TECHNOLOGY USE OF SOCIAL MEDIA WITHIN CUSTOMER RELATIONSHIP MANAGEMENT: AN ORGANIZATIONAL PERSPECTIVE

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Abstract

This paper presents a formative measurement model for Social CRM technology use from an organizational perspective. The current literature measures the usage of Social Media technologies (e.g., Facebook) and single Social CRM features (e.g., information generation) with reflective indicators, but does not provide a structured approach, which would generate deeper insights into this research field (i.e., formative indicators). To address this gap, the article develops and evaluates formative indicators and corresponding constructs of Social CRM technology use, following the procedure of Moore and Benbasat (1991). To evaluate the impact of single indicators on their corresponding constructs, data is analyzed through confirmatory factor analysis with a survey sample of 122 marketing, communication and IT decision makers. The results show that four constructs measure the use of Social CRM technology (Processing, Communication, IS Integration, and Management), which constitutes the formative measurement model. The construct Processing highlights a second-order construct, including Monitoring and Capturing, Analysis, and Exploitation as first-order constructs. Generally, the developed formative indicators and corresponding constructs generate deeper insights through a control system within a company, so as to increase the efficiency and effectiveness of their marketing, communication as well as IT efforts.

Keywords: Social CRM technology use, Social CRM technology measures, Social CRM technology measurement.

1 INTRODUCTION

Social media enables a new mode of communication and interaction between companies and their customers, which changes the existing approach to customer relationship management (CRM) (Baird & Parasnis 2013; Kumar & Reinartz 2012). Within CRM, companies have one-directional communication (e.g., e-mail newsletter) and gather information on existing customers. Due to multidirectional communication through Social Media, companies now have additional access to public and private information (e.g., profiles, activities, interests etc.) of consumers (e.g., followers of a company's social media account) as well as their friends (Alt & Reinhold 2012). The integration of Social Media into CRM is a rising phenomenon, leading to a new scientific paradigm (Askool & Nakata 2011) and is referred to Social Customer Relationship Management (Social CRM) (Lehmkuhl & Jung 2013). Social CRM is defined by Greenberg (2010) as "[…] a philosophy and a business strategy, supported by a technology platform, business rules, processes and social characteristics, designed to engage the customer in a collaborative conversation in order to provide mutually beneficial value in a trusted and transparent business environment". Gartner has identified Social CRM as one of the top innovation-triggered themes in the next five to seven years (Alvarez 2013).

The exploitation of customer information is "expected to positively contribute to the performance outcomes" (Trainor 2012) and possibly enhance the company's business success. One viable option for companies to achieve and analyze "the customers content on the companies' Social Media platforms …" (Küpper 2014) is the implementation of tools. Vendors like Lithium, Jive, Salesforce offer various tools (e.g., Hearsay Social, Radian6, ExactTarget) for Social CRM. However, research and practice have revealed problems in implementing Social CRM tools successfully. This is due to the fact that companies striving for constant improvement of their Social CRM initiatives face the challenge of identifying and measuring the use of Social CRM technology constructs (Alvarez 2013; Sarner & Sussin 2012; Küpper et al. 2014).

A literature review in 2014 by Küpper et al. (2014), focuses on the current state of knowledge for Social CRM technology features, and reveals the lack of clearly defined and robust constructs and corresponding formative indicators. Previous works conceptualize individual features of Social CRM technologies (Reinhold & Alt 2013; Woodcock et al. 2011; Alt & Reinhold 2012), evaluate single Social CRM features (e.g., information generation) and measure the usage of Social Media technologies (e.g., Facebook) with reflective indicators (Trainor et al. 2014). Yet, there is a lack of empirical research, because no article measures the use of Social CRM technology from an organizational perspective, i.e. measures the use of tool features (e.g., capture, analysis, exploitation), and develops formative indicators. Concerning the level of attention in current literature, formative indicators (in contrast to reflective indicators) provide detailed insights on specific resources and are "desired as potential leverage points for managerial change" (Mathieson et al. 2001). Given the novelty of the topic, the objective of the present article is to develop and evaluate formative indicators and corresponding constructs for Social CRM technology use, so that a formative measurement model emerges. This first academic evaluation in the context yields new and detailed insights into the technology use of an organization. The corresponding research question (RQ) is as follows:

RQ: What are the formative indicators and corresponding constructs for evaluating a formative measurement model for Social CRM technology use?

To achieve the stated objective, the article follows the process of designing a measurement model, as proposed by Moore and Benbasat (1991). Accordingly, data from a survey sample of 122 marketing, communication and IT decision makers are analyzed through a confirmatory factor analysis, as in Diamantopoulos and Winklhofer (2001), so as to answer the RQ. The results show that four constructs measure the use of Social CRM technology (*Processing*, *Communication*, *IS Integration*, and *Management*). The practical implications entail a control system for the management of a company, aimed at increasing the efficiency and effectiveness of their marketing, communication and IT efforts.

The rigorous methodology enables researchers to adopt and apply the measurement model for their own research, which constitutes a significant contribution.

The remainder of the paper is structured as follows. Section 2 presents the conceptual background and explains the different dimensions of Social CRM technology use. Afterwards, the research design is described. The measurement model with formative indicators is explained in section 4 (results) within six sub-sections (4.1 – 4.6). Section 5 contains the findings from the evaluation and highlights the resulting constructs. Next, a detailed summary of research and practical implications is given. Finally, the paper concludes, covers the limitations, and outlines further research approaches.

