

How should teams be formed and managed?

How teams are chosen and how they are compensated can determine how successfully they solve problems and benefit the firm

Keywords: job design, team, diversity, team-based incentives, task assignment, peer effect

ELEVATOR PITCH

The keys to effective teamwork in firms are (1) carefully designed team-formation policies that take into account what level of diversity of skills, knowledge, and demographics is desirable and (2) balanced team-based incentives. Employers need to choose policies that maximize the gains from teamwork through task coordination, problem solving, peer monitoring, and peer learning. Unions and labor market regulations may facilitate or hinder firms' attempts at introducing teams and team-based incentives.

Nature of tasks and the mechanism that should be exploited

<i>Nature of task</i>		<i>Important roles of teams</i>
High complexity	→	Problem solving
High interdependency	→	Task coordination/peer learning
High uncertainty	→	Task coordination
Low observability	→	Peer learning
Low interdependency	→	Peer monitoring

Source: Author's own.

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KEY FINDINGS

Pros

- + Diverse teams in terms of skills, knowledge, and information sources benefit from matching workers and tasks appropriately and facilitating learning within teams.
- + Uniform teams exhibit lower communication costs and higher levels of trust and worker satisfaction.
- + Self-selected teams tend to have stronger social connections among team members and thus mitigate free-riding and encourage peer learning.
- + Compensation based on team performance encourages task coordination, problem solving, peer monitoring, and peer learning.

Cons

- Uniform teams may experience limited opportunities for task coordination, problem solving, and peer learning.
- Demographically uniform teams may have similar problems because they often rely on the same information sources.
- Self-selected teams may engage in unproductive socialization. Self-selection could also lead to more uniform teams than desired.
- Team-based pay (in which all members are paid equally) may encourage free-riding and break-ups of teams due to dissatisfaction with unequal contributions.

AUTHOR'S MAIN MESSAGE

Firms commonly assign employees to work on a team in order to harness and amplify the skills and knowledge of its individual members. Firms need to choose policies that maximize the gains from teamwork through task coordination, problem solving, peer monitoring, and peer learning—but these policies will vary depending on which roles of teamwork are emphasized. Policymakers need to be aware that labor market regulations can facilitate or hinder the ability of firms to form teams.

MOTIVATION

Teams are prevalent in the business world. Members of a team typically interact frequently or routinely for a long period of time. Both online (process-based) and offline (cross-functional) teams could be driving forces for higher quality and productivity. A survey of Fortune 1000 firms has shown that the share of large firms that have more than 20% of their employees in teams increased from 37% in 1987 to 66% in 1996 before leveling off. Other surveys of UK and Japanese firms indicate the ubiquitous nature of teamwork in the workplace in both countries. Despite a high penetration of the practice, the literature on teams has been relatively scarce. The remainder of this paper will summarize what we can learn from a small number of existing studies of teams.

DISCUSSION OF PROS AND CONS

Roles of teams

Teamwork can facilitate task coordination, problem solving, peer monitoring, and peer learning (see Figure 1). By introducing autonomous teams, an employer can

Figure 1. How an employer's choice impacts team effectiveness

Choice	Roles of teams/reasons to use teams				
	Task coordination	Problem solving	Peer monitoring	Peer learning	Other effects
Form uniform teams (versus diverse teams)	Negative: limited gains from reassigning tasks	Positive: reduce communication costs Negative: limited knowledge and information sources	Positive: develop trust and make peer pressure more effective	Negative: limited opportunities for peer learning	Positive: reduce turnovers
Team membership chosen by employees (versus assigned by management)			Positive: teams formed by those with strong social ties	Positive: greater incentive to teach each other	Possibly negative: uniform teams are formed Negative: unproductive socialization
Team-based pay	Positive: motivate efficient task assignment	Positive: motivate cooperation to solve problems	Positive: motivate workers to press each other to exert effort Negative: may cause free-riding and team break-ups due to dissatisfaction with unequal contribution	Positive: motivate workers to teach each other	Possibly negative: uniform teams in terms of skill level tend to occur when team members are chosen by workers (see the first row) Negative: cause team break-ups due to dissatisfaction with unequal contribution

Source: Author's own.

efficiently utilize workers' comparative advantages as well as local information that the management cannot directly observe, such as opportunities for quality improvement and effort put forth by peers.

