

# Human Resource Management and Nudging: An Experimental Analysis on Goal Settings in German Companies

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## Abstract

We analyse how human resource managers and directors in German companies can become aware of the application of incentive systems like goalsetting and performance-based pay. In particular, we analyse to what extent a nudge can increase the interest of experts in goalsetting and performance-based pay. The nudge consists of giving information concerning the diffusion rate of goalsetting and performance-based pay, as well as the potential productivity increase. In fact, surveyed HR managers who received the information reported a higher interest in goalsetting and performance-based pay compared to the control group of HR managers without such information. Furthermore, the study showed a consistent answering behaviour between statements about intended activities with the performance management and statements about the actual implementation one year later.

**Keywords:** behavioural economics, human resources, managers, compensation

## 1. Behavioural Economics in Organisations

During the last thirty years, business sciences have expanded their research methods and objects of investigation by insights from other domains like psychology, sociology and neurology. One important insight for managers in companies is that people are much more often guided and influenced by emotions and external factors than had been assumed so far. For example, behavioural economics research shows that fairness and inequality aversion plays an important role for performance evaluation by managers (e.g. Kampkötter & Sliwka, 2016). In general, behavioural economics research findings prove to be well reproducible. Camerer et al. (2016) conducted worldwide replications from particularly well-known behavioural economics studies, with the result that 78 percent of the research findings could be replicated and the rest of the findings just shortly missed the level of significance.

Behavioural economics expands standard economic theory with psychological factors. For example, the suggestion that a human implements all available information in his decision making could not be proven by various studies (e.g. Altmann et al., 2011). In fact, in the face of cognitive limitations, he will concentrate on fewer pieces of particularly important information. Not just marketing experts take advantage of this phenomenon; election researchers also use it to motivate non-voters. For instance, Gerber and Rogers (2009) informed US citizens about the high voter participation during the last election and showed that the voter participation of these citizens was on average three percent higher compared to citizens who did not get such information. This information has this effect because most people are interested in the behaviour and activities of others and seek to imitate it. This is called herding behaviour.

In this study, herding behaviour will be analysed as a causing channel of the behavioural economics treatment with human resource managers and directors, who will be called “HR-managers” in what follows. HR managers are a particularly interesting group to study because they work in the actual environment of companies. Typically, behavioural economics researchers conduct experiments with students in laboratories, which are affiliated with universities. Controlled experimental analyses can have high benefits since they establish a causal connection and show the consequences of a change. For example, the management of incentive systems with result-orientated leadership and bonuses uses behavioural economics insights. In addition to presenting evidence from controlled experiments, behavioural economics research identifies and raises awareness for alternative forms of behaviour, instead of forcing such alternatives by law. This procedure is called nudging and gets applied

by various topics like health or retirement provision, with the aim to improve people's lives (e.g. Thaler & Sunstein, 2008).

## 2. Research Question and Experimental Design

We want to raise HR managers' awareness for goal setting and performance-based pay with the help of two different nudges. Many firms already apply a combination of base salaries and performance-based pay instead of fixed wages. Furthermore, the performance-based pay significantly depend on objective agreements between employees and superiors and the completed evaluation. Next to other motives, this also leads to the attainability of a collective company aim (Hammermann et al., 2016).

We analyse to what extent goal setting and performance-based pay are applied in German companies, and if the perceived attractiveness of such setups can be increased by a nudge. The nudge is a clear and concise piece of information about the diffusion rate of objective agreements and performance-based pay. It is possible to present it with only a little effort and also—according to the hypothesis—increases the interest as well as partly the implementation of goal setting and performance-based pay.

Before the experiment starts, HR managers are randomly assigned to one of three different groups. Then each group receives a different kind of information in an online-questionnaire. Consequently, three groups appear, consisting of one control group and two treatment groups, while every HR manager can be assigned in each of the three groups with the same probability. The aim of this random assignment is to prevent certain company characteristics from being over-represented in any one group (see also chapter 3). This is supposed to guarantee a similar structure of characteristics in each group.