2 CONCEPTUAL BACKGROUND

Information technology use and information systems (IS) use are widely and vividly discussed topics in the discipline of IS research. For example, Bhattacherjee (2001) and Bhattacherjee et al. (2008) focus on the construct "information technology continuance intention". Venkatesh et al. (2003) discuss the user acceptance of IT, including the construct "use behavior". All recommended constructs ("use behavior" and "information technology continuance intention") are measured with reflective indicators. Due to the fact that this article contributes the first measurement model for Social CRM technology use, the focus is on formative indicators and corresponding constructs, in order to investigate the specific research topic in detail. The CRM and Social Media literature constitute a validated conceptual background, which additionally need to be considered.

Within the CRM as well as Social Media context, information technology use is a central component, and also measured by a single reflective construct. An abstract of IS, CRM and Social Media literature is presented in Table 1. Only Zablah et al. (2012) develop and evaluate formative indicators and corresponding constructs for CRM technology use, which serve as a theoretical framing for the article. CRM technology is understood as the automation of internal (e.g., among employees like sales-, Marketing people) and external information processing (e.g., communication with consumers through IT such as e-mail, supported by systems for customer analytics). Therefore, CRM technology is defined as "the degree to which firms use supporting information technology to manage customer relationships" (Reinartz et al. 2004). Due to the lack of a Social CRM technology use definition in the literature, the authors adopt a previous definition for CRM within the Social CRM context. Thus, Social CRM technology use is defined as the degree to which Social CRM technology features are being utilized to support organizational work.

References	Level of Analysis		Typ of Construct		Topic of the "Use" Construct			
	Ind.	Org.	Refl.	Form.	IS	CRM	SM	Social CRM
Bhattacherjee (2001)	x		x		x			
Bhattacherjee et al. (2008)	x		x		x			
Venkatesh et al. (2003)	x		x		x			
Jayachandran et al. (2005)		x	x			x		
Chang et al. (2010)		x	x			x		
Zablah et al. (2012)		x		x		x		
Trainor et al. (2014)		x	x				x	
Abdul-Muhmin (2012)		x	x			x		
Rodriguez et al. (2012)		x	x				x	
Sum	4	6	9	1	4	4	2	0
This article		**x**		**x**				**x**
Ind. = Individual; Org. = Organizational; Refl. = Reflective; Form. = Formative; SM = Social Media								

Table 1. Overview of the literature.

According to Zablah et al. (2012), a necessary first step in assessing the degree of a company's Social CRM technology use is to identify corresponding Social CRM technology features. Therefore, a

previous explorative qualitative investigation conceptualizes and validates the current literature and consists of two steps (Wang et al. 2009). First, a literature review, according to vom Brocke et al. (2009), is conducted to identify preliminary Social CRM technology features, based on conceptual arguments. Second, a market study reveals the practitioner perspective through an investigation of current tools from different vendors[1]. The analysis of 26 relevant academic publications reveals 16 Social CRM technology features. The market study (with a total number of 40 investigated vendors) results in (1) the validation of 16 identified Social CRM technology features found in the literature and (2) the identification of two additional features. Thus, a total of 18 Social CRM technology features are identified (Küpper et al. 2014). Table 2 presents the previous findings, illustrating examples of references and the number of hits from the market study.

Additionally, the previous findings are challenged by four semi-structured interviews with practitioners being concerned with Social CRM in stock listed companies. The interviewees were asked to name all implemented Social CRM tools from different vendors, as well as the corresponding features. The number of simultaneously used Social CRM tools from different vendors ranges from one to eight. All implemented features of the tools used by the companies conform to one of the 18 identified Social CRM technology features. Consequently, the previous findings do indeed constitute a scientific necessity and satisfy real practical needs.

Social CRM technology features	Example of references	# of hits
Real time data monitoring	Acker et al. (2010), Reinhold and Alt (2013), Reinhold and Alt (2012)	13
Capturing aggregate data	Olszak and Bartuś (2013), Yawised et al. (2013)	36
Capturing individual data	Woodcock et al. (2011), Trainor (2012), Olszak & Bartuś (2013)	8
Analysis of content (real time)	Reinhold and Alt (2013), Alt and Reinhold (2012), Reinhold and Alt (2012)	12
Analysis of aggregate data	Storey et al. (2010), Yawised et al. (2013), Woodcock et al. (2011)	36
Analysis of individual data	Nadeem (2012), Yawised et al. (2013), Alt and Reinhold (2012)	8
Predictive modelling	Woodcock et al. (2011), Olszak and Bartuś (2013)	2
Intercon. consumer network map	Trainor 2012, Askool and Nakata (2011)	4
Sales activities	Acker et al. (2010), Sarner et al. (2012), Woodcock et al. (2011)	4
Reporting	Olszak and Bartuś (2013)	20
CRM interface	Trainor (2012), Yawised et al. (2013), Askool and Nakata (2011)	9
Information Systems interface	Acker et al. (2010), Trainor et al. (2014), Storey et al. (2010)	11
Com.with a single consumer	Woodcock et al. (2011), Trainor (2012), Bahrami et al. (2012)	19
Com. with a group of consumers	Trainor et al. (2014), Nadeem (2012), Alt and Reinhold (2012)	16
Com. with employees	Yawised et al. (2013), Sarner et al. (2012), Panahi et al. (2013)	11
Community management	Reinhold and Alt (2013), Alt and Reinhold (2012), Reinhold and Alt (2012)	14
User permission management	-	4
Engagement management	-	8

Table 2. Previous findings (Küpper et al. 2014).