Task coordination

If members of a team are empowered to make decisions on task assignment, teams can better respond to changes in the composition of skills within the team— and also changes in the products produced and the environment—by optimally reassigning tasks. For example, if a new worker joins a team, he will be assigned easy tasks while other experienced workers take on more difficult tasks. Or, for example, when demand is weak, more experienced workers in a sales team may spend more time developing new customers while less experienced workers focus on existing customers.

Task coordination is an important mechanism when task assignment has to be adjusted continuously to adapt to a changing environment, which is likely when tasks are highly interdependent and there is substantial uncertainty about the optimal mix of tasks.

The shift from mass production to flexible production described in *Case 1—US garment factory in California* raises the interdependency among workers' tasks by eliminating work-in-process among workers, which in turn necessitates teamwork and task coordination [1], [2]. Similarly, the uncertainty about demand (customer arrivals) made task coordination between high-ability and low-ability workers effective in raising productivity in *Case 2—Cosmetic sales in a Chinese department store* [3]. In both cases, teams comprising workers with more diverse skill levels were more productive because diversity in skills creates more opportunities for gains from task reassignment.

Case 1—US garment factory in California. A Koret Corporation garment manufacturing facility in Napa Valley had historically used a Taylorist straight-line production system where workers were paid individual piece rates. But in the mid-1990s, in order to accommodate the demand by retailers to make just-in-time deliveries, the plant manager introduced self-managed flexible work teams (called module production) with equal pay based on group output to the sewing operation. The shift to module production was gradual, with the first team hand-picked in 1994. The next eight teams—consisting of volunteers—were formed in 1995.

Initially, workers could return to straight-line production if they preferred, but this option disappeared in mid-1996 when the manager decided to convert the entire plant to module production.

The adoption of teams at the plant improved worker productivity by 14% on average. Productivity improvement was greatest for the earliest teams and diminished as more workers engaged in team production, providing support for the view that self-selection encouraged the participation of workers with collaborative skills, which are less valuable in individual production.

High-productivity workers tended to join teams first, despite a loss in earnings in many cases, suggesting non-pecuniary benefits associated with teamwork. More diverse teams in terms of skills—teams composed of members with diverse experience and ability in sewing operations—were more productive, with average ability held

constant, which is consistent with explanations emphasizing task coordination and mutual team learning. Finally, ethnically uniform teams were less likely to experience turnovers, also suggesting the association of non-pecuniary benefits with a team's demographic uniformity [1], [2].

Case 2—Cosmetic sales in a Chinese department store. One of the largest department stores in China sells 15 major brands of cosmetics, each of which occupies a separate counter in a common floor area. These brands hire their own salespeople who work to promote and sell their products in one of three overlapping shifts. Among 11 brands that provided the researchers with data, four brands used team-based compensation (TC) to pay each worker a monthly salary of approximately \$150 plus 0.5% of the monthly total counter sales. The other seven brands employed individual-based compensation (IC) to compensate workers with approximately \$150 plus 2% of personal monthly sales.

It was found that highly capable workers improved peer productivity under TC but hurt their peers under IC, due to competition among peers at the same counter for customers—especially in the form of price discounting: salespeople are shown to engage in excessive price discounting when they work with highly capable workers.

The positive peer effect under TC is attributed to two factors. First, highly capable workers at TC counters adopt a different strategy: focusing their efforts on stealing customers from competing brands. Highly capable workers at TC counters have strong negative effects on outside peers, but their counterparts at IC counters are less likely to have an impact on outside peers. Second, workers learn more from peers within counters than from those outside, and this is especially true for new workers. Also, this learning effect is greater for skin care than for makeup, as techniques are more difficult and less observable for skin care. Overall, diversity in workers' abilities enhances team performance under TC, but hurts IC firms [4], [5].

