

# Improving Employees' Commitment through Employee Engagement - A Case Study of selected IT Companies of Punjab & Chandigarh



**Jitesh Kumar Pandey**

Research Scholar,  
Deptt. of Management Studies,  
IKG Punjab Technical University,  
Kapurthala

**Jagmeet Singh**

Assistant Professor,  
IKG Punjab Technical University,  
Kapurthala

## Abstract

Employee engagement is an approach which is designed to ensure employees' commitment towards their organization's values goals and objectives. It also make sure motivated workforce who contribute their best to organizational success, and at the same time they are able to increase their own sense of happiness. There is a distinct correlation between employee level engagement and high level of organizational performance and productivity, across all type of organizations. Apart from enhancement in performance and efficiency, employee engagement also reflect positive impacts upon other organizational issues such as absenteeism, attrition, retention, innovation, better customer services and other issues concerned to Industrial relation. Perfectly engaged employee enjoys a blend of job involvement, job involvement, organizational commitment and sensations of empowerment which are collectively goes towards enhanced level of Productivity. The *Main effort of this study is to analyze how the Employee engagement enhances the confidence level of the employees in order to give their best to organization as well as improvement in their organizational & Affective commitment. The scheduled questionnaire was distributed and filled by 400 middle and lower managerial cadre employees of IT companies located at Punjab and Chandigarh. Statistical tools like correlation and Regression have been used to understand the relation between effectiveness of the Employee Engagement and its impact upon employee's Affective & Continuance Commitment.*

**Keywords:** Employee Engagement, Employee Productivity, Job Involvement, Employee commitment (*Affective & Continuance commitment*).

## Introduction

Employee engagement is an important tool that strongly associated with organizational performance and outcomes. IT companies having engaged employees have lower employee turnover rate, higher employee retention rate as a result trim down intention to leave the company. Engaged manpower also increases business growth like productivity, profitability, and customer satisfaction. On the contrary, IT companies having disengaged employees suffer from waste of effort and attrition of talent, receive less employee commitment, counter increased absenteeism and have lower customer orientation, lowest productivity, and decreased profitability. Generally, positive impacts of employee engagement upon the business performance are discussed importantly but cost-benefit analysis of engagement decisions are left behind. Engagement decision should be evaluated in both terms qualitatively and quantitatively. Evaluation method of employee engagement should be based upon associated costs and benefits, without giving priority to any one aspect and should be get done through unbiased decision makers.

Hence there is a requirement of revision of the cost part of engagement options. For managers of IT industry, work of employee engagement begins at day first through effectual recruitment, selection and orientation program. As the work of employee engagement begins from the top management of organization, where usually no engagement is found. It is unimaginable that an organization have engaged employees but there is lack of engaged leadership. For best employee engagement program, managers of IT companies should establish two-way proper

communication and also make sure that all the job related essential resources is being supplied to the employees. There should be appropriate training program to enhance their job related skills, knowledge and capacity. Reward mechanism should be established in order to reward against good performance through various non-financial and financial incentives. As the IT industry has largest intellectual human capital therefore the need of distinguished corporate culture that promotes hard work and maintains success chronicle alive, a stringent performance management system which brings accountability among managers and employee for the behavior at the workplace, a proper focus on top-performing employees and ensure their stay inside organization to maintain or enhance business performance.

#### **Employee Engagement Strategies for Indian IT Industry**

There are some factors that affect employee engagement and explain how it is linked to business outcomes. In order to ensure employee engagement in any IT organization, managers keep watch at the following ten points. It is strongly believed that following ten points will ensure employee engagement in an IT organization.

##### **Start it on Day One**

The majority of IT organizations do have comprehensive talent acquisition strategies but they have lack of employee retention strategies that enhance employee attrition rate. The first building blocks of employee management are the Effective recruitment and orientation programs which leads acquisition of new talent. Managers organize the effective recruitment to ensure the pool of potential human talent in form of new employee. The newly hired employee should be given both of orientation trainings i.e. general orientation training comprise of knowledge about company mission, vision, values, procedures, policies and job-specific orientation training which specifically relates to knowledge about job duties, responsibilities, authorities, accountabilities, and current priorities of respective department of company which enable him/her to build up practical job expectations and diminish future job role conflict. Subsequent the hiring decision, the manager has to ensure the link between job role and talent when placing an employee in a certain position and wield all managerial attempt required to retain the respective talent in the organization.

