intentions and implementation intentions. *Personality and Social Psychology Bulletin* 2005;31(1):87–98.