3 RESEARCH DESIGN

A formative measurement model is designed in a three-stage approach (I. Item Creation, II. Scale Development and III. Indicator Testing), including six sub-stages, as proposed by Moore and Benbasat

[1] The vendor solutions are listed by conducting a Google search, using the search term: "Social CRM or Social Media and CRM Features or Requirements". If possible, a full demo version is downloaded and analyzed in detail. Otherwise, brochures and websites are intensively studied using the research method to analyze information systems, according to Alavi and Carlson (1992).

(1991), see Figure 1. The first sub-stage "Conceptualization Content Specification" focuses on a literature review, in order to identify context-specific constructs and corresponding sub-dimensions. Second, items (i.e., indicators) are deduced to operationalize the previous constructs. Third, a Q-sorting procedure assesses the "Access Content Validity" with the calculation of an inter-rater reliability index (or related indexes, e.g., Cronbach's Alpha). Within the next two sub-stages ("Pretest and Refinement" and "Field Test"), a questionnaire is developed and tested in order to obtain some initial feedback, for instance on problematic areas (definitions, wording), length of the survey etc. Especially for the unique characteristics of formative indicators and the corresponding constructs, the final sub-stage "Evaluation of Formative Measurement Model and Re-Specification" is based on the process of formative measurements from Cenfetelli and Bassellier (2009). The applied confirmatory factor analysis is designed according to Diamantopoulos and Winklhofer (2001), and focuses on a statistical evaluation of formative indicators and the corresponding constructs.

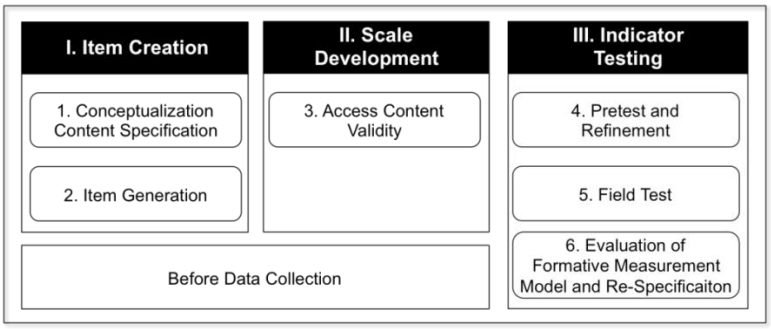

Figure 1. Process of designing a measurement model (Walther et al., 2013).

4 RESULTS

4.1 Conceptualization and Content Specification

Diamantopoulos and Winklhofer (2001) explicitly mentioned the importance of appropriate content specification for the development and evaluation of formative measurement models. Content conceptualization refers to the formative constructs and is the first step in the development process, "because under formative measurement the latent variable is determined by its indicators rather than vice versa, content specification is inextricably linked with indicator specification" (Diamantopoulos & Winklhofer 2001). The second step refers to the assignment of descriptions for the appropriate constructs, as an important aspect of generating and developing formative constructs. A misinterpretation of the description would neglect sub-dimensions of the constructs. This leads to the last issue in the conceptual specification, because neglecting sub-dimensions would bias the statistical evaluation in the ongoing process of designing a measurement model (MacKenzie et al. 2005).

These three steps – (1) identify relevant sub-dimensions (i.e., Social CRM technology features), (2) develop construct (i.e., dimensions) and (3) define corresponding descriptions in a Social CRM context – are conducted as follows. First, the Social CRM technology features have already been identified (see Section 2). Second, they are classified into different dimensions (Bailey 1994; Nickerson et al. 2012). A sorting procedure validates the classified dimensions on a quantitative foundation, operationalized by PhD students in the discipline of IS and Social Media, as well as CRM practitioners[2]. Finally, the dimensions are described within a Social CRM context. Table 3 presents the six developed and defined constructs of Social CRM technology use, the 18 Social CRM technology

[2] For the classification an inter-rater reliability ratio is calculated, according to Perreault and Leigh's formula (1989), to check for external validity.

features as well as a corresponding example. Examples are provided so as to avoid misinterpretations of the Social CRM technology features.

Constructs of Social CRM technology (dimensions)	Descriptions	Social CRM technology features (sub-dimensions)	Examples	ID
Monitoring and Capturing	"Monitoring & Capturing" describes the real time data observation on social media (e.g., with in-memory technologies) and the collection of different social media data (e.g., with batch processing).	Real time data monitoring	Identify content through system keywords algorithm	CA1
		Capturing aggregate data	About consumers, competitors, brand	CA2
		Capturing individual data	About a single consumer, a new product release	CA3
Analysis	"Analysis" describes the assessment, segmentation and/or analysis of the monitored and captured social media data.	Analysis of content (real time)	Recognition of consumers questions	AN1
		Analysis of aggregate data	Customer analysis, brand feedback analysis	AN2
		Analysis of individual data	Personal behavior	AN3
Exploitation	"Exploitation" describes different activities, which are executed especially after the analysis phase.	Predictive modelling	Forecast consumer beh.	EX1
		Interconnected consumer network map	Social Graphs	EX2
		Sales activities	Advertising campaigns	EX3
		Reporting	Summary statements	EX4
IS Integration	"IS Integration" describes transmission and integration functions with other information systems in the company.	CRM interface	Integration of existing CRM systems	IN1
		Information Systems interface	Interface with other IS, integration of other tools	IN2
Communi-cation	"Communication" describes different types of external (B2C) and internal communication.	Communication with a single consumer	Solving a single consumer issue	CO1
		Communication with a group of consumers	Newsletter for an event	CO2
		Communication with employees	Cross-functional communication	CO3
Management	"Management" describes the support and/or coordination of companywide management functions (e.g., moderation).	Community management	Management of social accounts, communities	MA1
		User permission management	Allocation of employees' access system rights	MA2
		Engagement management	Applying engagement features e.g. gamification	MA3

Table 3. Dimensions for Social CRM technology use (Küpper et al. 2014).