In order to find out if a treatment actually shows an effect, a control group is necessary. The subjects of the control group do not get any additional information in the questionnaire at the beginning of the experiment. Nevertheless they get asked the question, as well as the subjects of the treatment group, about the future purpose to motivate colleagues with goalsetting and performance-based pay. The answer of this question serves as an independent variable in the upcoming analysis.

In treatment comparison (treatment C), as well as in treatment comparison and productivity (treatment CP), we inform HR managers that a majority of companies in the German economy offer goalsetting and performance-based pay. The subjects in treatment CP also receive these information, as well as the information that nine out of ten companies consider these instruments to be practical in order to increase motivation and productivity of their employees (table 1). All of this information stems from two earlier surveys in the years 2011 and 2013 and therefore represent realistic evaluations of companies in Germany (Schmidt, 2012; Hammermann & Stettes, 2014).

Table 1. Treatment information

	Introduction text
Control group	(No additional information.)
Treatment comparison	The importance of goalsetting and performance-based pay increased in the German economy in recent years: About six out of ten companies already use such instruments.
Treatment comparison and productivity	The importance of objective agreements and performance-based pay increased in the German economy in recent years: About six out of ten companies already use such instruments. Furthermore, nine out of ten companies consider these instruments to be practical in order to increase motivation and productivity of their employees.

Subsequently to the treatment-information, the HR managers get asked the following question, which answer serves as a dependent variable in the following statistical evaluation:

Do you have the intention to use (intensified) goalsetting and performance dependent payments in the future, in order to motivate your employees? The four answer opportunities are "Yes, for sure", "Yes, probably", "Yes, perhaps" and "No".

The herding behaviour and the framing effect are the two causal channels whereby the interest of the HR managers regarding goalsetting and performance-based pay should be aroused. Herding behaviour describes the behaviour where one person follows the decision of another person. This behaviour tends to occur in conditions of asymmetric information because the person concludes that some decision(s) of others are optimal. Furthermore, social norms can influence decision making to such an extent that the person adopts the behaviour of the herd. The herding affect is often used in the behavioural finance literature as an explanation of financial

bubbles, wherein investors orient themselves by other investors' decisions, assuming that those others have better information (cp. Lux, 1995; Drehmann et al., 2005). Additionally, managers often use benchmarking to get information about relevant key data from other companies in order to utilize it as a reference for their own performance enhancement. Such managers consciously use information and activities of other companies. Consciously or not, the preferences and behaviour thus can get modified at upcoming decisions.

The information for the HR managers was consciously presented in a positive framing. The framing affect describes the fact that, depending on a positive or a negative framing of the same information, different decisions follow. Famous framing research by Kahneman and Tversky (1981) analyses the following situation with two different frames: "Imagine you are a cardiac patient and can get a difficult operation done. How do you react, if you get either the following statement: 'Out of 100 patients, who've got this operation done, 90 patients are still alive after five years' or the statement: 'Out of 100 patients, who've got this operation done, ten patients died after five years'?" The first statement will convince many patients to agree with the operation, whereas the second statement has a dissuasive effect. Even doctors are more likely to recommend the operation if they are told that 90 out of 100 patients are still alive after five years. Applied on the treatment variation, the positive framing is supposed to lead to a higher interest on the part of the HR managers for goalsetting and performance-based pay.

Consequently, we can derive our hypotheses. Due to the information in treatment comparison and treatment comparison and productivity, a positive influence of an affirmative answer for the question about the future engagement with goalsetting and performance-based pay, in comparison with the control treatment, is expected. Hypothesis 1: Higher rates of agreement in treatment C and in treatment CP compared to the control treatment.