##### **Start engagement from the top Management**

Employee engagement needs top leadership commitment through ascertaining clear mission, vision, ethics and values. In absence of the believe of top leadership in employee engagement, if they don't own it, pass it downward to managers , supervisors and employees, and develop their leadership skills, employee engagement will never be successful. Employee engagement requires committed heart and action-oriented service rather than edge-service from top management of organisation. It needs "Leading by being example".

#### **Enhance employee engagement through two-way Proper communication**

Managers of IT companies should encourage two-way communication rather command and order. The issues related to job and life of employees should be understand through proper communication never impose top management idea on employees without knowing practical reality. The clear and consistent communication comprehends the expectation employer from employees. It is suggestion for manager of IT companies to involve your workforces and always show respect towards their inputs. Participative decision making ensure power sharing in organization which leads sense of belongingness among employees and they feel more engaged and realized.

#### **Provide suitable chances for development and advancement**

Job autonomy encourages independent thinking so that employees will have liberty of choosing best way to perform their job and producing the expected outcomes. Ultimately one can say employee engagement stands "Manage through results rather than managing all the procedures through which result is achieved".

#### **Ensure the resources required for jobs**

It is expected to all managers to ensure the supply of all the physical, material, financial and informational resources to employees in order to successfully completion of their jobs.

#### **Provide appropriate training to the employees**

Training program gives chance to employees to update themselves by increasing their knowledge and skills through appropriate trainings. Generally, self-efficacy and commitments among the employee are enhanced if they have adequate information about their job. Having adequate knowledge about job increases the confidence of employee and curtails the much supervision of immediate managers while working.

#### **Strong feedback system**

Most of IT companies have developed a performance management system which ensures accountabilities of managers and employees at the level of their engagement. Regular survey of employee engagement level highlights the factors that make employees engaged. On score of survey results, all the driving factors of employee engagement have been determined then the list of factors is narrowed down and focus is made on two or three areas. Organizations are supposed to prioritize the factors that will formulate the most difference to the employees and put efforts to improve these areas as it is difficult to address all factors at once. Managers should follow such survey results and establish action-oriented plans that are precise, reckonable and accountable and time- bound also.

#### **Incentives play important part**

Payment of incentive motivate employees therefore proper provision financial and non-financial incentives for employees to engagement more towards their jobs. Various management theories also advocate payment of monetary and non monetary incentives, rewards, recognition and praise that

encourage employees to exert more effort into their job. The performance management system should be transparent link between performance and incentives given to the employees.

#### **Role of Distinctive Corporate Culture**

IT companies are supposed to develop a strong work culture enriched with the goals and values of organisation and linked across all work sections. IT Companies develops culture of mutual respect by keeping live achievement chronicle. The above success stories will not only continue engagement among existing employees but also identify the newly hired employees with his catching spirit of work culture.

#### **Focus on Top-Performing Employees**

Top performing organizations are focused on retaining and engaging their top-performing employees. According to current trends of IT industry, high-performing firms are giving preferences top top-performing employees to diminish the turnover of high-performing employees and getting excellent business performance as results.

#### **Organizational Commitment**

Organizational commitment is the feeling of attachment of employees with their respective organization. In broader sense, employees who are committed to their organization normally have a sense of association with their organization, and also have awareness of the objectives of the organization. The such type of employee have added value they tend to be more determined in their work, show relatively high productivity and are more positive in contributing their support. Some Managers describe commitment as both a enthusiasm to continue the course of action and unwillingness to change plans, generally owing to a sense of responsibility to stay the course. General People are at the same time committed to several entities, such as familial, educational, economic, political and spiritual institutions. Employees also commit themselves to definite individuals like their children, spouses, parents and siblings, as well as to their employers, colleague, peers managers and customers. Commitment declares itself in distinct behavior. Committed people usually express positive feelings toward a unit or individual to whom they have made a commitment. Commitment is emotional as well as rational element like most of people willfully take decision to make commitments, then they considerately plan and perform the actions necessary to accomplish them. In the world of business, there is a traditional tacit agreement between employees and employers, employers provide value for employees in form of job security and fair compensation against employee's organizational commitment. Remarkable changes in the global/ international economy over the past 25 years have had major implications for commitment and reciprocity between employee and employers and consequently for employee engagement. Most of organizations are restructuring themselves because of scarce and costly resources, rising global competition, high labor charges and customer's demands for ever-higher quality and shareholder pressures for better returns on equity. At

some companies, restructuring has inevitable decreases in staff and in level of management.

