Bring Your Own Device

Does it influence work engagement?

MSc Business Information Management
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1. Preface

This master thesis is written for the Business Information master at the Rotterdam School of Management faculty of the Erasmus University. During the master Business Information Management my interests were driven to new technologies which are enabling us to do things better. Better can be interpreted as more productive, faster, more economical or doing things with higher engagement and satisfaction levels. During the research bazaar with all the subjects we could choose the Bring Your Own Device subject was immediately one of my favorite subjects. After discussing this with Eric van Heck I choose this subject for my master thesis.

I want to thank my first and second reader, Eric van Heck and Michaéla Schippers, for the guidance and comments on my thesis. Giving helpful advice about previous research and doing academic research. Another word of thank for Eric van Heck for the introduction to the Erasmus@Work research program. Not to forget, Jack van der Linde for letting me do this research at Sogeti, a corporate partner of Erasmus@Work. And for being a good sparring partner about the goal and managerial implications of this research.

Last I want to thank the people that are part of the Erasmus@Work group. Erasmus @ Work is a multi-year, multi-client, multi-departmental research program at Rotterdam School of Management, Erasmus University. The five research themes are: 1) Impact of new and sustainable work; 2) Ecological behaviour and mobility; 3) New media communication repertoires; 4) Self-organising; and 5) Transition Processes. My research was part of the first theme. Thank you all for answering my questions and keep me going in the right direction.
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2. Introduction

The new generation of information workers are getting more tech savvy by the day. The young professionals of today own a smartphone, a laptop, a tablet or a pc that can do more than the average office pc. This new generation wants the type of experience they have in their personal life at work. They expect to be able to use any device they want and get their apps and data anywhere and also easily share with their friends. These increasing expectations are making their way into the workplace. The technology tides are changing to an era of diversity: the Post-PC era. Many of those new generation information workers prefer to use their own devices to access the corporate network. This demand for using your own device in the workplace has become more and more popular in the corporate environment nowadays and is called Bring Your Own Device (BYOD). BYOD can be seen as an extension or a part of the movement which is already there for years and is called the New Ways of Working (NWW).

There are three main characteristics for the NWW (Baarne et al., 2010). First there is the timing of work, which has become more flexible. Workdays from 9 till 5 are not necessary anymore to fulfil your job. The second characteristic is the place of work. At the office there a no longer fixed work places, instead there are neutral workplaces suitable for everyone who comes to the office. But the biggest influence of this characteristic is that people no longer have to work at the office, but can also work at home or during travel time. The third characteristic is that the NWW are enabled by new media technologies. New media technologies can be e-mail, smart-phones and videoconference. So far these are the characteristics of NWW. Where does the BYOD strategy fit next to or inside this NWW? The third characteristic is already talking about new media technologies enabling NWW, but can BYOD be seen as a new media technology? For this research BYOD will be characterized as an enabler for NWW. BYOD will make the users’ own device capable of running work related apps and thus use it for work. Virtualization is one of the key enablers for the BYOD strategy. Via virtualization BYOD will be an enabler and supporter for the NWW.

This thesis will start with the problem statement that is the guidance for the whole thesis and will be answered at the conclusion. Next the literature review is done to see what relevant literature there is in the current academic literature. This literature review will lead to the relevant hypothesis, which will be presented in that part. After the literature review the conceptual model is presented, following this model the methodology is discussed. Following the methodology is the empirical analysis which presents the results of the different analysis done with the data that is collected though a survey. At the end of this thesis there will be a conclusion which answers the problem statement.
3. Problem Statement
Organizations that are embracing BYOD are reporting improved productivity and employee retention, enhanced mobility, a more flexible work environment and improved IT value to the business. All of these positive influences can lead to a higher work engagement. When searching for literature to back this up there was not much to find. Because BYOD is a very new strategy and companies are not implementing it on the large scale it is hard to find something in the academic literature for it. This is an excellent opportunity for the master thesis and to come up with a research to prove, or disprove, that BYOD has a positive influence on work engagement. The objective of this research is to gain more insight in the influence of pursuing the BYOD strategy on the work engagement of knowledge workers. The research question will be: Does pursuing the BYOD strategy by an organization influence work engagement of their employees?