Problem solving

Another mechanism for achieving efficiency gains from teamwork is problem solving. By analyzing unique data on production lines in US minimills, researchers have shown that problem-solving teams are found almost exclusively in lines with more complex production processes [3]. (This relationship is illustrated in the figure on page 1.) Other studies have shown that diverse knowledge and information sources should improve a team's capability to solve problems [6].

Peer monitoring

The third role of teams is peer monitoring. One problem with motivating workers working under team-based pay (versus individual pay) is free-riding. Workers may underprovide effort because the return to their effort is shared among the team members, and thus workers have an incentive to free-ride on others' efforts. This free-riding problem is mitigated when there are strong social connections or the expectation of a long-term relationship among team members because peer pressure or the reputation mechanism in the long-term relationship motivates the workers' efforts.

More formally, in repeated teamwork settings under team-based pay, workers can form an implicit contract where everyone puts forth efficient effort as long as everyone else does the same, but the team also punishes its members by cutting back efforts if somebody shirks their duties.

This story encapsulates the role of peer monitoring as punishment takes place when someone is observed to be shirking. A prior study found that team organizations can be optimal even without any technological interdependency whenever the firm can rely on internal peer monitoring [7]. Consistently, one common feature of many successful business cases of teamwork (including Cases 1 and 2) is that members can monitor each other's efforts due to the close proximity of team members. The importance of the visibility of peers' actions and social connections has been convincingly demonstrated in a study using high-frequency data on worker productivity from a large national supermarket chain [8].

Peer learning

The final role of teams is to facilitate peer learning. There are two kinds of peer learning: observation of the successful techniques of peers, and direct teaching. Although the former type of learning does not require team organization or depend on the compensation scheme, the incentive to teach co-workers should crucially depend on the pay scheme being greater under team-performance-based pay than individual-performance-based pay. Hence, peer learning could be an important role of teams when a worker's techniques are not easily observable to peers; thus, an explicit incentive to teach is important. One recent study—described in Case 2—shows that peer learning within a cosmetic sales team in a Chinese department store is greater for products that require less observable sales techniques [8] (also see the illustration on page 1).

Benefits and costs of diversity

The predicted effects of skill and knowledge diversity on team performance are mixed and largely depend on the role of teams. In teams where task coordination and peer learning play important roles in improving productivity, greater skill and knowledge diversity would lead to better team performance because a larger gap in skill and knowledge means more opportunities for task reassignment and mutual learning. The empirical results in Cases 1 and 2 are consistent with this assumption [1], [2], [4], [5]. In a situation where task coordination and peer learning are less likely to occur, however, skill diversity may harm team performance by making it difficult to establish team norms, especially when it is hard for team members to observe each other's efforts and their levels of proficiency [9].

On the other hand, demographic diversity may harm productivity by raising communication costs and making peer pressure less effective. The literature generally finds negative effects of age and ethnic diversity on team productivity. One counterargument to this view is that some skills and knowledge sets are specific to certain demographic or cultural groups, and thus there are gains from forming groups with diverse characteristics [6]. If workers' salient demographic characteristics are

correlated with some dimension of the relevant skill sets, demographic diversity may be positively associated with team performance. For example, if workers in different gender or ethnic groups have different skill sets, personalities, or information sources (such as those about their customers), grouping them may lead to higher performance when such characteristics are complementary.

Benefits and costs of self-selection

When team members choose their own teammates, they will tend to choose friends or those who are in their social network. Since friends care about the well-being of each other and are more susceptible to peer pressure, free-riding is more likely to be contained. The example of the US garment factory in Case 1 illustrates another mechanism [2]. When participation in teams is voluntary and teamwork requires additional team skills (for example, communication and leadership skills), teams are likely to attract workers with such skills, leading to better task coordination and problem solving, because they expect to earn higher pay in teams. This self-selection effect will further improve team productivity [1].