#### **Types of Organizational Commitment**

The explanation given above is a great indicator of organizational commitment, but does only recommend a wide description. John Meyer and Natalie Allen in their article "Three component model of commitment" discussed organizational commitment in grand detail. They classified organizational commitment in three distinct types on the basis of their insightful research which are as under:-

#### **Affective Commitment**

Affective commitment show that how much workers wish to continue with their organization. If an employee is affectively committed to their organization, it denotes that he would like to stay at his organization. Affectively committed employees classically recognize the organizational objectives; they feel fit into the organization and are highly contented with their work. Affectively committed Employees feel valued, perform as ambassadors of their organization and are usually great assets for organizations.

#### **Continuance Commitment**

Continuance commitment recounts to how much employees feel the need to stay at their organization. Continuance committed employees have the reason for their commitment which lies in their need to continue with the organization. There might be various reasons to stay with respective organizations, but it is often found that the lack of job alternatives and remuneration are main reasons of Continuance commitment among employees.

As example employees admit that current employer is providing best of industry salary and benefits and no chance of improvement if switching the organization. They are compelled to stay with current organization despite dissatisfaction towards present employer. Employees are unwilling to leave in spite of dissatisfaction with their work, is the real sense of continuance commitment.

#### **Normative Commitment**

Normative commitment measures how much employees feeling to stay at their organization. Normatively committed employees usually believe that they should continue with their organizations. Normatively committed employees experience a sense of penitence about the possibility of leaving of current organization and also feel that leaving their organization would have terrible end result.

Generally, normatively committed employees think that, subsequent of leaving the current organization their knowledge/skills would be null and void, there would be pressure on their coworkers, and consequently negative impact upon performance of employees as well as organizations.

#### **Review of Literature**

Basu (2017), has completed a Case Study from an Indian Automotive Industry and depicted that Employee Engagement theory is regarded as one of the highly prominent theories among the available literature of management. It has been developed from the theories of job satisfaction, organizational commitment and organizational residency actions,

however it is much extensive than the thoughts of 'commitment' and 'motivation' in the field of management. Employee engagement is usually regarded as a two-way interface between the employee and the organization and organization is completely responsible and accountable to design its path. Devi Sonali (2017) has conducted a study on 150 banks employees to do deeply investigate the connection between Employee Engagement and Organizational Performance and its outcomes and found positive relationship between them.

Bhavani, Sharavan, Arpitha (2015), has found in their study on the employees of Automobile Sector and concluded employee engagement directs to better level of performance, employee retention, customers' trust, profitability and finally enhanced productivity of Organization. Employee engagement bring believe among employee that their employer is concerned about their health and interests are more likely to be devoted and stay longer in respective organization. This method of management can bring massive benefits for employers who bring more effectiveness through augmented productivity and performance and can decrease employee turnover, absenteeism as well as cost of recruitment. When a person give the value to particular aspect of a job, his engagement towards job is more greatly influenced both positively and negatively, comparing to one who doesn't value the job aspect.

Robertson-Smith, Markwick (2012) has concluded in his book that Employee Engagement is constantly revealed as something given by the employee which can add value to the organization through commitment and devotion, support, discretionary endeavor, using talents to the best and being persuasive towards organizational values and goals. Engaged employees experience a sense of affection towards their organization, devoting themselves not only in their role, but in the organization as a whole.

Leiter and Bakker (2010), There are number of unique features of an 'engaged' employee comprise allegiance, contentment and encouragement, and closely alliance with the organization's strategy, and the appearance of discretionary endeavor are the sign of engaged employee. Engaged workers are also dynamic, are sanguinely related to their work and think they are performing their duties successfully. It is a stable and extensively emotional-cognitive state.