4. Literature review

4.1. Bring your own device
Two trends have been major causes of the BYOD phenomenon. The first trend is from a company perspective. Companies want to reduce complexity and cost of managing mobility. The second trend is from the employer perspective. Employees want to use the most popular devices that they use as consumers, instead of the device provided by their employer. BYOD is enabling workers to use their own device for both work and personal purposes. The main characteristic of BYOD is that this strategy is completely device agnostic. It does not matter anymore on which operating system you want to work or on which device you want to work. BYOD will make sure that your work environment is accessible.

There are a few different ways for a company to adopt the BYOD strategy. The level of support is the most interesting characteristic that varies. A company can choose to give support to people’s own devices, but this will be a great challenge for the IT support. Instead of knowing their way around a couple of models, they need to know more about different operating systems, different smartphone models, different laptop models etc. On the other hand a company can give no support to people’s own devices. This will reduce support costs, but on the other hand when a smartphone or laptop is not functioning correctly the owner is not able to do his or hers work. So there are other costs incurring. The other important enabler for a good BYOD strategy is the development of device agnostic applications. Reading and answering emails is very simple to accomplish on your own device, but the hard part are the specific business applications. These applications must be often be developed.

4.2. Work engagement
Work engagement is defined as a positive, fulfilling, work related state that is characterized by vigor, dedication and absorption (Schaufeli & Bakker, 2004). Vigor can be seen as having high levels of energy and resilience while working. Dedication is the high level of involvement in one's work and hereby experiencing a sense of significance and enthusiasm. Absorption is defined by being fully concentrated and happily engrossed in your work. All three combined, you can say that engaged people are energetic and enthusiastic about their work. Employers should try to facilitate a work environment where employees feel energetic and enthusiastic to arise highly engaged employees. One of the ways to accomplish this is to offer employees flexibility in when and where they work, combined with superior communication technologies such as e-mail and smart-phones. (Brummelhuis et al., 2012)
4.3. Effective and efficient communication
The use of new media technology (e.g., smartphone, e-mail) is suggested to facilitate efficient time use and the coordination of work tasks (Hurme, 2005). In comparison with face-to-face meetings, electronic communication is more structured and selective (Kraut, Fish, Root & Chalfonte, 1993). Moreover, communication via e-mail helps employees to formulate their answers better and better understand the message received (Warkentin, Sayeed & Hightower, 1997). When combining these studies you can interpret that those employees who are empowered though the BYOD strategy can communicate more effectively and efficiently by using their own electronic devices. Effective and efficient communication is one of the enablers of keeping the workflow while enhancing pleasure in conducting tasks and demising stress. Thus, this will lead to employees who are focused and motivated, which are two of the characteristics of work engagement.

Hypothesis 1: Use of BYOD will be positively related to work engagement due to the enhanced effective and efficient communication.

4.4. Connectivity
When employees are using smartphones and e-mail they are usually longer and quicker available to co-workers (Derks & Bakker, 2010). Relationships between employees are even more positive in teams using electronically mediated communication in contrast to face-to-face teams. The level of affection is higher and also the employees are more relaxed. (Walther, 1995) Taking into account these studies, it suggests that employees will have higher dedication and vigor on the days on which they use their electronic communication devices. This will enhance their close connection with other employees and satisfies their basic need for belongingness (Baumeister & Leary, 1995).

Hypothesis 2: Use of BYOD will be positively related to work engagement due to the enhanced connectivity.

4.5. Interruptions
Bring your own device will add an extra layer to work/life balance. The influence of more flexibility and autonomy in your job on work/life balance is often researched and has several positive outcomes. (Hill, 2003) However there are also some negative influences. In the case of teleworking Olson and Primps (1984) suggest that the lack of separation between work and family life can lead to workaholism. Kurkland and Bailey (1999) found that virtual office employees had more difficulty to manage their work/life balance in comparison to traditional office workers. In extend to that Katz & Aarhus (2002) found that when combining flexible work arrangements and increasing electronic communication this can lead to disruption in the work/family boundaries.