Furthermore, treatment CP contains additional information for a positive enhancement of the two causal channels of framing and herding behaviour. This is the information about the productivity of goalsetting and performance-based pay. It is being tested whether a higher rate of agreement for a prospective engagement with goalsetting and performance-based pay occurs in treatment CP than in treatment C. Hypothesis 2: More approval in treatment CP compared to treatment C.

### 3. Database

The experiment was conducted between May and July 2014 at the Cologne Institute for Economic Research with the IW-labour-panel. The IW-labour-panel has analysed different questions of human-resources management up to three times a year since 2010. The panel surveys HR managers in German companies in all branches who employ at least one employee. To establish the sample for this experiment, the companies surveyed were chosen at random. Their willingness to participate and their e-mail addresses were then requested via telephone. This procedure guarantees a high quality of answers and also ensures that the questions are answered by an HR manager (e.g. a personnel director or an executive director).

The invitation to the online survey took place via e-mail. To increase the response rate, companies which did not answer the questionnaire by a certain date were reminded to do so. During the whole research period an individual contact person was available for the HR manager to answer possible questions. Overall, 1,505 companies participated in the study.

In the panel survey, many different kinds of questions concerning staff were asked. This strategy has the advantage of minimizing bias due to selectivity, wherein HR managers may choose not to respond at all due to the particular kind of the questions being asked. Besides questions about specific HR topics, the IW-labour-panel also collected data about company and employee structures, as well as particular operating figures—for example, headcount, department, sales volume, qualification structure and annual earnings.

In order to analyse the status quo of goalsetting and performance-based pay, the following questions were asked in the first part of the online questionnaire: "How many employees in your company are incentivized by goalsetting and whose pay is dependent in part on performance?" The evaluation of the status quo is important on the assumption that previous engagement with performance management strongly correlates with willingness to engage (in an intensified way) in the future.

The experiment was placed at the end of the online questionnaire. Only single structure questions and organisational closing questions followed. In this way, selectivity effects are, again, minimized. Overall, about 500 companies were randomly sorted into each of the two experimental groups – treatment C and treatment CP – and the control group (see chapter 2). This random assignment guarantees that the companies in each group exhibit, on average, similar structural characteristics. Concerning the previous use of goalsetting and performance-based pay, the companies in all three groups did not significantly differ from each other (the

distribution is shown in Table 2).

Table 2. Previous utilisation of goalsetting and performance dependent payments

How many employees in your company are evaluated by goalsetting and receive their salary at least in part through performance-based pay? Data is given in percentage				
	All	Control group	Treatment C	Treatment CP
<b>Executives</b>				
All	32.6	32.1	32.3	33.5
A part of such employee group	29.6	30.7	27.3	30.7
None	37.8	37.2	40.4	35.8
Total	100.0	100.0	100.0	100.0
<b>Employees without management responsibilities</b>				
All	12.7	11.0	13.0	14.3
A part of such employee group	30.4	31.7	27.6	31.7
None	56.9	57.3	59.4	54.0
Total	100.0	100.0	100.0	100.0

*Note.* No significant difference between the several survey samples based on a Chi<sup>2</sup>-Test. Further statistical analyses shows that there is also no significant difference at the 5-percent level concerning the relevant structural variables like branch, age of the company and innovation activities between the three groups – treatment C, treatment CP and control group.

## 4. Experimental Results

### 4.1 Initial Situation

In more than one third of the surveyed companies (34.5 percent), neither executive managers nor employees without management responsibilities receive goals and performance-based pay (Figure 1). More than a fifth of the surveyed companies use performance-based pay only for their executives. Executive managers often have a stronger influence on the (financial) operating numbers due to their larger scope of action, concerning for example the distribution of resources and customer acquisitions. Almost one-third of the companies surveyed measure and compensate employees without management responsibilities on the basis of established goals and performance. One-eighth of the companies surveyed use goals and a variable-compensation scheme for the entire workforce.