Harter JK & Schmidt 2002, their research was based on 7,939 business units in 36 companies. They used meta-analysis to check the connection at the business-unit level between employee satisfaction–engagement and the business-unit results of customer satisfaction, productivity, profit, employee turnover, and accidents. Generalized relationships are enough to have substantial practical value were found between unit-level employee satisfaction–engagement and these business-unit outcomes. One implication is that changes in management practices that increase employee satisfaction may increase business-unit outcomes, including profit.

Schaufeli et al. (2002), view as a positive, fulfilling work-related state of mind that is characterized by vigor, dedication, and absorption. Vigor is characterized by high levels of energy, the willingness to invest energy in one's work. Dedication refers to being strongly involved in one's work and experiencing a sense of significance enthusiasm, and challenge. Absorption is distinguished by being entirely concentrated and happily absorbed in one's work whereby time passes quickly and one has difficulties with detaching oneself from work. In short, engaged employees have high levels of energy and are enthusiastic about their work. Moreover, they are often fully immersed in their work so that time flies.

#### **Objectives of Research**

1. To identify the relationship between Employee Engagement and Employee's Affective & Contingence commitment in IT Companies of Punjab & Chandigarh.
2. To analyze the impact of Employee Engagement on the Level of Employee's Affective & Contingence commitment.
3. To suggest the strategies to enhance the Employee Engagement and Employee's Affective & Contingence Commitment.

#### **Research Methodology**

##### **Research Design**

The type of research is descriptive as well as explorative. The main objective of using descriptive research model is to clarify the state of affairs as it exists at present. It mainly involves surveys and fact finding enquiries of different kinds.

##### **Research instruments**

The Structured questionnaire (closed and open type both) is used as the research instrument for the study.

##### **Sample sizes**

400 Respondents

##### **Sampling Technique**

Simple Random sampling and Convenience sampling has been adopted for the study.

##### **Data Collection Methods**

As primary data, the new data collected from the 400 employees of 10 IT Companies of the Punjab i.e. Icon Software Technologies Ludhiana, UCreate IT Systems, Logic ERP Solutions Pvt. Ltd. , Amba Software, Suntech Solutions, Quick coders, Smart info system, Sky Water Lab. Pvt. Ltd., Commission Adways VC Company, Endavour IT Solutions from SAS Nagar, Mohali, through structured questionnaire. The secondary data are collected through the structured literature review, journals, internet, magazines, Research Papers and articles.

The questionnaires were designed in order to collect opinion of Employees of 10 IT companies of Punjab and Chandigarh on their perceptions regarding strategies of respective organization towards Employee engagement. The questionnaire mainly consisted of closed-end questions and likert scale technique has been adopted. All the selected respondents are engaged employee of the IT organizations and working with such organization with at least 4 years. The Key sections of the Questionnaire are about factors of Employee

Engagement i.e. Training, Career Development & planning, Motivation & Participation, Employee Grievance & Respect and type of Organizational commitment i.e. Affective Commitment and Continuance Commitment.

The responses from every employee for each determinant are scored on a five point scale i.e.; Highly Satisfied, Satisfied, Neutral, Dissatisfied and Highly Dissatisfied.

**Data Analysis, Interpretation and Findings**

This section of study comprise of interpretation and analysis of collected data. The data which was gathered from the respondents through the Questionnaire is analyzed and deduced to realize the result of the study. As statistical tool, Pearson's Correlation and Regression method have been applied to get the final results, which are as below:-

**Descriptive Table**

	N	Mean	Std. Deviation	Skewness	Kurtosis
Affective Commitment	400	25.00	2.95	-0.28	0.21
Continuance Commitment	400	37.95	5.02	-0.10	-0.06
Training	400	28.00	3.90	-0.77	1.32
Career Development & planning	400	12.01	2.03	-0.66	0.61
Motivation & Participation	400	20.52	2.72	-0.49	0.97
Employee Grievance & Respect	400	12.43	1.78	-0.65	1.42