Hypothesis 3: Use of BYOD will be negatively related to work engagement due to enhanced interruptions.

The influence of interruptions can also be moderated by the use of bring your own device. This is in line with the Diffusion of Innovations theory (Rogers, 1995). BYOD is a rather new strategy that is pursued at the researched company. The Bring Your Own Device strategy can be mapped against the diffusion of innovations theory to see how this new idea/technology/strategy will spread through this culture on a company level. The employees who are using their own devices in the researched company can be characterized as Innovators and thus be less influenced by the interruptions, since the Innovators are less influenced by the negative effects of the new technology/strategy.

Hypotheses 4: The relationship between interruptions and work engagement will be positive for BYOD users and negative for non-BYOD users.
5. Conceptual Model

The conceptual model shows us the influence of Bring your own device on work engagement through effective & efficient communication, connectivity and interruptions. For example, the use of your own device will lead to more effective & efficient communication, which will lead to a higher work engagement. The direct effect of bring your own device on work engagement will also be researched. The last relationship that will be researched is the moderating effect of bring your own device on the relationship between interruptions and work engagement.

6. Methodology

To validate the hypotheses a quasi-experiment is conducted at a firm that implemented the BYOD strategy. The quasi-experiment is chosen because the research group is not randomly selected, but selected on their use of BYOD with more than one own device and two control groups which will be selected for the use of none or one device for BYOD. This automatically leads to a quasi-experiment. This quasi-experiment is conducted through a survey, which was handed out in the proposed company during November last year. The survey is completed by 149 respondents. The complete survey is added in the appendix.

A classic method for researching a counterfactual interference is to add a control group that is not influenced by the researched phenomenon, with the control group selected to be as similar as the research group (D’Agostino & Kwan, 1995).

NR X O1
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NR O2

BYOD will be measured with a research group versus a control group. The research group is using either their own laptop and/or their own tablet with the BYOD strategy and the control group is using laptops provided with the company without any self-own device. Phones are provided by the company, so there are no differences between the teams in this area. Tablets are not provided by the company so everyone
using a tablet is making use of the BYOD possibilities. In the survey the distinction was made between people who are using a tablet and people who do not use a tablet. This will lead to four different groups in the survey.

- Using your own laptop with a tablet. + This group has 19 respondents.
- Using your own laptop without a tablet. + This group has 16 respondents.
- Using a company laptop with a tablet. + This group has 43 respondents.
- Using a company laptop without a tablet. – This group has 71 respondents.

To improve the post-test only design the possibility of multiple control groups will be explored. This must lead to a more strengthened causal inference. (Shadish, Cook, Campbell, 2002)

The influence of BYOD on Work Engagement will be researched with the following three variables; Effective & efficient communication, Connectivity & Interruptions. People who use BYOD are able to communicate more effective & efficient, which will lead to more engagement. People who use BYOD are better connected to their coworkers, which will lead to more engagement. People who use BYOD have more distractions from their work, which will lead to less engagement.

Work engagement will be assessed with the fifteen-item version of the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2006). Example items are: «At my job I feel strong and vigorous», «I am enthusiastic about my job», and «I am immersed in my work». All items are scored on a seven-point rating scale ranging from 0 (‘never’) to 6 (‘always’).

Effective and efficient communication is referred to as the extent to which the communication was necessary for achieving work goals. The four-item scale will include the items «The phone-calls I had today were useful», «The communication I had today with my co-workers was efficient», and «The e-mail conversations I had today were necessary for completing my work tasks». (Brummelhuis et al., 2012)

Connectivity refers to the how easy, and how fast, the employee could be reached by co-workers. Examples of this four-item scale will be, «Today, I answered incoming e-mails within two hours», and «Today, co-workers could easily reach me» (Brummelhuis et al., 2012).

Interruptions are distractions from your main work tasks. The three-item scale will include the items «Today incoming e-mails kept me from doing my job», «Today, I was called at an inconvenient moment several times», and «Today, phone calls disturbed me in doing my work several times» (Brummelhuis et al., 2012)

Several background characteristics will be taken into account as control variables. Gender as a dummy variable (0= male, 1= female) and for educational level a 6-point scale ranging from 1 (primary school) to 6 (university degree) will be used. Employee’s age and years of work experience will be measured as continuous variables.