Figure 1. Goalsetting and performance dependent payment - How many employees in your company are evaluated by goalsettings and paid by performance-based pay? Data given in percentage

The following describes findings related to the distribution of goalsetting and performance-based pay based on a further empirical study on the basis of a multinomial logistical regression (see the appendix).

The more employees a company has, the more managers are needed since decisions are increasingly decentralized. Goalsetting and performance-based pay are thus more often found in larger companies. Comparatively younger companies often also use goalsetting in order to manage their employees. A reason for this might be that traditionally, in German companies incentives were less often set for individual performance than in Anglo-American countries. Redesigning performance management is not unproblematic since the status quo is often seen as a reference point by the employees. Changes normally lead to a fear of loss and loss aversion is crucial for decision-making (Kahneman & Tversky, 1979).

Also the age distribution of the employees supports this argument. Younger employees have on average a shorter

period of employment, compared to their older colleagues and thus a less consolidated status quo. Therefore it is logical that businesses with a high share of employees younger than 25 years old do more often agree on performance dependent payments.

Furthermore, differences appear concerning the qualification structure. Companies with many academics and engineers use goalsetting for the entire workforce more often. Also companies with a high potential for innovation commonly engage in performance management of their employees who lack management responsibilities. High-selling businesses are especially likely to concentrate on goalsetting with executives or individual groups of workforce.

Thus, it appears that the choice for or against goalsetting and performance-based pay is not independent from structural conditions of the company and characteristics of the workforce. Fundamental reasons against implementing goalsettings are neither justified empirically nor theoretically. The question for HR managers or directors, namely, to what extent goalsetting and performance-based pay is appropriate for the motivation of their employees, is thus of great importance.

#### 4.2 A View Into the Future

The goal of the experiment is to analyse to what extent the simple presentation of information about the productivity effects of goalsetting and performance-based pay can influence the intentions of HR managers going forward. To that end, the online questionnaire surveyed them about their intentions after presenting (or withholding) this information to them. Figure 2 shows the survey results of all three groups. One-fourth of the HR managers within each of the three test groups do not see a reason to consider (intensified) goalsetting and performance-based pay in the future, with no evident difference across groups. It looks different with those who strongly affirmed the commitment to adopt the strategy. Whilst just 21 percentage of the control group see a need for action, the treatment groups, which have additional information about goalsetting and performance-based pay, are much more likely to see such a need (27 or 28 percent, respectively). Although the answer category “yes, for sure” is chosen about 6 percentage points more often, Wilcoxon Rank-Sum tests do not show a significant difference. If differences are controlled with regard to the branch, the obligation to pay or the number of employees and the structure of the workforce a significant positive effect can be found regarding the information about the distribution of goalsetting and performance-based pay (treatment C) on the willingness to deal with the issue in their own company (Table 3). This is valid in comparison with the reference category of the control group who did not receive any additional information. In order to survey the robustness of such an effect, we also estimate a Probit-regression with the summarized answer categories “yes, probably” up to “yes, for sure”. A weak positive correlation (with a percentage value of 0.091 in an estimation analogue to model 4) appears for the treatment C regarding the probability to answer with “Yes”.

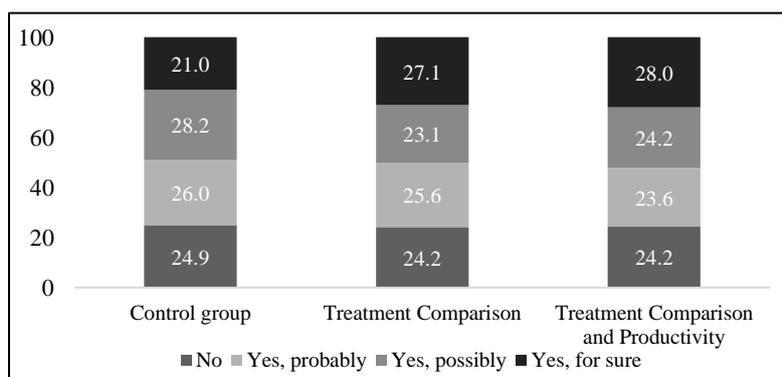


Figure 2. Goalsetting as relevant future issues - Do you consider (intensified) how you can motivate your employees by goalsetting and performance-based pay in the future? Data given in percentage