4.2 Item Generation

After conceptualizing the constructs, for all identified sub-dimensions, an item (or indicator) is generated. The formative indicators "must cover the entire scope of the latent variable as described under the content specification" (Diamantopoulos & Winklhofer 2001). Due to the fact that this is a new research topic, all indicators are newly created to fit into the Social CRM context. In particular, the construct of *Monitoring and Capturing* contains three formative indicators, *Analysis* three, *Exploitation* four, *IS Integration* two, *Communication* three and *Management* three. For each construct, two additional reflective indicators are generated for the ongoing process. This yields a total of 30 indicators (18 formative and 12 reflective indicators).

4.3 Assessing Content Validity

"Content validity assesses whether the researcher has chosen measures that appropriately capture the full domain of the construct" (Petter et al. 2007). This present study therefore follows Petter et al. (2007), who stated that content validity for reflective indicators does not have strong validatory power, but is essential for using formative indicators and corresponding constructs. Therefore, the Q-sorting procedure, which is "one of the best methods to assess content validity" (Petter et al. 2007), focuses only on the 18 considered formative indicators. In sequentially independent rounds, a master student, two PhD students in the discipline of IS and one practitioner from the corresponding operative departments classify the indicators according to the constructs. Participants are encouraged to carefully read the definitions of the constructs, and then classify the formative indicators within the appropriate construct. After each round, inter-rater reliability, following Perreault and Leigh's formula (1989), raw agreement and a placement ratio are calculated in order to identify problem areas (e.g., in the definitions, wording etc.). The content validation stops when all ratios fall within the generally accepted range of 0.8 – 1.0. After each round, the problems are eradicated, and the indicators are re-written or even totally re-defined to improve understandability. Discrepancies are always reviewed, discussed and clarified with an independent focus group of researchers and one professor. In the first round, the participants reached an average inter-rater reliability of 0.90, and a raw agreement average of 0.88, which are very reliable results, but two out of six placement ratios were below 0.8. The second round was conducted with four new participants in the same manner. The calculated average inter-rater reliability was 0.96, the raw agreement average was calculated at 0.96 and all placement ratios were above the recommended threshold of 0.8. Table 4 provides an overview of the Q-sorting results.

Inter-rater Reliability			Raw Agreement			Placement Ratio		
Judges	Round 1	Round 2	Judges	Round 1	Round 2	Constructs	Round 1	Round 2
A+B	0.87	0.98	A+B	0.88	0.98	Monitoring & Capturing	0.90	1.00
A+C	0.94	0.94	A+C	0.87	0.95			
A+D	0.87	0.98	A+D	0.83	0.98	Analysis	1.00	1.00
B+C	0.94	0.92	B+C	0.92	0.93	Exploitation	0.71	0.83
B+D	0.89	0.96	B+D	0.88	0.97	IS integration	1.00	1.00
C+D	0.89	0.96	C+D	0.87	0.93	Communication	1.00	1.00
Average	**0.90**	**0.96**	**Average**	**0.88**	**0.96**	Management	0.70	0.95

Table 4. Results of the Q-sorting procedure.

4.4 Pre-test, Refinement and Field Test

The pre-test is the initial step in launching the final survey. The questionnaire was distributed online to PhD students and some selected practitioners in the appropriate Social CRM context. After some cuts to the introduction, the practitioners stated that screen-out questions are required. These are questions which ensure that only suitable people complete the questionnaire. Therefore, two initial questions were generated. First, "does your company use Social Media?" and second, "do you work in a related department or have a decision function enabling you to answer questions about the use of Social CRM technologies?" If participants answered one of these questions with "no", they were excluded from the online survey. Despite the subsequently lower number of participants, the screen-out questions ensured a high degree of validity and increase the quality of the data.

Subsequently, a field test, with n=10 completes, was conducted in order to check technical aspects and calculate the time that practitioners need to fill out the questionnaire. No technical complaints or issues with the length of the questionnaire arose, so that the final survey was launched. The indicators were measured using a 7-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (7). As mentioned above, the final questionnaire was only available online and distributed over Social Media (e.g., Xing, LinkedIn, Twitter), focusing on marketing, communication and IT decision makers. After

three months, a total of n=126 responds completed the survey. Due to four incomplete questionnaires (i.e., missing data), data from n=122 participants was captured and serve as the basis for further analysis. Due to the distribution via Social Media channels, no response rate could be calculated. Table 5 presents an overview of the sample characteristics for industry sector, position within the company and number of employees.