6.1. Reliability

The reliability of the scales is tested first. Effective & Efficient communication is tested reliable with a Cronbach alpha of 0.734. Connectivity is at first not reliable with a Cronbach alpha of 0.395 but after removing one item the scale is more reliable as the Cronbach alpha is now 0.596. The variable Interruptions is tested with a low reliability of 0.552 and this cannot be improved with the removal of one of the items. The reliability of Work Engagement is 0.939. This is the most reliable scale, which can be explained by the number of items (15) of which this variable consists.
7. Empirical Analysis

7.1. Descriptive statistics

In table 1 the means, standard deviations and correlations of all the model variables are presented. The table shows three interesting significant correlations. The first correlation is between BYOD and connectivity that is negative. The second correlation is between effective & efficient communication and work engagement and is positive. The third correlation is between connectivity and work engagement and is positive.

<table>
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<th>Table 1 Correlations</th>
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<tbody>
<tr>
<td>1. Work Engagement</td>
<td>70.86</td>
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<td>2. Gender</td>
<td>1.11</td>
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<td>-.094</td>
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<td>3. Age</td>
<td>38.92</td>
<td>9.658</td>
<td>.142 *</td>
<td>-.129</td>
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<td>4. Education</td>
<td>5.07</td>
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<td>.016</td>
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<td>5. Work Experience</td>
<td>8.94</td>
<td>7.902</td>
<td>.180 *</td>
<td>-.080</td>
<td>.676 **</td>
<td>.125</td>
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<tr>
<td>6. Effective &amp; Efficient communication</td>
<td>21.34</td>
<td>2.996</td>
<td>.351 **</td>
<td>-.041</td>
<td>.122 *</td>
<td>.138 *</td>
<td>.140 *</td>
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<td>7. Connectivity</td>
<td>26.93</td>
<td>3.359</td>
<td>.194 **</td>
<td>-.182 *</td>
<td>.098</td>
<td>-.073</td>
<td>.182 *</td>
<td>.391 **</td>
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<td></td>
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<tr>
<td>8. Interruptions</td>
<td>9.35</td>
<td>2.556</td>
<td>-.014</td>
<td>-.014</td>
<td>-.057</td>
<td>-.095</td>
<td>-.070</td>
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<td>9. BYOD1234</td>
<td>3.20</td>
<td>1.072</td>
<td>-.084</td>
<td>.031</td>
<td>-.063</td>
<td>.017</td>
<td>-.045</td>
<td>.098</td>
<td>.166 *</td>
<td>-.033</td>
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<td>10. dBYOD</td>
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<td>.491</td>
<td>.101</td>
<td>-.032</td>
<td>.041</td>
<td>-.018</td>
<td>.017</td>
<td>-.106</td>
<td>-.159 *</td>
<td>.000</td>
<td>-.924 **</td>
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<td>11. dBYODtablet</td>
<td>.32</td>
<td>.466</td>
<td>.069</td>
<td>-.016</td>
<td>.118</td>
<td>.016</td>
<td>.139 *</td>
<td>-.072</td>
<td>-.163 *</td>
<td>.024</td>
<td>-.939 **</td>
<td>.838 **</td>
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<tr>
<td>12. dBYODlaptop</td>
<td>.17</td>
<td>.375</td>
<td>.067</td>
<td>-.048</td>
<td>-.114</td>
<td>-.088</td>
<td>-.218 **</td>
<td>-.099</td>
<td>-.071</td>
<td>.033</td>
<td>-.522 **</td>
<td>.555 **</td>
<td>.198 **</td>
<td></td>
</tr>
<tr>
<td>13. BYOD012</td>
<td>.48</td>
<td>.654</td>
<td>.088</td>
<td>-.039</td>
<td>.019</td>
<td>-.039</td>
<td>-.026</td>
<td>-.109</td>
<td>-.157 *</td>
<td>.037</td>
<td>-.970 **</td>
<td>.916 **</td>
<td>.827 **</td>
<td>.198 **</td>
</tr>
</tbody>
</table>

*: Correlation is significant at the 0.05 level (1-tailed).
**: Correlation is significant at the 0.01 level (1-tailed).