The additional information about productivity increases from performance management (treatment CP) does not have a strong significant effect with regard to the control group. In other words, the additional information did not convince the HR managers to reconsider the effects their payment structure has on their employees' incentives. A reason for this could be that the additional information was not noticed due to the longer text, compared to the given information for treatment C. This phenomenon is called information overload (cf. e.g. Schwartz, 2004; Enste et al., 2016) and describes how too much information is adverse for information

processing. A further reason could be that the absolute positive assessment of the increasing productivity and motivational effect of goalsetting is not shared by the HR managers due to their own experiences. While the distribution of goalsetting and performance-based pay is easily measurable, the pure positive valuation of the performance management presented by the information might be critically received as too impartial – in particular, because potential risks do not receive any attention in the information text.

Table 3. Goalsetting as relevant future issue - Ordered Probit regression results

Models	(1)	(2)	(3)	(4)
Dependent variable: Increasing engagement with performance management in the future (4 categories)				
Treatment C	0.154** (0.069)	0.174** (0.072)	0.217*** (0.075)	0.236*** (0.077)
Treatment CP	0.103 (0.068)	0.146** (0.070)	0.154** (0.073)	0.126* (0.075)
Goalsetting are already implemented for a share of the employees or managers (Yes = 1)	1.016*** (0.061)	0.982*** (0.066)	0.940*** (0.070)	0.953*** (0.071)
Enterprise characteristics1)		yes	yes	yes
Workforce structure2)			yes	yes
Realisation categories				yes
Observations	1490	1412	1305	1242
Pseudo R2	0.067	0.085	0.089	0.088

Note. 1) Company characteristics: number of employees nationally and growth plans in the next three to five years, branch of industry, the age of the company since foundation, existence of a works council and/or an alternative employee representative committee in the business, product /process or procedure innovations, annual result, collective agreements, legal form of the company; 2) Workforce structure: age structure and qualification structure, robust standard errors in brackets; \*\*\*, \*\*, \* significance at the 1-, 5-, 10- percent level, respectively.

Finally it can be concluded that the information, that more than half of all companies in Germany use goalsetting, leads more often to a positive answering behaviour of the surveyed person in favour of an increasing engagement with the issue of performance management. This is admittedly just an expression of the immediate attitude of the respondent, not an indicator of actual behaviour.

#### 4.3 A Look Back

One year after the experiment in the IW-employee-panel 2014, we ask again questions about performance management in companies in the summer of 2015. The panel included 544 companies with HR managers that attended both surveys. In contrast to the survey in 2014, one year later the subjects were not asked about their plans, but rather about the activities of the performance management during the previous year.

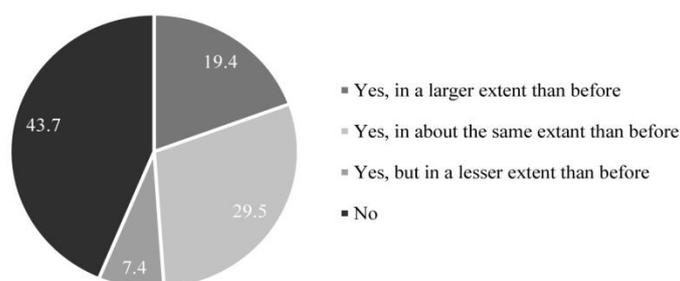


Figure 3. A view into the previous year - Have you dealt during the last twelve months with the issue of how you can motivate your employees by goalsetting and performance-based pay? Data given in percentage

Figure 3 shows to what extent the subjects engaged with issue of goalsetting and performance-based pay during the last twelve months before the survey. Each of the questions were constructed inversely to the survey in 2014, just as the time perspective was changed. One-fifth of respondents claim to have intensified engagement with the topic during the last year.