Industry	Percent	# of Employees	Percent	Position in Company	Percent
Manufacturing & Utility	31.1%	< 10	16.4%	Executives	31.1%
Others	18.0%	10 – 49	17.2%	Team Manager	18.9%
Information & Communication	14.8%	50 – 499	28.7%	Specialized Manager	17.2%
Finance & Insurance	13.9%	500 – 999	9.8%	Department Manager	15.5%
Public Administration & Logistics	11.5%	1000 – 5000	16.4%	Division Manager	14.8%
Health Industry	10.7%	> 5000	11.5%	Others	2.5%

Table 5. Overview of the sample characteristics.

4.5 Evaluation of Formative Measurement Model

Reflective indicators		AVE	Com. R.	Load.	p-val.
Monitoring & Capturing		0.932	0.965		
CA4**	In general, the company utilizes a tool to monitor and capture social media data.			0.965	< 0.01
CA5**	Overall, the utilization of monitoring and social media data capturing with a tool is high.			0.964	< 0.01
Analysis		0.921	0.960		
AN4**	In general, the company utilizes a tool to assess and analyze social media data.			0.963	< 0.01
AN5**	Overall, the utilization of analysis and assessment of social media data with a tool is high.			0.957	< 0.01
Exploitation		0.901	0.952		
EX5**	In general, the company utilizes the tool for the exploitation of activities after a social media data analysis.			0.953	< 0.01
EX6**	Overall, the utilization of exploited activities after the analysis of social media data is high.			0.954	< 0.01
IS Integration		0.931	0.964		
IN3**	In general, the company utilizes integrated interfaces within a tool with other information systems.			0.965	< 0.01
IN4**	Overall, the utilization of integrated interfaces within a tool with other information systems is high.			0.964	< 0.01
Communication		0.884	0.939		
CO4**	In general, the company utilizes a tool for all forms of communication.			0.940	< 0.01
CO5**	Overall, the utilization of communication within a tool is high.			0.941	< 0.01
Management		0.899	0.947		
MA4**	In general, the company utilizes a tool for supporting and coordinating companywide management functions.			0.948	< 0.01
MA5**	Overall, the utilization of support and coordination of companywide management functions within a tool is high.			0.949	< 0.01
AVE = Average Variance Extracted; Com. R. = Composite Reliability; Load. = Loadings; p-val. = p-value; **p-value < 0.05; *p-value < 0.10					

Table 6. Test statistics for the reflective measurement model.

In order to develop and evaluate formative indicators and the corresponding constructs for Social CRM technology use, the process from Cenfetelli and Bassellier (2009) is applied, which contains a

confirmatory factor analysis, according to Diamantopoulos and Winklhofer (2001), as mentioned above. Using the PLS (partial least square) method to analyze the data, SmartPLS (Ringle et al. 2005) and SPSS 21 are the appropriate tools (Hair et al. 2013). For assessing the quality of a newly introduced formative measurement model, the development process of formatively measured indicators and corresponding constructs follows the five steps, recommended by Cenfetelli and Bassellier (2009), namely (1) multicollinearity testing, (2) the effect of the number of indicators and non-significant weights, (3) co-occurrence of negative and positive indicator weights, (4) absolute versus relative indicator contributions and (5) nomological network effects. To rigorously follow the five-step process, each of the six constructs is modeled as an exogenous latent variable with formative indicators, and as an endogenous latent variable with reflective indicators. According to Söllner et al. (2012), "the reflective measurement serves as a benchmark for assessing the quality of the formative measurement model."

Concerning the benchmark measures, the quality assessment of the reflective measurement model is the initial approach for the ongoing process. The average variance extracted (AVE), composite reliability value and indicator loading with the respective p-values constitute the quality criteria (Chin 1998). Due to their being six separate reflective constructs, no cross-loadings or co-linearity test have to be considered. Table 6 presents an overview of the calculated values. All recommended thresholds from Söllner et al. (2012) are exceeded. The evaluation of the AVEs (0.932, 0.921, 0.901, 0.931, 0.884 and 0.899) are higher than 0.5, composite reliability values are above the threshold of 0.6, and all indicator loadings yield results above 0.7 and are highly significant with a p-value lower than 0.01. To conclude, the reflective measurement model is appropriate as a benchmark for evaluating the formative measurement model.

After the fulfillment of the quality criteria for the reflective measurement model, the focus is on evaluating the formative measurement model, concerning the abovementioned five-step process. Table 7 provides an overview of the test statistics. For the first step (multicollinearity testing), the variance inflation factors (VIFs) are calculated using SPSS 21. All VIFs are below the maximum threshold of 5.0, recommended by Hair et al. (2011) and Walther et al. (2013). The results reveal that multicollinearity is not an issue in this study. Steps two to five are based on calculated values and test statistics using SmartPLS with settings of 120 cases and 1000 samples. The second step (the effect of the number of indicators and non-significant weights) deals with the problem that a large number of indicators cause non-significant weights. The results show that indicator MA2 (management construct) is not significant and indicator EX3 (exploitation construct) has a high p-value, which has to be considered in the following steps. Cenfetelli and Bassellier (2009) also state that this should not be misinterpreted concerning any irrelevance of the indicators. The only interpretation of this issue is that some indicators have a lower influence than others. In order to gain a deeper understanding, this study continues with step three (co-occurrence of negative and positive indicators weights). No indicator has negative weights; therefore this is not an issue in the study. Step four (absolute versus relative indicator contributions) needs to be conducted by reporting the respective loadings. The loadings indicate that an "indicator could have only a small formative impact on the construct (shown by a low weight), but it still could be an important part of the construct (shown by a high loading)" (Söllner et al. 2012). Concerning the issues with MA2 and EX3, which show non-significant or low weights, but very high loadings, no further improvements (dropping indicators or re-specify constructs) have to be performed (Hair et al. 2013; Hair et al. 2011; Cenfetelli & Bassellier 2009). To complete the process, the final step (nomological network effects) can proceed by conducting a redundancy analysis. This compares the formative construct with the reflective constructs, which explains the variance in the reflective measured benchmark (reflective construct) and assesses the validity of the formative construct. Due to the fact of having six constructs, six redundancy analyses have to be considered, resulting in values of 0.893 for *Monitoring and Capturing*, 0.896 for *Analysis*, 0.892 for *Exploitation*, 0.904 for *IS Integration*, 0.882 for *Communication* and 0.859 for *Management*. All results are above the recommended threshold of 0.8 (Chin 1998) and are highly significant with a p-value lower than 0.01 (the values from the redundancy analysis are excluded from Table 7). To conclude, all formative indicators and corresponding constructs are suitable for evaluating Social CRM technology use.