Table 2 shows us the multilevel results of the mediated relationship of BYOD on work engagement through the independent variables. The most interesting finding is the significant positive influence of BYOD though effective & efficient communication on work engagement.

<table>
<thead>
<tr>
<th>Table 2 Multilevel results of the mediated relationship of BYOD on work engagement through the independent variables</th>
</tr>
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<tbody>
<tr>
<td>Direct Model</td>
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<td>---------------</td>
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<tr>
<td>(Constant)</td>
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<tr>
<td>dBYOD</td>
</tr>
<tr>
<td>Work Experience</td>
</tr>
<tr>
<td>Effective &amp; Efficient Communication</td>
</tr>
<tr>
<td>Connectivity</td>
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<tr>
<td>Interruptions</td>
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<tr>
<td>dBYODxEfficient</td>
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<tr>
<td>dBYODxConnectivity</td>
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<tr>
<td>dBYODxInterruptions</td>
</tr>
</tbody>
</table>

Note: *** p<.001; ** p<.01; *p<.1. N= 149
7.2. Validating Hypotheses

The relationship between BYOD and the three identified variables; Effective and efficient communication, Connectivity, and Interruptions is tested first. In table 1 we see a significant negative correlation \((t=.159)\) between BYOD and connectivity on a ten percent level. In the second part of the model we see a positive correlation \((t=.351)\) between Effective & efficient communication and Work Engagement on a one percent level. The last significant correlation is between Connectivity and Work engagement, which also is a positive correlation \((t=.194)\) at a one percent level. As a control variable work experience is included in the model because it has a significant correlation \((t=.180)\) at a five percent level with Work Engagement. These correlations will be further investigated with a regression analysis. A multiple regression model with the variables BYOD, Work experience, Effective & efficient communication, and Connectivity influencing Work engagement is explaining work engagement for around fifteen percent. With this in mind the BYOD strategy should not be overlooked when a company is trying to enhance work engagement.

In a second step the main effect of BYOD on work engagement is tested. As can be seen in table 2, there was a marginally significant direct effect of BYOD on work engagement. \((t=1.782, \ p=.077)\) Note that in multiple mediator models, it is not always possible to find a significant direct relationship between the \(x\) and \(y\), as two mediator variables \((m1\) and \(m2\)) can have opposite effects, outweighing a net effect of \(x\) on \(y\) (Preacher & Hayes, 2008). Looking at the conceptual models shows that this is the case for the positive mediators Effective & Efficient communication and Connectivity, interrupted by the negative mediator Interruptions. Therefore, the mediation model is analyzed in figure 2.

7.2.1. Interaction effect

In the third step the interaction effect is analyzed for the significant relation between BYOD and effective & efficient communication. For effective & efficient connectivity we see an interesting effect. Employees who are using their own devices are stronger influenced by effective & efficient communication. In other words effective & efficient communication has a stronger positive influence on BYOD users as opposed to employees using company owned device. The second conclusion we can interpret from this graph is that employees who are using company devices are less negatively influenced by low effective & efficient communication as opposed to employees who are using their own devices. In other words employees who use their own device are less engaged as opposed to employees that have low effective & efficient connectivity with company owned devices. Following this conclusion employees are more demanding on effective & efficient communication when using their own devices.
7.2.2. Scatterplots

The scatterplots are made to visualize the correlations between the variables. First the three different groups are used in the scatterplots, namely; 0: No BYOD, 1: One device with BYOD and 2: Two devices with BYOD. There is little difference in the direction of the correlation lines between the last two groups (Fig.3 & 4). Figure 5 is the scatterplot to show the interesting relationship between Interruptions and work engagement.
Because of the little difference between the last two groups, scatterplots with two groups are made. The first group is 0: No BYOD and the second group consists of 1: The employees who use one or two own devices for work. The hypotheses will thus be tested with only one control group as the two groups do not add any extra depth to the research.