The results of the combined data from 2014 and 2015 show that companies that signalled in 2014 a higher likelihood of dealing with goalsetting and performance-based pay in the following year have actually implemented it over that year (Table 4). A high consistency is also apparent for the respondents who said in 2014 that they did not plan to do so: the large majority (68 percent) stated in 2015 that goalsetting and

performance-based pay were not a live question over the previous twelve months. The present study is thus consistent with the literature which shows that interviews can give a good prediction about the future behaviour, provided that the question is stated in sufficiently neutral terms so as to avoid prompting socially desirable answers, and that it is also not about a particularly long period of time (see also Naeff and Schupp (2009) for an exploration about trust or Vischer et al. (2012) for an exploration about patience).

Table 4. Relation between intention and realisation

Share of HR managers distinguished according to the extent of engagement with the topic goalsetting and performance-based pay in the last twelve months					
Data given in percentage					
	Have you dealt with the issue of how you can motivate your employees by goalsetting and performance-based pay during the last twelve months? (2015)				
	Model 1	Model 2	Model 3	Model 4	
Do you have the intention to deal (intensified) with goalsetting and performance-based pay in the future, in order to motivate your employees target orientated? (2014)	Yes, in a larger extent than before	Yes, in about the same extent than before	Yes, but in a lesser extent than before	No	Σ
Yes, for sure	34.7***	40.9***	4.7*	19.7***	100
Yes, possibly	23.6**	36.4***	7.9	32.1***	100
Yes, probably	10.6	25.8*	9.9	53.8	100
No (reference)	9.9	15.5	7.0	67.6	100

*Note.* For example: Of those HR managers who were sure in 2014 to deal (intensified) in the future with performance management, 34,7 percent stated in the year 2015 that they have dealt with it in a larger extent than before. Of those HR managers who stated in the year 2014 that they do not want to deal with it, just 9,9 percent in 2015 have dealt with it in a higher extent. This difference is significant at the 1-percent level, respectively.

\*\*\*, \*\*, \* significance at the 1-, 5-, 10- percent level, respectively. Reference category: Company plans to not deal intensified with goalsetting and payment dependent payments in the future. Probit regression: Control variables for the use of goalsetting and performance dependent payment for (a part of) the employees and executives. Enterprise characteristics (number of employees nationally, branch of industry, the age of the company since foundation, existence of a works council and/or an alternative employee representative committee in the business, product /process or procedure innovations, annual result, collective agreements, legal form of the company and workforce structure (age structure and qualification structure).

In addition to the rather soft question of to what extent the surveyed HR managers have dealt with the topics of goalsetting and performance-based pay in 2015, those who at least guided some of their employees or executives in a performance dependent way, were also asked to what extent the performance management had changed specifically. Figure 4 shows that 40 percent of the respondents have thought about the incentive effect of their performance management. A completely new implementation of goalsetting in connection with performance-based pay happened in 15 percent of the companies. 17 percent stated that they have increased the targeted group.