Formative Indicators		VIF	Weights	p-val.	Load.
The company utilizes a tool to …					
Monitoring & Capturing					
CA1**	search different type of content (e.g., posts, tweets, etc.) on social media platforms in real time.	1.846	0.171	0.020	0.766
CA2**	collect and store unstructured social media information about the company, product, etc. on their social media platform(s).	2.385	0.535	< 0.01	0.952
CA3**	collect and store unstructured information about a single artifact (e.g., consumer, a single event, etc.) on social media platform(s).	1.540	0.397	< 0.01	0.906
Analysis					
AN1**	analyze and assess different types of content in real time.	2.577	0.213	0.028	0.884
AN2**	analyze unstructured social media data across various criteria (e.g., consumer segmentation) in order to identify general trends, profitable consumers, etc.	2.299	0.476	< 0.01	0.941
AN3**	analyze unstructured data for a single consumer (e.g., a high potential influencer) across one (or more) social media platforms.	2.300	0.397	< 0.01	0.915
Exploitation					
EX1**	forecast consumer behavior, and trends, etc.	2.477	0.264	0.017	0.872
EX2*	create a network map of consumers and their relationships.	3.207	0.177	0.100	0.878
EX3**	support product purchase, increase sales, cross- and upselling (e.g., social advertising campaigns).	3.519	0.325	0.011	0.918
EX4**	prepare summary statements, evaluate user activity and their loyalty, and/or prepare management reports.	4.341	0.331	0.038	0.953
IS Integration					
IN1**	integrate the social media data with an existing CRM system.	1.000	0.497	< 0.01	0.947
IN2**	integrate other information systems, sales processes and existing technologies, and other tools along the project lifecycle (exclude a CRM system).	1.000	0.553	< 0.01	0.957
Communication					
CO1**	interact personally, 1:1 communication, with a single consumer.	1.937	0.288	< 0.01	0.798
CO2**	communicate with an entire community or multiple consumers.	1.369	0.245	< 0.01	0.775
CO3**	communicate with other employees throughout the organization.	1.402	0.634	< 0.01	0.916
Management					
MA1**	manage their social media accounts, communities and forums, such as moderation, internal process management, etc.	2.377	0.575	< 0.01	0.950
MA2	allocate employee access rights.	2.104	0.062	0.342	0.819
MA3**	apply different engagement features (e.g., gamification).	2.230	0.442	< 0.01	0.913
VIF = Variance Inflation Factor; Load. = Loadings; p-val. = p-value; ** p-value < 0.05; * p-value <= 0.10					

Table 7. Test statistics for the formative measurement model.

4.6 Re-Specification and Final Measurement Model

Despite the robust results for all formative indicators and the corresponding constructs, concerning the practical implementations of Social CRM technologies with the respective 40 investigated vendors, a re-specification, i.e. creating a new second-order construct, is needed. In particular, some of the tools have various features for a special data type (e.g., aggregate data), including the dimensions *Monitoring and Capturing*, *Analysis and Exploitation*. An example: the tools CustomScoop and ExactTarget capture, analyze and exploit aggregate data, i.e. use predictive modeling, network maps and/or reporting features. Buzzient and Bazaarvoice monitor, analyze data in real-time and have a reporting feature. Kana and Demand Media (Pluck) capture and analyze individual data, including a network map and reporting feature. Therefore, a new second-order construct is created, named *Processing* (Zablah et al. 2012), covering the first-order constructs *Monitoring and Capturing*, *Analysis and Exploitation*. *Processing* is a higher level construct and represents the applied process of specific data types, e.g., aggregate data is first captured, then analyzed, followed by the exploitation (the same process can be explained in the use of real-time and individual data). To conduct an

appropriate redundancy analysis, a new benchmark, i.e. reflective indicators, for evaluating the second-order constructs, has to be created. After re-specifying the formative measurement model, SmartPLS is applied, using the same parameter settings as in the previous sub-section. Table 8 presents the respective test statistics.

Reflective indicators		AVE	Com. R.	Load.	p-val.
Processing		0.736	0.965		
PR1**	The company utilizes a tool to capture, analyze and exploit social media data.			0.940	< 0.01
PR2**	Overall, the utilization of a capturing, analytical and exploitation function within a tool is high.			0.962	< 0.01
PR3**	In general, the company uses a tool to capture, analyze and exploit social media data.			0.955	< 0.01
AVE = average variance extracted; Com. R. = Composite Reliability; Load. = Loadings; p-val. = p-value; ** p-value < 0.05; * p-value < 0.10					

Table 8. Test statistics for the re-specified reflective construct Processing.