Figure 4

Figure 5
7.2.3. Hypotheses

Hypothesis 1: Use of BYOD will be positively related to work engagement due to the enhanced effective and efficient communication.

Hypothesis 1 is accepted. There is a very strong interaction effect between BYOD and Work engagement through effective and efficient communication. Effective & efficient communication is positively related to work engagement. This is in line with the findings of Brummelhuis (2012). As said before the direct influence of BYOD on work engagement is not significant. This can be explained by the opposite effects of the mediators (Preacher & Hayes, 2008). The effect of BYOD on effective & efficient communications is not significant at first, but after testing for interaction there is a strong positive effect between these variables.

Hypothesis 2: Use of BYOD will be positively related to work engagement due to the enhanced connectivity.

Hypothesis 2 is rejected. There is a slightly significant negative relation between BYOD and connectivity. This is due to the group of people who are using their own laptop without a tablet. The more connected the lower the work engagement. The relation between connectivity and work engagement is significantly positive. This relation could be stronger, only the group with their own laptops without making use of tablets is making this relation less strong. This second relation is in line with the research done by Brummelhuis (2012), but because of the first negative relation the hypothesis is rejected.

Hypothesis 3: Use of BYOD will be negatively related to work engagement due to enhanced interruptions.

Hypothesis is rejected. When we look at the scatterplots in the appendix they tell a very interesting story. The relation between interruptions and work engagement is positive for the groups that are using a BYOD device. The group that is not using any of their own devices has a negative relation between interruptions and engagement. This negative relation was also expected for the BYOD groups, but this was not the case.

This can be explained by the Diffusion of Innovations theory (Rogers, 1995). BYOD is a rather new strategy that is pursued at the researched company. The BYOD device strategy can be mapped against the diffusion of innovations theory to see how this new idea/technology/strategy will spread through this culture on a company level. Rogers defines an innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption”. The Diffusion of Innovation theory categorizes the individuals on a base of their innovation awareness. The five categories are Innovators, Early Adaptors, Early Majority, Late Majority and the Laggards. For this research and to explain the outcome of the third hypothesis the first group is further explained. Within the researched company the employees who are using BYOD can be seen as the Innovators. The Innovators are the first individuals to adopt a new innovation. The BYOD device strategy is just started at the researched company so we can say that the employees who are using it right now are classified as the Innovators. The characteristics of the Innovators described by Rogers for this group are:

- Appreciate innovation for its own sake
- Motivated by the idea of being a change agent in their reference group
- Interest in new ideas leads them out of narrow circles of peers into broader circles of innovators
• Willing to tolerate initial glitches and problems that may accompany any innovation just coming to market and are willing to develop makeshift solutions to such problems.

The first and last points are in line with the findings of this research. Interruptions are one of the negative aspects of the BYOD strategy. When employees have dedicated work devices it is easy to put your personal device away when you are working but when your work device is also your personal device you will receive more personal messages during work and those can be seen as interrupting and distracting you from work. In this research and in line with the diffusion of innovations theory employees who are using their own devices are classified as Innovators and the results show that they have a positive relation to interruptions, which can be explained by their tolerance for initial glitches and problems. They are more positive because they are innovating, and that has a positive influence on their behavior and that can explain their higher work engagement.

**Hypotheses 4: The relationship between interruptions and work engagement will be positive for BYOD users and negative for non-BYOD users.**

Hypothesis 4 is accepted. The scatterplot in figure 5 shows us a slightly negative correlation between interruptions and work engagement for the non-BYOD group and a slightly positive correlation between interruptions and work engagement for the BYOD group. This is in line with the diffusion of innovations theory, which states that the innovators are more willing to tolerate initial glitches and problems that may accompany any innovation.
8. Conclusion

This research is showing the influence of pursuing the BYOD strategy for a knowledge intensive company on the work engagement of the employees. Work engagement is one of the key factors for employers to keep in mind because it is linked to satisfaction and performance in several researches (Bakker & Demerouti, 2008, Salanova, Peiro & Agut, 2005). This research shows that BYOD has a positive influence on work engagement, for the company researched. BYOD is responsible for explaining around fifteen percent of the variation in work engagement, and should be classified as an influencer of work engagement. The influence of the work engagement model is in line with the main article where this researched is based on (Brummelhuis et al., 2012). This researched measured the influence of the new ways of working on work engagement. The statement that BYOD can be seen as an extension of the NWW is proven to more likely with this research. To clarify this, as said before, this research makes the assumption that BYOD is an extension of the NWW because NWW can be characterized as working “at the time you want” “at the location you want”, and BYOD extends that with “on the device you want”.