**Correlation**

Correlations						
	Affective Commitment	Continuance Commitment	Training	Career Development & planning	Motivation & Participation	Employee Grievance & Respect
Affective Commitment	1	.429**	.375**	.498**	.518**	.530**
Continuance Commitment		1	.327**	.349**	.421**	.345**
Training			1	.505**	.359**	.320**
Career Development & planning				1	.515**	.414**
Motivation & Participation					1	.478**
Employee Grievance & Respect						1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Regression****Dependent Variable: Affective Commitment**

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.53	.281	.280	2.50627	.281	155.858	1	398	.0001**
2	0.612	.375	.372	2.34018	.094	59.498	1	397	.0001**
3	0.643	.414	.409	2.26977	.039	26.013	1	396	.0001**
4	0.648	.419	.414	2.26137	.006	3.946	1	395	.048*

**ANOVA**

Model		Sum of Squares	df	Mean Square	F-value	p-value
1	Regression	979.004	1	979.004	155.858	.0001**
	Residual	2499.993	398	6.281		
	Total	3478.998	399			
2	Regression	1304.845	2	652.422	119.132	.0001**
	Residual	2174.153	397	5.476		
	Total	3478.998	399			
3	Regression	1438.860	3	479.620	93.096	.0001**
	Residual	2040.137	396	5.152		
	Total	3478.998	399			
4	Regression	1459.040	4	364.760	71.328	.0001**
	Residual	2019.958	395	5.114		
	Total	3478.998	399			

**Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	p-value	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	14.058	.885		15.883	.0001**	12.318	15.799
	Employee Grievance & Respect	.880	.070	.530	12.484	.0001**	.741	1.019
2	(Constant)	11.049	.914		12.089	.0001**	9.252	12.845
	Employee Grievance & Respect	.649	.072	.391	8.983	.0001**	.507	.792
	Career Development & planning	.489	.063	.336	7.714	.0001**	.365	.614
3	(Constant)	8.859	.985		8.995	.0001**	6.923	10.796
	Employee Grievance & Respect	.520	.075	.313	6.974	.0001**	.373	.667
	Career Development & planning	.354	.067	.243	5.282	.0001**	.222	.486
	Motivation & Participation	.264	.052	.243	5.100	.0001**	.162	.366
4	(Constant)	7.989	1.075		7.435	.0001**	5.877	10.102
	Employee Grievance & Respect	.505	.075	.304	6.757	.0001**	.358	.652
	Career Development & planning	.300	.072	.206	4.170	.0001**	.159	.442
	Motivation & Participation	.255	.052	.235	4.915	.0001**	.153	.357
	Training	.068	.034	.089	1.986	.048*	.001	.135

**Dependent Variable: Continuance Commitment**

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.421	.177	.175	4.56364	.177	85.560	1	398	.0001**
2	0.461	.212	.208	4.46990	.035	17.868	1	397	.0001**
3	0.479	.230	.224	4.42550	.018	9.006	1	396	.003**

**ANOVA**

Model		Sum of Squares	df	Mean Square	F-value	p-value
1	Regression	1781.936	1	1781.936	85.560	.0001**
	Residual	8289.064	398	20.827		
	Total	10071.000	399			
2	Regression	2138.936	2	1069.468	53.527	.0001**
	Residual	7932.064	397	19.980		
	Total	10071.000	399			
3	Regression	2315.315	3	771.772	39.406	.0001**
	Residual	7755.685	396	19.585		
	Total	10071.000	399			

**Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	p-value	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	22.005	1.739		12.655	.0001**	18.586	25.423
	Motivation & Participation	.777	.084	.421	9.250	.0001**	.612	.942
2	(Constant)	17.465	2.013		8.674	.0001**	13.507	21.424
	Motivation & Participation	.643	.088	.348	7.299	.0001**	.470	.817
	Training	.260	.062	.202	4.227	.0001**	.139	.381
3	(Constant)	15.455	2.103		7.349	.0001**	11.321	19.590
	Motivation & Participation	.525	.096	.284	5.487	.0001**	.337	.713
	Training	.226	.062	.176	3.656	.0001**	.105	.348
	Employee Grievance & Respect	.433	.144	.153	3.001	.003**	.149	.716