Another implication of choosing your own teammates is that you are likely to enjoy a non-pecuniary benefit—socialization. On the one hand, socialization can reduce turnover and may encourage more knowledge transfer, and thus have a positive effect on overall team productivity. On the other hand, socialization may make teams less productive as team members may spend too many work hours engaged in non-work activities, such as chatting.

One last problem with self-selected teams is that these teams are likely to be uniform in skills and demographic characteristics. To the extent to which diversity in skills and knowledge sources are important, letting workers choose team membership may be too costly [3].

Impacts of team-based incentives

The literature generally shows that a team-based incentive—a pay scheme that depends on joint team output—is a necessary ingredient for successful team organization [1], [2], [3], [7], [8]. It motivates all four roles of teams discussed in this paper (see Figure 1). Although there is a concern that teamwork with only team-based incentives could be subject to free-riding, if members of a team interact frequently and persistently for a sufficiently long period of time, an implicit agreement of cooperation and peer monitoring is likely to suppress free-riding [5].

Team incentives could also change the discretionary strategies workers employ to compete with one another and the nature of peer effects—the positive or negative influence you receive from your peers through psychological pressure or learning. The case of cosmetic sales in a Chinese department store (Case 2) indicates that an individual incentive scheme intensifies internal competition resulting in excessive price discounting while a team incentive scheme encourages workers to focus on competing with other firms in order to maximize total team pay.

Interacting effects of team incentives

As the Chinese department store case (Case 2) suggests, the effects of team incentives and team composition interact with each other. Namely, under team incentives, skill diversity has a positive effect on team performance by encouraging task coordination and peer learning. In contrast, in firms with individual incentives, skill diversity could have a negative effect on team performance if workers steal customers from each other.

Another important issue is how team incentives affect team members' preferences for team composition. When team incentives are moderately powered, the non-pecuniary benefits of working with friends may exceed the monetary loss that high performers might experience by joining a team based on social connections instead of forming a team with workers of similar ability [1]. When team incentives are high-powered, however, forming a team with friends may be too costly for high performers because their actual pay could be substantially lower than their contribution to total team pay. When the expected pay increase from forming a new team with others of similar ability exceeds the non-pecuniary benefit of working with friends, the worker will quit the team. When workers are free to choose their own team members, the impact of stronger team incentives is ambiguous.

On the one hand, the marginal return to efforts will increase if the piece rate is raised or a rank-order tournament pay is introduced. On the other hand, increased team incentives may encourage team turnover, which in turn may harm productivity because:

- weakened social ties among members may exacerbate the free-riding problem;
- smaller skill and ability differences will reduce the gain from knowledge sharing and peer learning; and
- increased turnovers will result in losses of team-specific human capital [10].

Case 3, involving a fruit producer in the UK, illustrates evidence of the conflicting effects of team incentives.

Case 3—UK fruit producer. A field experiment was conducted at a leading soft fruit producer in the UK in 2005. When seasonal workers arrived at the farm, they were assigned to a team by the general manager, but thereafter they were free to choose their own team members at the weekly team exchange meetings. From the start of the peak picking season in June, teams were paid piece rates for each kilogram of fruit picked by their members.

At the beginning of August, in addition to the piece rates scheme, workers were also provided daily rank incentives based on team performance. Although it did not involve any monetary rewards, detailed information about the absolute productivity of each team and the productivity ranking across teams were publicly posted. Starting in September, the farm added a weekly monetary prize for the most productive team on each site. During the experiment, 16 weekly team exchanges took place—eight during the control period (i.e., no additional team incentives above piece rates) and four during each experimental treatment.

As each worker picked fruit on her own row, her productivity was independent of the efforts of other team members. Researchers found that strengthening incentives, either through rankings or tournaments, made workers more likely to form teams with others of similar ability rather than with their friends. Providing rank information, however, reduced average productivity by 14%, whereas introducing a monetary prize tournament increased it by 24%. Both effects were heterogeneous: Rank incentives only reduced the productivity of teams at the bottom of the productivity distribution, while monetary prize tournaments only increased the productivity of teams at the top [10].