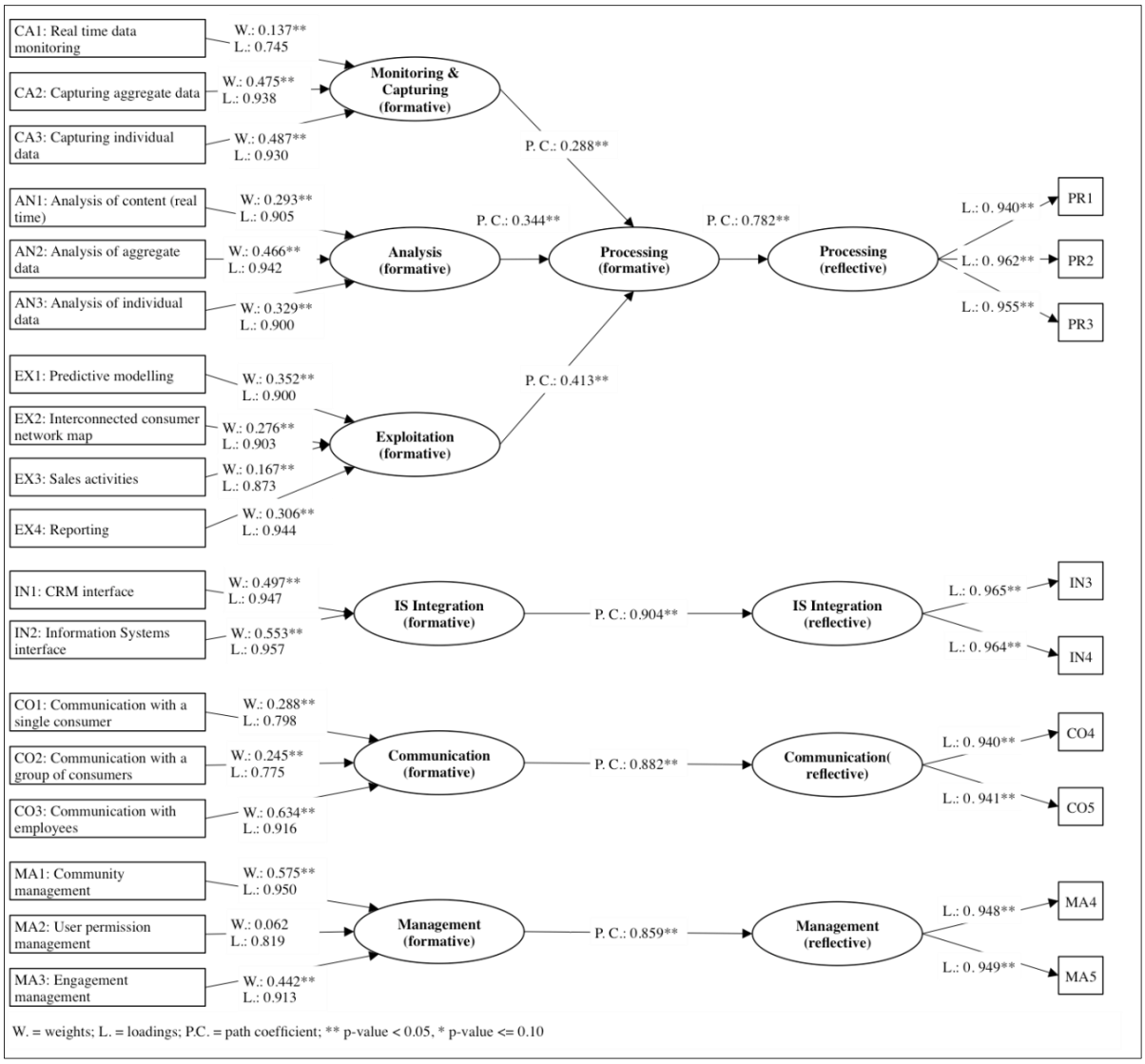

Figure 2. Final formative measurement model for Social CRM technology use.

Figure 2 presents an overview of the newly calculated test statistics for the re-specified constructs, as well as the results for the (old) constructs *Communication, IS Integration, and Management* (as mentioned above in Table 7). In particular, the re-specification reveals significant weights and high loadings for all the remaining formative indicators. The path coefficients between the first-order and second-order constructs are highly significant, and the path coefficient for redundancy analysis is slightly below the threshold of 0.8 between formative and reflective constructs. Regarding the minimum value of 0.64 recommended by Söllner et al. (2012), the path coefficient of the redundancy analysis (0.782) yields reliable results. Consequently, the re-specification of the constructs *Monitoring and Capturing, Analysis, and Exploitation* is clearly suitable for evaluating the final measurement model for Social CRM technology use, concerning a practical perspective.