**Conclusion**

The above study disclosed Positive relationship between Employee Engagement and Employee's Affective and Continuance Commitment in the IT industry of Punjab and Chandigarh. Employee Engagement is regarded as positive attitude of the employees towards their respective organization as well as its, ethics and values. It is found that, there is positive and significant impact of employee engagement variable i.e. Training, Career Development & planning, Motivation & Participation, Employee Grievance & Respect on Employee's Affective and Continuance Commitment. The idea of employee Engagement is quickly gaining popularity and being used importantly in the workplace affairs and impacts organizations in several dimensions. Employee engagement highlights the significance of employee communication on the business's success. Exclusively in case of IT organizations, employee's commitment is most important variable and influence organizational success should more than any other variable, and it is most powerful contributors towards company's competitive position. Employee Engagement is about the drivers that consequence in employee feeling a profound touching association to their work and to the success of their organizational business.

The current study exposed that factors of employee engagement like Training, Career Development & planning, Motivation & Participation, Employee Grievance & Respect can enhance level of Affective and Continuance Commitment among employees towards respective organization. The current engagement levels can be continued and enhanced when the management is careful about motivation techniques like employee participation in developmental activities and word of appreciations as well as monetary benefits. After analysis of the data it can conclude that there is significant positive relationship between employee engagement and Employee's Affective & Continuance Commitment in selected IT companies of Punjab and Chandigarh or in other word it can be said that employee engagement impact positively on Employee Commitment. Engaged employees of selected IT companies of Punjab and Chandigarh has shown significant level of Affective & Continuance commitment towards their present company.

**Suggestions**

The company management has to give importance to employee development and employee well being so that job satisfaction can be improved. Since majority of the employees are in the middle age group, they may be facing problems of career plateau. At this point, short-term training programmes to enhance the skill level, new work methods can help these employees feel encouraged to continue in their

work. In addition to the above, two-way communication can be encouraged between the superiors and junior employees through regular meetings. This can iron out misunderstandings in the workplace. These meetings can also help clarify core values and goals of the organisation.

**References**

1. Harter JK & Schmidt (2002), *Business-Unit-Level Relationship Between Employee Satisfaction, Employee Engagement, and Business Outcomes: A Meta-Analysis*, *Journal of Applied Psychology*, 2002, Vol. 87, No. 2, 268–279
2. Devi Saloni (2017), "Impact of employee engagement on organizational performance: A study of select private sector banks" *International Journal of Commerce and Management Research*, Vol.18, page 10-13, ISBN: 978-93-85895-57-9.
3. Bhavani, Sharavan, Arpitha (2015), "A Study Effectiveness of Employee Engagement in Automobile Industry", *International Journal of Economics & Management Sciences*, Oct.2015, <https://www.omicsonline.org/open-access/a-study-effectiveness-of-employee-engagement-in-automobile-industry-2162-6359-1000295.php?aid=65217> date 01.09.2017
4. Gemma Robertson-Smith and Carl Markwick(), "Employee Engagement A review of current thinking", *Institute for Employment Studies*, page 3-5, ISBN:9781851844210. <http://www.employmentstudies.co.uk/system/files/resources/files/469.pdf> date 01.09.2017
5. Basu(2017), "Improving Employee Retention through Employee Engagement – A Case Study from an Indian Automotive Industry", *Proceedings of International Conference on Strategies in Volatile and Uncertain Environment for Emerging Markets*, July 14-15, 2017, *Indian Institute of Technology Delhi*, New Delhi pp.248-257 <http://strategiesinemergingmarkets.com/proceedings/T2/Paper%2028,%20HR%201721.pdf> date 01.09.2017.
6. Vance Robert J. (2004) *Employee Engagement and Commitment*, SHRM Foundation, Society for Human Resource Management, 1800 Duke Street, Alexandria <https://www.shrm.org/foundation/ourwork/initiatives/resources-from-past-initiatives/Documents/Employee%20Engagement%20and%20Commitment.pdf>
7. Mayor John P, Natalie J Allen (1991), *A three-component conceptualization of organizational commitment*, *Human Resource Management Review*, Volume 1, Issue 1, Spring 1991, Pages 61-8 <https://www.sciencedirect.com/science/article/abs/pii/105348229190011Z>