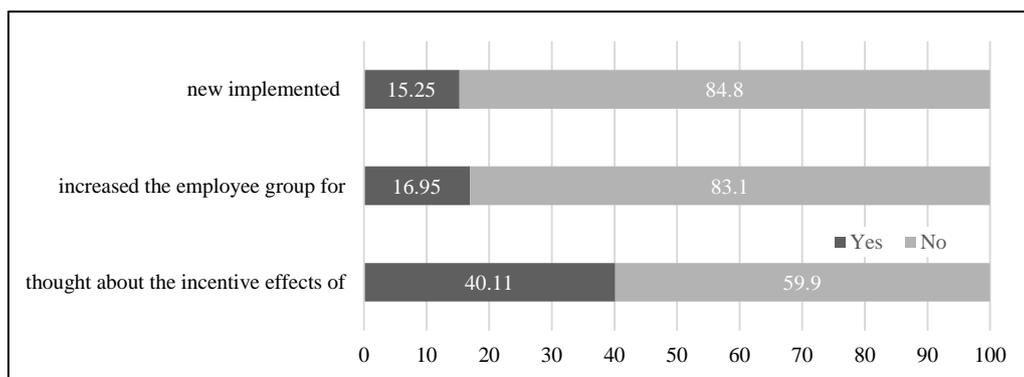


Figure 4. Specific changes - Have you in your company ... goalsetting in connection with a performance-related payment in the last twelve months? Data given in percentage

HR managers who definitely wanted to deal with the subject in 2014 have implemented goalsetting significantly more often (p-value: 0.039) or increased the employee group (p-value: 0.033, cf. table 5) by 2015. The

differences related to considering the incentive effects is also close to the 5-percent level (p-value: 0.063). Therefore, it strengthens the finding of table 1 that the stated intention to deal with the subject is often executed. There can be several reasons why not all of the HR managers who intended to do so actually have implemented it in 2015. Not least, day-to-day business determines whether there is enough time for the HR manager to deal with the strategic aspects of personnel policy.

Table 5. Intention and concrete implementation - Share of HR managers who have implemented goalsetting, reviewed the incentive effects or have expended the employee group. Data given in percentage

	Have you in your company ... goalsetting in connection with a performance-related payment in the last twelve months? 1) (2015)		
	Model 1	Model 2	Model 3
Do you have the intention to deal (intensified) with goalsetting and performance-based pay in the future, in order to motivate your employees target orientated? (2014)	... newly implemented...?	... thought about the incentive effects of...?	...increased the employee group for...?
Yes, for sure	25.4**	50.4*	25.4**
Yes, possibly	10.8	41.6	14.7
Yes, probably	6.0	35.8	17.9**
No (reference)	13.6	24.2	4.5

*Note.* For example: Of those HR managers who were sure in 2014 to deal (intensified) in the future with performance management, 25.4 percent stated in the year 2015 that they have implemented goalsetting in connection with performance-based pay in the last twelve months. Of those HR managers who stated in the year 2014 that they do not want to deal with it, 13.6 percent implemented new incentive systems. This difference is significant at the 5-percent level, respectively.

\*\*\*, \*\*, \* significance at the 1-, 5-, 10- percent level, respectively. Reference category: Company plans not to deal intensified with goalsetting and performance-based pay in the future. Probit regression: Control variables for company characteristics (usage of goalsetting and performance-based pay for (a share of) the employees and manager, number of employees nationally, branch of industry, the age of the company since foundation, existence of a work council and/or an alternative employee representative committee in the business, product /process or procedure innovations, annual result, collective agreements, legal form of the company) and workforce structure (age structure and qualification structure).

## 5. Conclusion

We showed that human resource managers and directors in German companies can become aware of the application of incentive systems like goalsetting and performance-based pay by using a nudge. HR managers are experts for their companies due to their competences and business experiences. Because of scarce temporal and financial resources, not all personnel policy measures can be carefully considered and implemented. The outcomes of the experimental surveys show that the findings of nudging by Thaler and Sunstein (2008) are also applicable for HR managers. If one's intention is to raise awareness of the target group for topics like operational performance management, one has to be convincing. Teaching and paternalism often have the opposite effect. A sustainable conscious attitude occurs just in case the person decided on it by him or herself. Therefore, it is not possible to force good decisions, but rather initiate them.