With this research we can conclude that the influence of BYOD through effective & efficient communication is the biggest positive influencer for work engagement. Effective and efficient communication is one of the enablers of keeping the workflow while enhancing pleasure in conducting tasks and demising stress. Thus, this will lead to employees who are focused and motivated, which are two of the characteristics of work engagement. BYOD through Connectivity has a limited influence on work engagement. This is not in line with the several researches which are suggesting that employees will have higher dedication and vigor on the days on which they use their electronic communication devices. The finding that this will enhance their close connection with other employees and satisfies their basic need for belongingness (Baumeister & Leary, 1995) is up for further research. BYOD through Interruptions is not influencing work engagement in a significant matter. This is in line with the research done by Brummelhuis et al. (2012).
9. Recommendations

9.1. Managerial implications

The managerial implications of this thesis are very interesting. To measure the generalizability and broader implications for management of this research we must look at the BYOD situation at the researched company. To make a clear and understanding overview of the situation a five-point radar is developed in consultation with the researched company. The five main points on this radar are: Technology, Applications, Employment condition, Top Down Support, and Maturity. Companies are able to plot themselves on this radar to see what their position is on the BYOD radar.

9.1.1. Technology

Technology is the first dimension on the radar. This dimension measures the technology readiness of the company to offer BYOD workplaces. Examples are a BYOD Wi-Fi network, e-mail settings to receive e-mails on your own device, and an own device accessible intranet. Without these technologies set-up it is impossible to implement a BYOD strategy.

9.1.2. Applications

The development of applications is essential to the success of your BYOD strategy. Receiving e-mail and be able to see your work calendar on your own device are just the beginning. If you start to implement BYOD in your company it will be necessary to do more with your own device. Therefore companies need to develop their own applications. One of these applications can be an application for the sales department to track their sales. These applications will make it more attractive for employees to switch to the BYOD strategy.

9.1.3. Employment conditions

There are several ways to implement BYOD in your company. One of these dimensions influencing this is whether or not the employee must pay for its own device. This dimension is taken a Wall Street Journal article “How CIOs Can Turn Consumerization of IT Into an Advantage” (Manchini, 2012) and came up in one of the sparring sessions with Jack ter Haar, when this research was discussed. The choice depends on what the goals are for implementing BYOD. The goal can be lowering costs, or to be a more attractive employee.

9.1.4. Top Down Support

Management of change is important to every company. During interviews at the researched company it was clear that the use of tablets were stimulated from top down in the company. The top level started to use tablets for their convenience. From there on the tablets were more widespread in the company. This is a perfect example of top down support with management of change.

9.1.5. Maturity

This point is crucial the whole interpretation of the research results. The researched company is in the early phase of developing the BYOD strategy. So the people who are pursuing the BYOD strategy and are actually using it can be seen as Innovators following the diffusion of innovations theory.
Figure 5 is showing that the biggest parts of improvement are employment conditions and maturity. There are some conditions for employees to be able to use their own device. This is only applicable for mobile phones. For laptops and tablets are no employment conditions as of today. This obviously is linked to employment conditions. Maturity can only improve with time, but should not be overlooked because maturity shows the influence of the diffusion of innovations theory with the different categories of employees. To generalize this research this radar can be used to analyze the BYOD situation in every company. If the radar is similar to the one at the researched company the results of this research are applicable to that company.
10. Further research

There are four main options to focus on with further research. This research should be interpreted as an exploratory study as there was no research done before to measure the influence of BYOD on work engagement. Further research thus includes that it would be recommended to do this research at more companies.