Other complementary practices

As discussed above, team incentives could still be optimal even when there is no technological interdependency among actions by the team members, if peer monitoring and peer pressure can effectively eliminate free-riding. But any changes in job design that create synergy and technological complementarity should make teamwork more desirable. One such change is worker empowerment, which is often perceived as complementary to team organization.

The effect of worker empowerment is two-fold. First, it encourages task coordination according to the skill and knowledge sets of the team's members. Since task coordination raises interdependency and the need to synchronize activities, members' efforts are more likely to be complementary. Second, the scope of punishment to a free-rider should be enlarged by worker empowerment. For example, empowered teams may assign free-riders boring tasks.

The theoretical literature shows that giving workers the opportunity to punish or sabotage each other helps them to maintain a cooperative implicit contract [7]. For example, the US garment factory case implies that greater skill diversity had a positive impact on team performance partly because workers had an option to leave the team [1]. For example, a high-skilled worker could use her threat of leaving the team in order to press others to work harder. Although team turnovers themselves may be counterproductive, the threat of leaving the team by high-performers will certainly provide the rest of the members with incentives to work harder to retain high-performing members.

Another mechanism to mitigate free-riding in teamwork is to give team members the opportunity to rate each other and adjust their compensation accordingly. Knowing that free-riding behavior will be punished, workers will work hard under such a rating system [11]. The 360-degree evaluation widely adopted in businesses may have such a mechanism and work to improve productivity in team organizations.

LIMITATIONS AND GAPS

Most of the empirical evidence in the literature looks at simple jobs with narrowly defined tasks where productivity can be easily measured. Therefore, the extent to which we can replicate the results for high-skill jobs that involve complex problem solving—such as research and development (R&D) researchers and managers—is questionable. Professional teams in R&D and management do not work side-by-side and may not meet as frequently. They are not even offered team incentives, except for those with large-scale coverage such as stock ownership or stock option programs.

Nonetheless, peer monitoring rarely becomes an issue, presumably because typically there is a specialized monitor, such as a team leader or a board of directors. Also, free-riding is less likely to arise in professional teams because incentives, such as rewards through promotion and task assignment or reputation, are presumably enough to motivate team members. Further research on professional work teams is necessary.

It should also be emphasized that, among the four roles of teams discussed in this paper, only peer learning has a long-term effect: The productivity of a worker who learns from highly productive peers continues to be high even after his peers change.

Although this feature allows researchers to evaluate the magnitude of peer learning—whereas distinguishing alternative explanations by task coordination, problem solving, and peer monitoring is more difficult—relatively few studies have examined this effect. The questions of how important peer learning is, what factors determine the level of knowledge transfer, and what the optimal worker staffing rule is, are under-cultivated in the literature.

SUMMARY AND POLICY ADVICE

The keys to effective teamwork are carefully designed team formation policies (i.e., how much diversity in skill, knowledge, and demographics should be attained, and whether workers can choose team memberships) and balanced team-based incentives. Employers need to choose policies that maximize the gains from teamwork through task coordination, problem solving, peer monitoring, and peer learning. Thus, the optimal policies will vary depending on which roles of teamwork are emphasized.

Note that the use of teamwork to encourage task coordination often requires broader skills and knowledge of workers (i.e., job enlargement). Such changes in job design may make jobs less standardized, and therefore workers may not cooperate with the changes unless a certain level of job security is offered. Unions may play a certain role in facilitating the changes in work organization as a safeguard.

Furthermore, labor market regulations may facilitate or hinder a firm's attempts at introducing teams and team-based incentives because the expectation of a stable employment relationship, the firm's commitment to the new policy, and its flexibility in designing compensation policies are necessary ingredients for introducing successful team organizations.

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Competing interests

The IZA World of Labor project is committed to the *IZA Guiding Principles of Research Integrity*. The author declares to have observed these principles.

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