5 DISCUSSION

The study makes five important contributions to the field by presenting an empirically validated formative measurement model for Social CRM technology use. First, it can be stated that the evaluated formative constructs are well-suited to the Social CRM context, i.e. no indicator is dropped. Second, the *IS Integration* construct is almost equally distributed (same value of indicator weights). Concerning the prevailing attitudes towards data integration from Social Media into CRM systems (IN1), the literature supports the data integration via an IS interface (IN2) as proposed by Chang et al., (2010), measured with reflective indicators. Third, the *Communication* construct presents different results (i.e., unequally distributed indicators). CO3 (communication with employees) has the highest impact (weight: 0.634) on the corresponding construct. This finding is also supported within the CRM and Social Media literature. According to Zablah et al., (2012), communication and "employee coordination across organizational functions" have a high impact on the formative construct named "Use of CRM Interaction Support Tool". Within the Social Media context, Trainor et al. (2014) stated that the communication attribute of employees with other departments has the highest impact on the corresponding construct (reflective). Additionally, interviews with practitioners show that the usage of so-called workflow features are implemented across departments (e.g., marketing, service/support, IT department), in order to communicate with other employees. Fourth, the highest impact on the *Management* construct is operationalized by a community management feature (MA1) with a weight of 0.575. This result is not surprising, given that the central hub (i.e., a centralized platform which is hosted by the company to interact with consumers) is still an online brand community. The conducted interviews reveal that community tools like Lithium are the first investments within the *Management* construct. Fifth, within the second-order construct *Processing*, the first-order construct *Exploitation* reveal the highest impact (path coefficient: 0.413). Despite the relevant dimensions of *Monitoring and Capturing* as well as *Analysis*, companies focus on the added value of a technology and the usage of data. The literature confirms two out of the four indicators. The articles from Chang et al. (2010), Jayachandran et al. (2005) and Zablah et al. (2012) confirm the results, focusing for example on "sales support", "sales activity planning" (EX3). Zablah et al. (2012) address the indicator "forecasting" (EX1) and present a high weight on the corresponding construct named "Use of CRM Prioritization Tools". An additional reason is given by the current technology development. Tools like Hearsay Social, Engagor and the like can monitor social media data in real time (*Monitoring and Capturing* construct), concerning the issues of a suitable sentiment analysis. Therefore, companies use these tools, but control the results manually, which is one possible reason for the lower impacts on the second-order construct *Processing*.

6 THEORETICAL AND PRACTICAL IMPLICATIONS

The highly significant path coefficients indicate a very robust informative value of the evaluated formative indicators and corresponding constructs, which suggests a well-suited measurement model for Social CRM technology use. Generating the formative indicators and corresponding constructs yields some initial empirical insights into the predefined conceptual research topic and confirms the originality of this study.

The study has various implications for the scientific community. Firstly, the resulting measurement model facilitates the use of new indicators and corresponding constructs for measuring Social CRM technology use. Secondly, the rigorous nature of the study enables researchers to adopt and apply the measurement model for their own research. Finally, the various different dimensions generate deeper insights into Social CRM technology use within a company and guides future research activities (e.g., empirical evaluation of relationships between Social CRM technology use and performance).

Three practical implications in particular can be stated. First, the measurement of Social CRM technology use allows the management of a company to operate and control different departments which use the corresponding technologies (e.g., the measurement enables insurance companies to regulate their local agencies, thus facilitating a control system). Second, companies can discover low performing technologies and therefore quit the relevant current licences in order to reduce IT costs. Finally, the operational measurement enables new benchmark systems to compare their Social CRM technology use with competitors (e.g., in a consortium of different industry organizations, companies can identify the leader and learn from best practice).

7 CONCLUSION, LIMITATIONS AND FURTHER RESEARCH

The study develops and evaluates formative indicators and corresponding constructs for Social CRM technology use, in order to obtain a formative measurement model. The research approach is quantitative in nature, and follows the research procedure of Moore and Benbasat (1991) and particularly the process from Cenfetelli and Bassellier (2009). Accordingly, a sample of n=122 responses is investigated and analyzed, surveying marketing, communication and IT decision makers. In order to answer the research question (*RQ: What are the formative indicators and corresponding constructs for evaluating a formative measurement model for Social CRM technology use?*) the study makes three major contributions. First, the formative constructs of *Processing, Communication, IS Integration, and Management* measure different dimensions of Social CRM technology use. Second, the evaluated formative indicators are robust (no indicator is dropped) and fit the corresponding constructs. Finally, the newly created second-order constructs (*Processing*), included the *Monitoring and Capturing, Analysis,* and *Exploitation* constructs, represents the practical perspective on the research results and generates deeper insights into the measurement of Social CRM technology use of an organization.

Three potential limitations constrain the results of this research. Firstly, despite the highly significant values of the final measurement model (i.e., the statistical test values), there may be missing formative indicators, which should be included in the model. Secondly, due to the fact that the study is the first evaluated measurement model for Social CRM technology use, conducting a transferability test is not possible (Cenfetelli & Bassellier 2009). Future research should apply the model within different perspectives of Social CRM technology and test for construct portability and generalizability (Söllner et al. 2012). Finally, the study does not distinguish between the usage of different Social CRM technologies in different departments of a company, which could influence the results.

One promising approach for further research is a longitudinal analysis, which can be tested with statistical methods (e.g., compared test statistics for two dates - ANOVAs), in order to generate deeper insights into the lifetime cycle of technology use. Finally, going beyond the focus of technology use, the impact on Social CRM performance can be tested statistically. An example would be the impact of Social CRM technology use on Social CRM performance (e.g., in the CRM context, see Zablah et al., 2012). Therefore, the rigorously and systematically derived results presented the article form a sound for further research projects.

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