As a next more in-depth further research option it would be very interesting to do the same research when the company that is researched now has improved employment conditions and more employees are using their own devices, meaning the maturity will go to the next level, to see if that changes the influence of BYOD on engagement.

The other suggestion would be to incorporate the different employee categories to specifically look for the differences in work engagement between the categories identified in the diffusion of innovations theory.

The last suggestion would be to focus more on the negative influences of BYOD. This research focused on work engagement, but it would be very interesting to see the influence of BYOD on work exhaustion. The influence of interruptions could be further researched, because these results were very interesting and should be researched further to better understand the influence of interruptions. BYOD was slightly negative related to connectivity so this could also be researched more in-depth.
**References**


12. Appendix

Appendix 1 - Original Scatterplots

BYOD
- Own Laptop + Tablet
- Company Laptop + Own Tablet
- Own Laptop
- Company Laptop
- Own Laptop + Tablet
- Company Laptop + Own Tablet
- Own Laptop
- Company Laptop
- Own Laptop + Tablet, R² Linear = 0.186
- Company Laptop + Own Tablet, R² Linear = 0.222
- Own Laptop, R² Linear = 0.005
- Company Laptop, R² Linear = 0.026

BYOD
- Own Laptop + Tablet
- Company Laptop + Own Tablet
- Own Laptop
- Company Laptop
- Own Laptop + Tablet
- Company Laptop + Own Tablet
- Own Laptop
- Company Laptop
- Own Laptop + Tablet, R² Linear = 0.300
- Company Laptop + Own Tablet, R² Linear = 0.419
- Own Laptop, R² Linear = 0.003
- Company Laptop, R² Linear = 0.030

Effective & Efficient communication
BYOD

- Own Laptop + Tablet
- Company Laptop + Own Tablet
- Own Laptop
- Own Tablet
- Company Laptop
- Own Laptop + Tablet
- Company Laptop + Own Tablet
- Own Laptop
- Company Laptop

Own Laptop + Tablet, $R^2$ Linear = 0.002

Company Laptop + Own Tablet, $R^2$ Linear = 0.029

Own Laptop, $R^2$ Linear = 0.003

Company Laptop, $R^2$ Linear = 0.011
Appendix 2 - Bring Your Own Device Survey

Please identify your situation:
- Tablet and own laptop
- Tablet and company laptop
- Company laptop/No tablet
- Own laptop/No tablet

Q1.1 Gender

☐ Male
☐ Female

Q1.2 What year were you born?

Q1.3 What is the highest level of education you have completed?

☐ Primary School
☐ VMBO
☐ HAVO/VWO
☐ MBO
☐ HBO/Bachelor WO
☐ University Master’s Degree

Q1.4 In what year did you start working for the company?

Q2.1 Effective & Efficient Communication

<table>
<thead>
<tr>
<th>The phone-calls I’m having work related are useful</th>
<th>Never</th>
<th>Almost never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>The communication I’m having with my coworkers are efficient</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>The e-mail conversations I’m having are necessary for completing my work tasks</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Q3.1 Connectivity

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Almost never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>I answer incoming emails within two</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hours</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Co-workers can easily reach me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication via email on my laptop</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>goes flawless</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I am reachable via phone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q4.1 Interruptions

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Almost never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incoming emails are keeping me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>from doing my job</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I’m getting called at inconvenient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>moments</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Emails disturb me in doing my work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Q6.1 The following 9 statements are about how you feel at work. Please read each statement carefully and decide if you ever feel this way about your job. If you have never had this feeling, cross the “0” (zero) in the space after the statement. If you have had this feeling, indicate how often you feel it by crossing the number that best describes how frequently you feel that way.

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>A few times a year or less</th>
<th>Once a month or less</th>
<th>A few times a month</th>
<th>Once a week</th>
<th>A few times a week</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>At my work, I feel bursting with energy</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>At my job, I feel strong and vigorous</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I am enthusiastic about my job</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>My job inspires me</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>When I get up in the morning, I feel like going to work</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I feel happy when I am working intensely</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I am proud of the work that I do</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I am immersed in my work</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I get carried away when I’m working</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>