Best practices and benchmark data can provide decision makers in companies with valuable incentives. It is important, however, to be aware of the power of information. Best-practice examples of large companies are indeed normally more present and find better (media) attention, but whether that information is relevant for small- and middle-sized companies is often questionable. Especially for small- and middle-sized companies that do not have their own (differentiated) personnel department, an appropriate target-group preparation of benchmark information is important to ensure that the provided information can serve as a decision-making tool. Finally, the behavioural-economics findings show that experts should also mind the reflective handling of information in the particular operational context.

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## Appendix

### Multinomial logistical regression

(Reference category: Nobody)	How many employees in your company are evaluated by goalsetting and paid by performance-based pay?		
	Just executives	A part of the employees and executives	All employees and executives
<b>Company characteristics</b>			
Company size: between 50 and 249 employees (Reference: less than 50 employees)	0.885***	0.966***	0.867***
Company size: 250 employees and more (Reference: less than 50 employees)	(0.207)	(0.192)	(0.271)
	1.256***	1.187***	0.762*
Branch: metal and electrical industry (Reference: manufacturing industries and construction)	(0.391)	(0.355)	(0.445)
	0.077	0.181	-0.016
Branch: entrepreneurial services (Reference: manufacturing industries and construction)	(0.231)	(0.231)	(0.305)
	0.279	0.692***	0.419
Branch: social services (Reference: manufacturing industries and construction)	(0.237)	(0.224)	(0.294)
	-0.269	0.348	0.126
	(0.250)	(0.235)	(0.317)
Company's age since foundation: more than 10 years (yes=1)	-0.552**	-0.411*	-0.724**
	(0.276)	(0.249)	(0.305)

Works council available (yes=1)	0.020 (0.226)	-0.028 (0.221)	0.141 (0.282)
Alternative representation of interests available (yes=1)	-0.267 (0.302)	-0.376 (0.257)	0.294 (0.316)
Product /process or procedure innovations in the last 2 years (yes=1)	0.300* (0.179)	0.389** (0.163)	0.525** (0.230)
Company will grow in the next 3-5 years (yes=1)	0.156 (0.178)	0.269* (0.163)	0.037 (0.223)
Annual result: positive (Reference: balanced annual result)	0.564*** (0.213)	0.278 (0.190)	0.535* (0.274)
Annual result: negative (Reference: balanced annual result)	0.404 (0.307)	-0.023 (0.292)	0.003 (0.415)
Labor agreements: company or regional labor agreements (Reference: no labor agreements)	-0.010 (0.229)	0.111 (0.227)	0.144 (0.294)
Labor agreements: none, but similar to a labor agreement (Reference: no labor agreements)	-0.373* (0.209)	0.008 (0.193)	-0.327 (0.263)
Legal form of the company: legally and economical independent (yes=1)	-0.993*** (0.221)	-0.925*** (0.209)	-0.830*** (0.260)
<b>Workforce structure</b>			
Share of employees with completed apprenticeship (in %)	0.020 (0.488)	0.701 (0.520)	0.921 (0.863)
Share of employees with completed training (engineers, foremen, business administrator) (in %)	1.003 (0.739)	1.866*** (0.703)	2.595** (1.115)
Share of employees with a degree (university, technical college, university of cooperative education with degree status) (in %)	-0.679 (0.591)	0.943* (0.558)	2.554*** (0.812)
Share of employees between 25 years and 54 years (in %)	-1.274* (0.771)	-1.592** (0.721)	-2.964*** (0.938)
Share of employees older than 55 years (in %)	-0.606 (0.815)	-2.332*** (0.821)	-3.676*** (1.070)
<b>Revenue category</b>			
Revenues between 1 and 50 million Euro (Reference: revenue less than 1 million Euro)	0.000 (0.333)	0.000 (0.254)	0.000 (0.349)
Revenue of 50 million Euro and more (Reference: Revenue less than 1 million euro)	1.033*** (0.333)	0.352 (0.254)	0.101 (0.349)
Observation		1244	
Pseudo R2		0.1019	

Note. Robust standard errors in brackets, constants were estimated, Significance levels \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

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